Draft
Supplemental Recirculated Environmental Impact Report

SCH# 2014041005

Volume 15
Volume 11 Appendix R through Appendix Z of the Previously Circulated DEIR

GRAPEVINE SPECIFIC AND COMMUNITY PLAN (2019)
Tejon Ranchcorp

Specific Plan Amendment No. 157, Map 500
General Plan Amendment No. 9, Map 202
General Plan Amendment No. 10, Map 202
General Plan Amendment No. 4, Map 218R
General Plan Amendment No. 5, Map 218R
General Plan Amendment No. 11, Map 219
General Plan Amendment No. 12, Map 219
Special Plan No. 2, Map 202
Special Plan No. 3, Map 218R
Special Plan No. 3, Map 219
Zone Change Case No. 18, Map 202
Zone Change Case No. 3, Map 218R
Zone Change Case No. 14, Map 219
Agricultural Preserve #19 - Exclusion

Kern County
Planning and Natural Resources Department
Bakersfield, California

August 2019

Draft
Supplemental Recirculated Environmental Impact Report

SCH# 2014041005

Volume 15
Volume 11 Appendix R through Appendix Z of the Previously Circulated DEIR

GRAPEVINE SPECIFIC AND COMMUNITY PLAN (2019)
Tejon Ranchcorp

Specific Plan Amendment No. 157, Map 500
General Plan Amendment No. 9, Map 202
General Plan Amendment No. 10, Map 202
General Plan Amendment No. 4, Map 218R
General Plan Amendment No. 5, Map 218R
General Plan Amendment No. 11, Map 219
General Plan Amendment No. 12, Map 219
Special Plan No. 2, Map 202
Special Plan No. 3, Map 218R
Special Plan No. 3, Map 219
Zone Change Case No. 18, Map 202
Zone Change Case No. 3, Map 218R
Zone Change Case No. 14, Map 219
Agricultural Preserve #19 - Exclusion

Kern County Planning and Natural Resources Department
2700 “M” Street, Suite 100
Bakersfield, CA 93301-2370
(661) 862-8600

Technical Assistance by:
Ecology and Environment, Inc.
One Embarcadero Center Suite 500
San Francisco, CA 94111
(415) 398-5326

August 2019

Draft
Environmental Impact Report

SCH# 2014041005

Volume 11
Appendix R through Appendix Z

GRAPEVINE SPECIFIC AND COMMUNITY PLAN PROJECT
Tejon Ranchcorp

Specific Plan Amendment No. 155, Map 500
General Plan Amendment No. 6, Map 202
General Plan Amendment No. 7, Map 202
General Plan Amendment No. 2, Map 218R
General Plan Amendment No. 3, Map 218R
General Plan Amendment No. 8, Map 219
General Plan Amendment No. 9, Map 219
Special Plan No. 1, Map 202
Special Plan No. 2, Map 218R
Special Plan No. 2, Map 219
Zone Change Case No. 16, Map 202
Zone Change Case No. 2, Map 218R
Zone Change Case No. 13, Map 219
Agricultural Preserve #19 - Exclusion

Kern County
Planning and Natural Resources Department
Bakersfield, California

May 2016

Draft
Environmental Impact Report

SCH# 2014041005

Volume 11
Appendix R through Appendix Z

GRAPEVINE SPECIFIC AND COMMUNITY PLAN PROJECT
Tejon Ranchcorp

Specific Plan Amendment No. 155, Map 500
General Plan Amendment No. 6, Map 202
General Plan Amendment No. 7, Map 202
General Plan Amendment No. 2, Map 218R
General Plan Amendment No. 3, Map 218R
General Plan Amendment No. 8, Map 219
General Plan Amendment No. 9, Map 219
Special Plan No. 1, Map 202
Special Plan No. 2, Map 218R
Special Plan No. 2, Map 219
Zone Change Case No. 16, Map 202
Zone Change Case No. 2, Map 218R
Zone Change Case No. 13, Map 219
Agricultural Preserve #19 - Exclusion

Kern County Planning and Natural Resources Department
2700 "M" Street, Suite 100
Bakersfield, CA 93301-2370
(661) 862-8600

Technical Assistance by:
Kimley-Horn and Associates
555 Capitol Mall, Suite 300
Sacramento, CA 95814
(916) 858-5800

May 2016

Appendices

NOTE TO REVIEWER OF ELECTRONIC FILES:

To assist you in reviewing this electronic document, "bookmarks" and/or "links" have been provided for easier navigation between sections. When available, bookmarks are located in the panel to the left. Links are highlighted in BLUE in the Table of Contents. Clicking on either the bookmarks or links will take you to the selected item. This document may consist of multiple linked PDF files. If saving this document to your computer, you must save all corresponding files to a directory on your hard drive to maintain the manner in which these PDF documents are linked.

Appendix R
Mineral Resources Evaluation

MINERAL RESOURCES EVALUATION

Grapevine Project

Prepared for:
Tejon Ranchcorp
4436 Lebec Road
Tejon Ranch, California 93243

Prepared by:
WZI Inc.
1717 28th Street
Bakersfield, California 93301
Contact: Laura M. Bazeley

November 2015

Mineral Resources Evaluation

This report was prepared by the staff of WZI Inc. under the supervision of the geologist whose signature appears hereunder.

Laura M. Bazeley

Professional Geologist
State of California No. 4340
Expiration Date: 10/31/2017

Certified Hydrogeologist
State of California No. 534
Expiration Date: 10/31/2017

PROFESSIONAL GEOLOGIST • LAURA MERRILL BAZELEY No.4340 • STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST • LAURA MERRILL BAZELEY No.534 CERTIFIED HYDROGEOLOGIST • STATE OF CALIFORNIA

Date: November 9, 2015

TABLE OF CONTENTS

Page No.

APPENDICES

LIST OF FIGURES

Mineral Resources Evaluation

EXECUTIVE SUMMARY

The Project development would take plan within and adjacent to existing oil fields and identified regionally significant sand and gravel resources. In accordance with the California Environmental Quality Act (CEQA) Guidelines, a significant impact on mineral resources would occur if the Project implementation would result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State or result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

The Project is located in and adjacent to the existing Tejon and North Tejon oil fields designated by DOGGR and subject to ongoing oil and gas exploration and production activities under leases with Tejon Ranchcorp and its subsidiaries. By project design the Project would allow for the continuation of oil and gas exploration and extraction activities subject to the contractual relationships in the leases, and in a manner consistent with applicable Kern County zoning and other law, rules and regulation

The State Mining and Geology Board (SMGB) has designated two regionally significant aggregate resources in the vicinity of the project site. By project design, the project development areas are sited to avoid all locally designated or regionally significant mineral resources within and adjacent to the specific plan area, all of which consist of aggregate sand and gravel.

Mineral resource extraction would be allowed within the Specific Plan land use designation for this area. The project would allow for the continuation of oil and gas exploration and extraction activities within the project site area in a manner consistent with applicable Kern County zoning and other law, rules and regulations. In addition to the project design features, Mitigation Measures are proposed to protect oil & gas mineral resources and adjacent land uses. With implementation of the project design features and mitigation measures, the impacts to mineral resources are considered to be less than significant.

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

This report provides a description of the mineral resource setting and evaluates potential project impacts related to mineral resources for the proposed Grapevine project, including oil and gas, sand and gravel, and other mineral resources, under applicable California Environmental Quality Act (CEQA) criteria. As discussed in more detail below, potential project impacts would be reduced to less than significant levels by specific project design features (PDFs) and Mitigation Measures (MMs) that would avoid and facilitate oil, gas, and other regionally significant mineral deposit exploration and extraction over time.

1.2 PROJECT DESCRIPTION AND PROJECT DESIGN FEATURES

1.2.1 PROJECT LOCATION

The proposed Grapevine project is located in the west-central portion of Tejon Ranch (the Ranch). The approximately 270,000-acre Ranch is currently held in private ownership by Tejon Ranchcorp. The Ranch includes a large portion of the Tehachapi Mountains as well as smaller portions of the San Joaquin and Antelope Valleys. Generally, the Ranch extends from State Route 58 (SR 58) on the north to SR138 on the south side (Figure 1-1).

The 8,110-acre Grapevine project site is entirely within unincorporated Kern County, just south of the junction of Interstate 5 (I-5) and SR 99. Downtown Bakersfield is approximately 25 miles north of the project. The majority of the project is on the east side of I-5, but a smaller portion lies on the west side of I-5. The project site is bisected by the California Aqueduct (Figures 1-1 and 1-2).

The Grapevine project site lies mainly in the Grapevine and Pastoria Creek U.S. Geological Survey (USGS) 7.5-minute quadrangles. There is one parcel and a portion of two other parcels in the project site that lie entirely within the Mettler USGS 7.5-minute quadrangles. The latitude and longitude of the approximate center of the site is 34° 57′ 9″ N and 118° 55′ 39″ W. The Universal Transverse Mercator (UTM) coordinates for the approximate center are UTM Easting (meters) 323999 and UTM Northing (meters) 3869472 in Zone 11.

1.2.2 PROJECT OVERVIEW

The 8,110-acre project site is within the 15,644-acre Grapevine Planning Area identified in the Tejon Ranch Land Use and Conservation Agreement, a landmark agreement reached in 2008 with leading environmental organizations (including the Sierra Club, Natural Resources Defense Council, California Audubon Society, Endangered Habitats League, and Planning and Conservation League) to permanently preserve over 90% of Tejon Ranch as open space and limit development to designated areas near existing infrastructure such as I-5. The precise boundaries of the 8,010-acre project site may be further adjusted based on the results of the ongoing environmental review and permitting process for the project, but would remain within the Grapevine Planning Area.

The Grapevine project site includes approximately 8,110 acres, of which approximately 3,232 acres (or about 40%) would be designated for agriculture (with grazing and open space as the predominant land uses) and approximately 4,778 acres (about 60%) would be developed as a new residential community and employment center. The community would leverage and build upon the economic expansion and job growth that has occurred at Tejon Ranch Commerce Center (Figure 1-2), located immediately north of the project on I-5. The Grapevine project would feature a series of compact neighborhoods linked by bicycle and pedestrian trails that provide convenient access to grocery and drugstores, professional services, schools, and parks. The project site is located along I-5, at the gateway to the Central Valley, and is immediately adjacent to the extensive open space that was conserved in the Tejon Ranch Land Use and Conservation Agreement.

The project, which would include up to 12,000-14,000 residential units and 5.1 million square feet of commercial and industrial land uses, is designed as a series of conveniently located village centers, each composed of a mix of housing, neighborhood-serving retail and office uses, schools, parks, and community services. Outside the village cores, the Grapevine project includes a mix of residential uses, office, research and development, regional commercial, freeway-oriented commercial, and light industrial/warehouse uses. Other potential public facilities, including a fire station, sheriff substation, transit facility/park-and-ride, and water and wastewater treatment facilities are proposed throughout the community.

Access to the first phases of the Grapevine community will be from Interstate 5 at the existing Grapevine Road and Laval Road interchanges. During later phases of development, the existing Grapevine Road/ Interstate 5 interchange may be expanded and relocated to the north. To allow for the relocation and replacement of the interchange, an existing Vehicle Enforcement Facility may be relocated to a TRC owned parcel on the west side of the junction of I-5 and CA-99. The project would also improve an existing TRC agricultural road east of the project area to provide access for truck traffic currently using Edmonston Pumping Plant Road to travel to properties east of the project. Additional circulation system improvements would include two off-site bridges crossing the California Aqueduct. The circulation network with in the project is composed of two- and four-lane arterials, collector streets, and local streets organized in a grid pattern. All roads within the project site would be public. Multipurpose trails are proposed along Grapevine Creek, Cattle Creek, the southern foothills, and the open space adjacent to the California Aqueduct and at other locations throughout the project site. Some of these trails would connect to on-street, Class 2 bike lanes. Water and sewer service will be provided by the Tejon–Castac Water District.

1.2.3 PROJECT DESIGN FEATURES (PDFS)

The project includes two PDFs that would avoid or reduce impacts to mineral resources.

PDF 1. The project would allow for the continuation of oil and gas exploration and extraction activities and ancillary facilities within the specific plan area subject to the contractual relationships in the leases, and in a manner consistent with applicable Kern County zoning requirements applicable to the Agricultural (A) District, Chapter 19.98 of the Kern County Zoning Ordinance and with all other applicable laws, rules and regulations including but not limited to those required by the California Department of Oil, Gas & Geothermal Resources (DOGGR) (such requirements are collectively referred to as “compliance requirements”), San Joaquin Valley Air Pollution Control District, California Regional Water Quality Control Board, the California Department of Fish and Wildlife, and the U.S. Department of Fish and Wildlife. The existing rules, regulations and contracts specify, among other aspects, development standards and conditions such as setback requirements for wells and tanks from buildings, height limits, screening requirements, and abandonment requirements. The DOGGR specifies and monitors well construction requirements.

PDF 2. The project development areas are sited to avoid all locally designated or regionally significant mineral resources within and adjacent to the specific plan area, all of which consist of aggregate sand and gravel (Figure 2-5). Consistent with applicable CEQA criteria, this PDF would avoid impacts to these mineral resources.

1.2.4 PROJECT CONSTRUCTION SCENARIO

The project site is divided into six planning areas ranging in size from approximately 450 to 1,400 acres. Development would be phased over a period of approximately 19+ years, starting with the development of either Planning Area 1 or 6a and continuing in sequence (Planning Areas 2 through 6e). Build out of each phase is projected to take approximately 2 to 4 years, with the first phase commencing in 2016. The portions of the site that are proposed to remain in exclusive agriculture/open space are primarily located along the southern edge of the California Aqueduct, along the southern portion of the project site at the foothills of the Tehachapi Mountains, and along Grapevine and Cattle Creeks.

1.2.5 PROJECT OPERATION SCENARIO

The project operations are described in the Grapevine Specific and Community Plan, and land uses associated with operations are described in the Grapevine Special Planning District Plan.

2.0 ENVIRONMENTAL SETTING

2.1 KERN COUNTY OIL, GAS AND RELATED MINERAL RESOURCES

Kern County is one of the richest oil-producing counties in the United States. The valley floor area of Kern County and the surrounding lower elevations of the mountain ranges contain numerous deposits of oil and gas resources. Oil and gas exploration and production is a major economic resource for the County. In addition, mineral resources in Kern County include numerous mining operations that extract a variety of materials, including sand and gravel, stone, gold, dimensional stone, limestone, clay, shale, gypsum, pumice, decorative rock, silica, and specialty sand. The State Geologist has classified 2,971 square miles of land in Kern County as Mineral Resource Zones (MRZs) of varying significance.

Kern County produces more oil than any other county in California, and is one of the nation’s leading petroleum-producing counties. As new recovery technologies come into use, petroleum extraction would continue to be of economic importance. And as long as restricted or land use compatibility issues are addressed in areas having important mineral and petroleum resources, the future production of these resources remains promising. Five of the largest producing oil fields for 2014 in the State are located in Kern County: Midway-Sunset, Kern River, South Belridge, Cymric and Elk Hills oil fields (California Division of Oil, Gas and Geothermal Resources, 2015). As of 2014, there are 68 producing oil fields in Kern County (California Division of Oil, Gas and Geothermal Resources, 2015).

2.2 OTHER MINERAL RESOURCES IN CALIFORNIA AND KERN COUNTY

Based on the U.S. Geological Survey’s (USGS) data for 2014, California ranked sixth after Arizona, Nevada, Minnesota, Texas and Utah in the value of mineral production other than oil and gas, accounting for approximately 4.2 percent of the nation’s total mineral production (U. S. Geological Survey, 2015). The California Geological Survey (CGS) complied data for 2011 (CGS, 2011). Based on this information, California was the only producer of boron compounds and rare earth minerals. In 2013, the state ranked second behind Texas in the production of construction sand and gravel and Portland cement. The only metals produced in California were gold, silver and iron ore. California ranked 6th in gold production out of ten states that reported for the year. Other minerals produced commercially include common clay, bentonite clay (including hectorite), crushed stone, diatomite, dimension stone, feldspar, fuller's earth, gemstones, gypsum, kaolin clay, lime, magnesium compounds, perlite, pumice, pumicite, salt, soda ash, sodium sulfates, and zeolites.

Sand and gravel are important mineral resources for construction and the physical maintenance of public and private infrastructure, such as highways, bridges, swimming pools and playgrounds. Sand and gravel resources in Kern County generally occur in stream deposits along the eastern side of the San Joaquin Valley and in the Sierra Nevada foothills, and in alluvial fan deposits along the north flank of the San Emigido and Tehachapi Mountains in the southern end of the County.

2.3 PROJECT AREA MINERAL RESOURCES

The project is located at the southern end of the San Joaquin Valley in an alluvial basin referred to as the Tejon Embayment (Figure 1-2). The majority of the project site is comprised of an alluvial fan which slopes to the northwest. It is bounded on the east and south by outcrops of older alluvial Quaternary deposits, Tertiary sedimentary rocks and volcanic rocks and Cretaceous granitic basement rocks (Figure 2-1). These units are gently dipping on the east side and steeply dipping to overturned on the south side, related to the Pleito Thrust Fault. Recent landslides are also present on the south side, which obscure the location of the Pleito Thrust Fault. The elevation of the project site varies from approximately 2200 feet above sea level along the southern boundary to approximately 900 feet in the northwest of the specific plan area (Figure 2-2). The major drainages that traverse the project area, Tecuya, Grapevine Creek, and Pastoria Creek, form alluvial fans that extend north across the project area.

The stratigraphic section, which consists of Eocene through Quaternary age sediments underlain by granitic basement rocks, thickens from the east and south to approximately 14,000 feet in the northwest portion of the specific plan area. The majority of the surficial deposits mapped in the project area are non-marine Quaternary (late Pleistocene and Holocene age) stream and alluvial deposits consisting primarily of gravel and sand (Figure 2-1). The fluvial and alluvial geologic units were derived from erosion of the Tehachapi Mountains and the San Emigdio Range to the east and south. The two northernmost parcels within the specific plan are underlain by recent alluvial fan material consisting of gravel, sand and clay. The Alluvium thickens to the north and west to approximately 600 feet. Late Pleistocene and Holocene age landslides are present in the southern portion of the project area, just to the east of Interstate 5. The Pleistocene non-marine Kern River/Tulare Formation underlies the Alluvium. This unit pinches out and is absent in the southern portion of the project area and thickens to approximately 1800 feet in the northern portion of the specific plan area.

2.3.1 OIL AND GAS MINERAL RESOURCES

Several oil field administrative boundaries have been identified by the California Division of Oil, Gas and Geothermal Resources (DOGGR) near and within the project site, including the Tejon, North Tejon, Wheeler Ridge and Tejon Hills oil fields (Figure 2-3). Portions of the project site are located within the Tejon and North Tejon oil fields.

The oil field administrative boundaries are established by the DOGGR based on established oil and gas production limits.

The DOGGR has the authority under the California Code of Regulations to adopt field rules for oil and gas pools or zones in an oil field when sufficient geologic and engineering data is available from previous drilling operations. The administrative boundaries of each pool or zone for which field rules have been adopted and geologic and engineering information is available to accurately describe subsurface conditions are designated through a ministerial process by DOGGR. Applicable field rules identify downhole conditions and well construction information that oil and gas operators should consider when drilling and completing onshore oil and gas wells. The field rules for Tejon and North Tejon Fields are contained in Appendix I.

2.3.1.1 Oil and Gas Mineral Resource Leases

Tejon Ranchcorp or its affiliates own all of the oil, gas and other subsurface mineral rights throughout the Grapevine Project area. The project area is subject to oil and gas exploration and development leases with several entities. Lessees and the lease locations are shown on an oil field and lease location map Figure 2-3.

2.3.1.2 Oil and Gas Mineral Resource Current and Projected Development

As the specific plan area is subject to ongoing oil & gas exploration and development leases, certain portions of the specific plan area have existing oil & gas development activity on them, while others are undergoing exploration and/or development (Figure 2-3). Where oil and gas development has occurred, it is expected to continue to occur. Where lease areas exist but oil & gas exploration and development activity has not occurred, it can reasonably be expected to occur in the future. As outlined in PDF 1, such ongoing or new exploration and development activity would occur only in compliance with applicable laws, including Chapter 19.98 of the Kern County Zoning Ordinance and the specified PDF.

There are many examples of areas where oil & gas exploration and development occurs in areas of urban, suburban, and rural development, including the Bakersfield, metropolitan area located approximately 25 miles north of the specific plan area. Similar to those areas, the interface between urban uses proposed in the Grapevine Specific Plan and the ongoing oil & gas exploration and development would be managed through lessee contracts, Specific Plan PDFs, mitigation measures and existing federal, state, and county regulations.

Project Area within DOGGR Oil Field Boundaries

DOGGR regulates productive wells in part through designating and establishing rules for designated oil fields. Approximately 204 acres of the Grapevine project site (including offsite development) are within the North Tejon Oil Field administrative boundary and approximately 930 acres are located within the Tejon Oil Field administrative boundary. Much of the area within these two field boundaries is extensively disturbed with pumping units, treatment units, storage tanks, heater treater, pipelines, tank farms, water treatment units, and unpaved roads. As of November 2014, there were 53 active wells within the Grapevine project site. Within the surrounding oil fields there are 191 active wells in the Tejon Field (including the project site), 40 active wells in the North Tejon Field and 63 active wells within the Wheeler Ridge Field. Planning Area 6 is located within the oil field boundary (Figures 2-3 and 2-6). The number of oil wells within each planning area as of November 2014[1] is as follows:

Area	Active	Idle	Plugged
6a	0	0	5
6b	1	0	5
6c	41	2	29
6d	3	0	24
6e	8	0	28

There are no energy producing facilities associated with oil production within the project site at this time.

Proposed land use within the oil field boundary is primarily industrial and commercial which is compatible with the existing oil field use.

During later phases of project development, the existing Grapevine Road/ Interstate 5 interchange may be expanded and relocated to the north. To allow for the relocation and

[1] http://www.conservation.ca.gov/dog, accessed July 13, 2015

replacement of the interchange, an existing Vehicle Enforcement Facility (VEF) may be relocated to a TRC owned parcel on the west side of the junction of I-5 and CA-99 as shown on Figure 2-3. The proposed relocated VEF is located within the North Tejon Oil Field boundary. Any plugged oil wells in this area may need to be re-abandoned. Oil and gas resources beneath the VEF can be accessed by directional drilling and will not interfere with oil and gas mineral resource extraction.

Construction of an off-site alternative truck route to the east of the project site connecting Edmonston Pumping Plan Road and Laval Road is proposed, as shown on Figure 2-3. A portion of the road will be located within the Tejon Oil Field. The proposed road is located where there are existing dirt roads and will not interfere with oil and gas mineral resource extraction.

The project would not affect current or future oil and gas mineral resource operations.

Project Area Outside of the Oil Field Boundaries

Oil and gas exploration and production activity is less intensive in the portions of the project that are located outside of the existing administrative oil field boundaries. No active production wells exist within these areas (Figure 2-3). Currently there are 15 abandoned wells located within the project site outside of the oil field boundaries. Sojitz Energy, the lessee of the oil and gas mineral rights located outside of the oil field boundaries, was issued permits by the DOGGR to drill eight exploratory wells to depths exceeding 7,000 feet, three of which are located within the project site boundary. These wells have been drilled, one well was abandoned however the status of the remaining wells is unknown at this time due to the confidential status of wells. The location of these wells are shown on the "Project Development Map", Figure 2-6. At the present time, there are no production facilities located outside of the oil field boundary. An Initial Study and a Mitigated Negative Declaration were prepared for the Sojitz project by the DOGGR, which was approved in September 2013 (DOGGR, 2013). The following information was obtained from the revised Mitigated Negative Declaration for the Sojitz project. Approximately 3 acres would be disturbed as a result of drilling the exploratory wells within the project area. Drilling mud and cuttings shall be contained in above ground tanks. Soil would be stockpiled on site and used as backfill upon completion of drilling. Approximately 52,700 gallons of water would be used during the drilling phase of each well. All hazardous materials such as diesel fuel would be stored according to applicable federal, state and local regulations. Portable tanks would be used for mixing and storing drilling fluids.

If economic quantities of oil or gas are discovered, a well would be completed and production equipment including a well head, pumping unit, one 500 Barrel Oil Tank and one 500 Barrel Produced Water Tank would be installed on site for each well. No production phase structure on-site would exceed 25 feet in height. Produced oil would be trucked to Kern Oil & Refining Company for further processing. Produced water would be trucked offsite for disposal. Once a well stops producing, it would be plugged and abandoned in accordance with Title 14 CCR Sections 1723 – 1723.8. During a typical well abandonment, recoverable casing would be salvaged from the well and the hole would be plugged with cement. The wellhead (and any other equipment) would be removed, the casing cut off 6 feet below ground surface, capped with a welded plate and the cellar backfilled. This process would utilize the same equipment that would be used for the completion phase and the process would be completed in four (4) days. The land contours of each well site would be re-established to near grade conditions as present at the time of project initiation. After all equipment is removed, the site would be restored to its condition prior to construction of the well pad.

Within this area of the specific plan, the proposed zoning consists of Mixed Use, Village Mixed Use and Exclusive Agriculture. In addition to the existing state and local rules and regulations, outside of the oil field boundaries, mineral lease requirements require that drilling be limited to compact drilling and production sites limited to 2.5 acres, setback requirements of 300 feet from buildings and visual screen requirements such as suitable berms, plantings and/or other forms of visual barriers so as to adequately conceal Lessee’s wells, tank batteries or other production facilities.

Construction of an off-site alternative truck route to the east of the project site connecting Edmonston Pumping Plan Road and Laval Road is proposed, as shown on Figure 2-3. A portion of the road will be located outside of the existing oil field boundaries. The proposed road is located where there are existing dirt roads and will not interfere with oil and gas mineral resource extraction.

The construction of two proposed off-site bridges crossing the California Aqueduct at locations outside of the oil field boundaries and will not interfere with oil and gas mineral resource extraction.

2.3.2 Other Mineral Resources

The State Mining and Geology Board (SMGB) has designated two regionally significant aggregate resources in the vicinity of the project site (SMGB, 2011) (Figure 2-5). These resources are classified as Mineral Resource Zones 2a (MRZ-2a), which are areas where the available geologic information indicates that significant mineral deposits are present. The designation of these sites as a regionally significant aggregate resource “is the formal recognition by the SMGB of lands containing mineral resources of regional or statewide economic significance that are needed to meet the demands of the future” (SMGB, 2011).

One of MRZ-2a designations, consisting of 467 acres, is located near the southeast corner of the specific plan boundary, to the north and south of the Edmonston Pumping Plant Road (Figure 2-5) and consists 467 acres of Pastoria Creek alluvial fan deposits. Only 35 acres of this mineral resource zone is located within the Specific Plan Boundary. This area of the Specific Plan would be designated for agriculture and open space uses, similar to its present zoning. The nearest future residential area within the specific plan boundary is located approximately 1.3 miles to the west of the mineral resource boundary (Figure 2-5). The existing Griffith Company mine, which is part of this mineral resource zone, is located outside of the specific plan boundary approximately ½ mile to the north. The project would not affect current or future mineral resources within this mineral resource zone. Mineral resource extraction would be allowed within the Specific Plan land use designation for this area.

The second identified mineral resource zone, consisting of 882 acres, is located to the west of Interstate Highway 5 and south of State Highway 166, approximately 1 mile west of the northern specific plan boundary (Figure 2-5). Vulcan Materials Company operates the Wheeler Ridge Mine in this area and produces PCC-grade aggregate. During later phases of project development, the existing Grapevine Road/ Interstate 5 interchange may be expanded and relocated to the north. To allow for the relocation and replacement of the interchange, an existing Vehicle Enforcement Facility (VEF) may be relocated to a TRC owned parcel on the west side of the junction of I-5 and CA-99 as shown on Figure 2-5. The proposed relocated VEF is located adjacent to the identified mineral resource zone and will not interfere with mineral resource extraction. The project would not affect current or future mineral resource operations within this mineral resource zone. The nearest future residential area is approximately 1.7 miles to the southeast of the existing mine and approximately 1.3 miles from the mineral resource boundary (Figure 2-5).

Construction of an off-site alternative truck route to the east of the project site connecting Edmonston Pumping Plan Road and Laval Road is proposed, as shown on Figure 2-5. A portion of the road will be located outside of the identified mineral resource zone and will not interfere with mineral extraction.

No other mineral resources have been designated as regionally or locally significant, are known to be locally or regionally significant, or have been classified as MRZ-2 or higher within or immediately adjacent to the project site. No existing precious metal resources have been identified within the specific plan boundary and based on the lack of granitic rocks within the specific plan boundary, the potential for precious metal resources is considered remote.

3.0 REGULATORY SETTING

The following regulatory discussion provides applicable mineral resource regulatory requirements relevant to the mineral resources located on the project site.

3.1 STATE DEPARTMENT OF CONSERVATION - DIVISION OF OIL, GAS AND GEOTHERMAL RESOURCES (DOGGR)

DOGGR is the State agency responsible for supervising the drilling, operation, maintenance, plugging, and abandonment of oil, gas, and geothermal wells. DOGGR's regulatory program promotes the sensitive development of oil, natural gas, and geothermal resources in California through sound engineering practices, prevention of pollution, and implementation of public safety programs. All oil and gas wells drilled and constructed in California must adhere to strict requirements. These requirements include general laws and regulations regarding the protection of underground and surface water, and specific regulations regarding the integrity of the well casing, the cement used to secure the well casing inside the bore hole, and the cement and equipment used to seal off the well from underground zones bearing fresh water and other hydrocarbon resources. (See California Public Resources Code sections 3106, 3203, 3211, 3220, 3222, 3224, 3255; Title 14 of the California Code of Regulations, sections 1722.2, 1722.3, 1722.4, etc.). In addition the DOGGR requires avoidance of building over or near plugged or abandoned oil and gas wells, or requires the remediation of wells to current DOGGR standards.

DOGGR also has the authority under the California Code of Regulations to adopt field rules for oil and gas pools or zones in a field when sufficient geologic and engineering data is available from previous drilling operations. The administrative boundaries of each pool or zone for which field rules have been adopted and geologic and engineering information is available to accurately describe subsurface conditions are designated through a ministerial process by DOGGR. Applicable field rules identify downhole conditions and well construction information that oil and gas operators should consider when drilling and completing onshore oil and gas wells. In addition to DOGGR facilities regulations, operators that have facilities in designated areas must have Spill Prevention, Control and Countermeasure Plans per US Environmental Protection Agency requirements.

In California, wells that inject fluids associated with oil and natural gas production operations (Class II injection wells) are regulated by the DOGGR under the Underground Injection Control (UIC) Program. Injection operations regulated under the UIC Program include waterflood, steamflood, cyclic steam, water disposal, gas storage, and other enhanced oil recovery projects. DOGGR's UIC program is monitored and audited by the U.S. Environmental Protection Agency because in 1982 DOGGR entered into a primacy agreement with the U.S. EPA for regulation of Class II injection wells under the federal Safe Drinking Water Act (SDWA). The requirements of DOGGR’s UIC Program are found in the Public Resources Code (PRC), the Safe Drinking Water Act, and in the state and federal regulations. The main features of the UIC Program include permitting, inspection, enforcement, mechanical integrity testing, plugging and abandonment oversight, data management, and public outreach.

On November 15, 2013, the DOGGR began the formal rulemaking process for Well Stimulation Treatment Regulations, which would go into effect no later than January 1, 2015. Effective January 1, 2014, an interim set of regulations requires oil and gas well operators to submit notification of well stimulation treatments and various types of data associated with well stimulation operations, including chemical disclosure of well stimulation fluids, to the DOGGR. In addition, the DOGGR is required to compile submitted information regarding these activities and make it available to the public in a format that is easily searchable.

Department of Conservation - Division of Mining and Geology

The mineral resources addressed in this report pertain to those resources that are classified under the State Mining and Reclamation Act of 1975 (SMARA). The SMARA mandated the initiation by the State Geologist of mineral land classification in order to help identify and protect mineral resources in areas within the State subject to urban expansion and other irreversible land uses which would preclude mineral extraction. SMARA also allowed the designation of lands containing mineral deposits of regional or State-wide significance. SMARA was amended (1980) to provide for the classification of non-urban area subject to land-use threats incompatible with mining. The classification of land within California takes place according to a priority list that was established by the State Mining and Geology Board (SMGB) in 1982, or when the SMGB is petitioned to classify a specific area. The State Geologist's SMARA classification activities are carried out under a single program for urban and non-urban areas of the State.

Mineral lands are mapped using the California Mineral Land Classification System according to jurisdictional boundaries, mapping all mineral commodities at one time in the area, including aggregate, common clay and dimensions stone. Priority is given to areas where future mineral resource extraction could be precluded by incompatible land use or to mineral resources likely to be mined during the 50-year period following their classification. Detailed mineral land classification and designation reports provided by the State Mining and Geology Board are on file at the City of Bakersfield and Kern County.

The SMGB established Mineral Resources Zones (MRZs) to designate lands that contain mineral deposits. Accordingly, the Mineral Resource Zone classification system is used to evaluate an area's mineral resources pursuant to SMARA. A "resource" is a concentration of naturally occurring solid, liquid, or gaseous material in such form and amount that economic extraction of a commodity from the concentrations is currently potentially feasible. A "reserve" is that part of the resource base which could be economically extracted or produced within the foreseeable future. For any given mineral resource, an area may be classified as MRZ-1, MRZ-2, MRZ-3, or MRZ-4, as follows:

- MRZ-1: Areas where the available geologic information indicates that no significant mineral deposits are present, or where it is judged that no significant likelihood exists for their presence.
- MRZ-2a: Areas where the available geologic information indicates that significant mineral deposits are present.

- MRZ-2b: Areas where the available geologic information indicates that there is likelihood for the presence of significant mineral deposits.
- MRZ-3a: Areas where the available geologic information indicates that mineral deposits exist, the significance of which cannot be determined from available data.
- MRZ-3b: Areas where the available geologic information indicates that mineral deposits are likely to exist, the significance of which cannot be determined from available data.
- MRZ-4: Areas where available geologic information is inadequate for assignment into any other MRZ, or where there is not enough information available to determine the presence or absence of mineral deposits.

The MRZ classifications are applied based on available geologic information and upon geologic appraisal of the mineral resource potential of the land, including geologic mapping and other information on surface exposures, drilling records and mine data; and on socioeconomic factors such as market conditions and urban development patterns.

3.3 Local

Kern County General Plan

The policies, goals, and implementation measures in the Kern County General Plan for mineral resources applicable to the project are provided below.

Chapter 1. Land Use, Open Space, and Conservation Element
1.9 Resource

Goal

Goal 1: To contain new development within an area large enough to meet generous projections of foreseeable need, but in locations which would not impair the economic strength derived from the petroleum, agriculture, rangeland, or mineral resources, or diminish the other amenities which exist in the County.

Goal 2: Protect areas of important mineral, petroleum, and agricultural resource potential for future use.

Goal 3: Ensure the development of resource areas minimize effects on neighboring resource lands.

Goal 4: Encourage safe and orderly energy development within the county, including research and demonstration projects, and to become actively involved in the decision and actions of other agencies as they affect energy development in Kern County.

Goal 6: Encourage alternative sources of energy, such as solar and wind energy, while protecting the environment.

Policies

Policy 14: Emphasize conservation and development of identified mineral deposits.

Policy 17: Lands classified as MRZ-2, as designated by the State of California, should be protected from encroachment of incompatible land uses.

Policy 25: Discourage incompatible land use adjacent to Map Code 8.4 (Mineral and Petroleum) areas.

Implementation Measures

Measure H: Use the California Geological Survey's latest maps to locate mineral deposits until the regional and Statewide importance mineral deposits map has been completed, as required by the Surface Mining and Reclamation Act.

Measure K: Protect oilfields and mineral extraction areas through the use of appropriate implementing zone districts: A (Exclusive Agriculture), DI (Drilling Island), NR (Natural Resource), or PE (Petroleum Extraction).

Chapter 5. Energy Element Reuse of Nonproductive Petroleum Resource Areas

The oil and natural gas reservoirs in Kern County are finite resources, which would eventually be depleted. It should be noted that recoveries from these reservoirs are only partial, and that upon abandonment; a reservoir may retain a major portion of the original oil-in-place. Based upon oil price and available technology, both individual wells and entire oilfields have been abandoned and subsequently reactivated. It is important to provide for the productive reuse of these areas. The State Division of Oil, Gas and Geothermal Resources (DOGGR) regulate abandonment of wells, including the removal of surface equipment.

Wells that were abandoned prior to the 1950's were abandoned in accordance to law and regulation in place at that time, however additional requirements have subsequently been added in order to better protect fresh groundwater and protect the public from hazards at the surface. Previously abandoned wells may not be precisely at the location on record, and may be hazardous or leaking.

Goal: To ensure the proper abandonment of petroleum production operations, in accordance with DOGGR requirements, when petroleum resource areas are depleted or are no longer productive, to provide for conversion of these areas to other land uses.

Policy 3: The County shall promote and encourage the safe reuse of former petroleum production lands by developments compatible with surrounding land use designations. The guidelines for site reestablishment include the following:

a. Removal of oil-laden soil
b. Shaping of disturbed lands back to natural grade and the elimination of pad areas, settling ponds, and similar disturbances.
c. Stabilization of sites by seedlings and plantings as appropriate.
d. Other measures as may be stipulated by the State Division of Oil, Gas and Geothermal Resources.
e. Proper identification and abandonment of all oil and natural gas well

Kern County Zoning Ordinance

Chapter 19.98 (Oil and Gas Production) of the Kern County Zoning Ordinance contains the procedures and standards that apply to all exploration drilling and production activities related to oil, gas, and other hydrocarbon substances carried out in unincorporated Kern County. The purpose of this chapter is to promote the economic recovery of oil, gas, and other hydrocarbon substances in a manner compatible with surrounding land uses and protection of the public health and safety.

Section 19.98.020 currently authorizes “unrestricted drilling”, having no review or permit required in the Exclusive Agriculture (A), Limited Agriculture (A-1), Medium Industrial (M-2), Heavy Industrial (M-3) and Natural Resource (NR) zones with the County, subject to compliance with specified conditions and standards which augment DOGGR, the San Joaquin Valley Air Pollution Control District, and other agency regulations. In these zoning districts, no review or permit is required for the drilling of any steam injection well, steam drive well, service well, or any well intended for the exploration for or development or production of oil, gas, and other hydrocarbon substances, or for any related accessory equipment, structure, or facility.

Section 19.98.030 provides for drilling by "ministerial permit" in the Light Industrial (M-1) and Recreation Forestry (RF) zones, subject to specified development standards, which also apply in Drilling Island (DI) and Petroleum Extraction (PE) Combining Districts. Under this provision, no well for use as an injection well and no well for the exploration for or development or production of oil or gas or other hydrocarbon substances may be drilled, and no related accessory equipment, structure, or facility may be installed in the above referenced zone categories until an application for plot plan review has been submitted to and approved by the Kern County Planning Director as consistent with the development standards set out in Section 19.98.050.

Existing Kern County oil and gas development standards and conditions generally require:

Specific well setback distances from structures;
Project signage limitations;
Timing for the removal of drilling equipment;
Timing for restoring drilling site and filling earthen sumps;
Landscaping and fencing requirements for oil tanks;
Limitations on equipment delivery hours;
Height restrictions and paint requirements for pumping units;
Dust abatement requirements for parking areas;
Pump site fencing and screening requirements; and
Compliance with all required federal, State, and County rules and regulations.

The County has proposed amendments to Title 19 of the Kern County Zoning Ordinance, focused on Chapter 19.98 (Oil and Gas Production) that would establish:

(a) updated development standards and conditions to address environmental impacts of pre-drilling exploration, well drilling and the operation of wells, including the exploration, production, completion, stimulation, reworking, injection, monitoring and plugging and abandonment;

(b) a new "Oil and Gas Conformity Review" ministerial permit procedure for County approval of future well drilling and operations to ensure compliance with the updated development standards and conditions and provide for ongoing tracking and compliance monitoring; and

(c) updated development standards and conditions that would apply in the portion for the Kern County Zoning Ordinance relating to the A (Exclusive Agriculture District), A-1 (Limited Agriculture District), M-1 (Light Industrial District), M-2 (Medium Industrial District), M-3 (Heavy Industrial District), NR (Natural Resource District) and RF (Recreation-Forestry District) zones and in DI (Drilling Island District) and PE (Petroleum Extract) Combining Districts. The standards would also be incorporated as conditions of approval in zone districts requiring a conditional use permit, such as the E (Estate District), R-1 (Low- density Residential District) and R-2 (Medium-density Residential District).
The required CEQA review, including the preparation and circulation of a Project-Level environmental impact report (EIR) for the proposed Zoning Ordinance and related amendments, is currently in progress. The County must certify the EIR and adopt the proposed Zoning Ordinance amendments before they become effective. This is anticipated to occur by December 2015.

4.0 Impacts and Mitigation Measures

4.1 Methodology

The potential impacts of the project were evaluated qualitatively by comparing the anticipated project effects on mineral resources with existing conditions. The evaluation is based on professional judgment, an analysis of project consistency with the goals and polices of the Kern County General Plan, and the significance criteria established by Appendix G of the State CEQA Guidelines, which the County has determined to be the appropriate review criteria for the project.

4.2 THRESHOLDS OF SIGNIFICANCE

The Kern County CEQA Implementation Document and Kern County Environmental Checklist state that a project would have a significant impact on mineral resources if it would:

- result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State, or
- result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

Potential cumulative impacts related to mineral resources are also considered in the following sections.

4.3 IMPACTS

Impact MnRsc - 1: Would The Project Result in the Loss of Availability of a Known Mineral Resource that Would Be of Value to the Region and the Residents of the State?

The project area is located in and adjacent to the existing Tejon and North Tejon oil fields designated by DOGGR and subject to ongoing oil and gas exploration and production activities under leases with Tejon Ranchcorp and its subsidiaries. Project-related development is proposed in certain of these locations as shown in Figure 2-6. As discussed above, the project Specific Plan would allow oil and gas activity in all zones and required conformance with the existing Kern County development standards and conditions for oil and gas exploration and production activity. These development standards and conditions provide for setback requirements, drilling and infrastructure standards and management, environmental protection, and health and safety standards and for County oversight of oil and gas activities to ensure compliance with all applicable requirements. Future oil and gas exploration and extraction activities within the portions of the specific plan area in which development is proposed would be allowed in all land use zones and would be required to conform with the County's development standards and conditions. This would facilitate continued access to potential oil and gas resources over time. As a result, the project would avoid certain areas subject to existing oil and gas activity, and would incorporate Kern County development standards and conditions for oil and gas development to facilitate future oil and gas exploration and extraction in all other portions of the project site. Industrial and commercial use is proposed land use in the areas of existing oil and gas development activity as shown on Figure 2-6, a map of proposed land use which shows the existing DOGGR designated oil field boundary. Industrial uses shall include, but are not limited to, the following: wholesale businesses, storage buildings and yards, warehouses, manufacturing, and assembling. Oil and gas activities are compatible with this type of land use designation.

During later phases of project development, the existing Grapevine Road/ Interstate 5 interchange may be expanded and relocated to the north. To allow for the relocation and replacement of the interchange, an existing Vehicle Enforcement Facility (VEF) may be relocated to a TRC owned parcel on the west side of the junction of I-5 and CA-99 as shown on Figure 2-3. The proposed relocated VEF is located within the North Tejon Oil Field boundary. Compliance with mitigation measures MM-1 and MM-2 will be required.

Construction of an off-site alternative truck route to the east of the project site connecting Edmonston Pumping Plan Road and Laval Road is proposed, as shown on Figure 2-3. A portion of the road will be located within the Tejon Oil Field. The proposed road is located where there are existing dirt roads and will not interfere with oil and gas mineral resource extraction. Compliance with mitigation measures MM-1 and MM-2 will be required.

As discussed above, almost all of the acreage in the lands designated as MRZ-2a are located outside of the project site boundary and would be avoided by the project. Approximately 35 acres of MRZ-2a is located in the southeast corner of the project. The project Specific Plan includes PDF 2 which states that project development areas are sited to avoid all locally designated or regionally significant mineral resources within and adjacent to the Specific Plan area, all of which consist of aggregate sand and gravel. The 35 acre area of MRZ-2a within the Specific Plan would be designated for agriculture and open space uses, similar to its present zoning. There are no incompatible land uses associated with the MRZ-2a area located within the Specific Plan boundary and the nearest residential use is located more than a mile from the MRZ-2a boundary.

Potential project minerals resource impacts are addressed by the incorporation of PDFs 1, and 2 that (a) allow for future oil and gas exploration activities in the rest of the project area in accordance with applicable Kern County oil and gas development standards and conditions (which include compliance with all applicable state and federal laws and regulations) and (b) the avoidance of and provision of future access to of all regionally significant aggregate resources. Mineral resource extraction would be allowed within the Specific Plan land use designation for this area. The project would allow for the continuation of oil and gas exploration and extraction activities within the project site area in a manner consistent with applicable Kern County zoning and other law, rules and regulations.

Mitigation Measures

The following Mitigation Measures (MMs) are proposed to protect oil & gas mineral resources and adjacent land uses:

MM-1. The project would implement the following MMs, which are consistent with current compliance requirements. Any MM which is inconsistent with a future compliance requirement would be superseded by the applicable compliance requirements:

MM 1-1: No oil or gas well shall be drilled within one hundred (100) feet of any public highway or building not necessary to the operation of the well, or within one hundred and ninety (190) feet of any dwelling, or within three hundred (300) feet of any building used as a place of public assembly, institution, or school, or within one hundred (100) feet of any building utilized for commercial purposes constructed prior to the commencement of such drilling, without the written consent of the owner of such structure.

MM 1-2: All drilling and production activities shall conform to all applicable fire and safety regulations, and firefighting apparatus and supplies required by the Kern County Fire Department shall be maintained on the site at all times during drilling and production operations.

MM 1-3: Oil and gas exploration, drilling, production and abandonment activities conducted within the Grapevine Specific Plan Area shall adhere to all applicable safety measured identified in Kern County's Oil and Gas Activities, Chapter 19.98 Zoning Ordinance.

MM 1-4: No signs, other than directional and warning signs and those required for identification of the well, shall be constructed, erected, maintained, or placed on the premises or any part thereof, except those required by law or ordinance to be displayed in connection with the drilling or maintenance of the well.

MM 1-5: Sanitary toilet and washing facilities, if required by the Kern County Health Department or other governmental agencies, shall be installed and maintained in a clean and sanitary condition during drilling operations, and at such other times as specified by these agencies.

MM 1-6: Proven technological improvements generally accepted and used in drilling and production methods shall be employed as they may become available if they are capable of reducing nuisances or annoyances.

MM 1-7: All derricks, boilers, and other drilling equipment employed pursuant to this section to drill any well hole or to repair, clean out, deepen, or re-drill any completed or drilling well shall be removed within ninety (90) days after completion of production tests following completion of such drilling, or after abandonment of any well, unless such derricks, boilers, and drilling equipment are to be used within a reasonable time, as determined by the Planning Director, for the drilling of another well or wells on the premises.

MM 1-8: Within ninety (90) days after any well has been placed in production, or after its abandonment, earthen sumps used in drilling or production or both (unless such sumps are to be used within a reasonable time as determined by the Planning Director for the drilling of another well or wells) shall be filled and the drilling site restored as nearly as practicable to a uniform grade. Temporary earthen sumps may be used for cleanout or remedial work on an existing well or other production facility. However, these sumps shall be filled and the site restored as nearly as practicable to uniform grade within ninety (90) days after the cleanout or other remedial work is completed. Such restoration work shall comply with all applicable regulations of the California Division of Oil and Gas.

MM 1-9: Any derrick used for servicing operations shall be of the portable type, provided, however, that upon presentation of proof that the well is of such depth or has such other characteristics, or for other cause, that a portable type derrick would not properly service such well, the Planning Director may approve the use of a standard type of derrick.

MM 1-10: Whenever oil or gas is produced into and shipped from tanks located on the premises, such tanks, whenever located within five hundred (500) feet of any dwelling or commercial building, shall be surrounded by shrubs or trees, planted and maintained so as to develop attractive landscaping or shall be fenced in such a manner as to, insofar as practicable, screen such tanks from public view. Such fencing shall comply with the requirements of the California Division of Oil and Gas.

MM 1-11: Whenever a well is located within five hundred (500) feet from an existing dwelling unit, except in case of an emergency, no materials, equipment, tools, or pipe used for either drilling or production operations shall be delivered to or removed from the drilling site, except between the hours of eight (8:00) a.m. and eight (8:00) p.m., unless otherwise required by the California Division of Oil and Gas.

MM 1-12: Pumping wells shall be operated by electric motors or muffled internal combustion engines.

MM 1-13: The height of all pumping units shall not exceed thirty-five (35) feet and shall be painted and kept in neat condition.

MM 1-14: All vehicle parking and maneuvering areas shall be treated and maintained with oiled sand or a similar dust binding material.

MM 1-15: After production begins and a pump is installed on the wellhead, a fence at least six (6) feet in height shall be installed around the pump site or drilling island for public safety. This fence shall be constructed of chain link with wood or metal slats or other screening fence as may be approved by the Planning Director. This fencing and screening requirement shall apply only to those pump sites located within five hundred (500) feet of any dwelling. Such fencing shall comply with the requirements of the California Division of Oil and Gas.

MM 1-16: All required Federal, State, and County rules and regulations shall be complied with at all times, including, but not limited to, the rules and regulations of the following agencies:

1. California Division of Oil and Gas
2. Kern County Fire Department
3. Kern County Health Department
4. Regional Water Quality Control Board
5. San Joaquin Valley Air Pollution Control District
6. Kern County Engineering and Survey Services Department

MM 2. The following MMs address the existence of plugged and abandoned oil wells within the project boundary and the proposed development and provides for offsets and evaluation of the abandoned wells in accordance with the DOGGR requirements. The number of wells in Planning Area 6, the planning area located within the current oil field boundary, are tabulated in section 2.3.1.2.

MM 2-1: Compliance with the DOGGR Well Review Program, including addressing development near plugged and abandoned oil and gas wells, shall be required prior to constructing any new structure within 100 feet of a plugged or abandoned well.

MM 2-2: No occupied structures may be built on top of a plugged or abandoned well. Prior to constructing any unoccupied structure, road or parking lot on top of a plugged or abandoned well, the well head must be excavated for surface plug inspection and leakage testing prior to any new surface development over the wellhead location. The plugged or abandoned well may need to be re-abandoned, if necessary, per compliance with DOGGR standards.

MM 2-3: If an abandoned or unrecorded well is uncovered or damaged during excavation or grading, the well would be reported to DOGGR and the County, and DOGGR would be contacted to determine whether remedial plugging operations are required.

MM 2-4: Developer would plot P&A wells on subdivision maps and submit maps to the DOGGR.

Level of Significance
Impacts after mitigation measures would be *less than significant*.

Impact MnRsc - 2: Would the Project Result in the Loss of Availability of a Locally Important Mineral Resource Recovery Site Delineated on a Local General Plan, Specific Plan, or Other Land Use Plan.

As discussed above, portions of the project are located within the Tejon and North Tejon oil field administrative boundaries and approximately 35 acres of the southeast corner of the site overlies an MRZ-2a aggregate resource area. Both of these designations reflect state agency criteria The project area located within the DOGGR designed oil field boundaries , as shown on Figure 2.6, is recognized in the Kern County General Plan as 8.4 Mineral & Petroleum.

As discussed in Impact MnRsc-1 above, the project specific plan would incorporate two PDFs and two MMs which protect the availability of delineated mineral resources. The oil & gas mineral resources are protected by the following PDF and MMs: PDF 1 allows for future oil and gas exploration activities in all zones in the project area in accordance with applicable Kern County oil and gas development performance standards (which include compliance with all applicable state and federal laws and regulations) and MM 1 provides specific oil and gas development performance standards. The identified mineral resource zone located within the specific plan boundary is protected by PDF 2 which provides for the avoidance of all regionally significant aggregate resources identified within the specific plan. As a result, the project would not result in a loss of availability of a locally important mineral resource recovery site delineated on a Local General Plan, Specific Plan, or Other Land Use Plan.

Mitigation Measures

No additional mitigation beyond compliance with PDFs and MM-1and MM-2 is required.

Level of Significance

Impacts would be *less than significant*.

Cumulative Impacts

Impact Cum MnRsc-1:

The appropriate geographic area for considering cumulative impacts on mineral resources is the Default Study Area. As discussed above, the project would not affect any regionally or locally significant rock, sand, metal or aggregate deposits. PDF 2 provides that the project would avoid the two operating aggregate mines in the region, no development is planned for the 35 acres of MRZ-2a located within the specific plan boundary by development, and potential sensitive receptors associated with the project are located more than a mile from the MRZ-2a boundary; therefore access to the minerals would not be affected by the project. As a result, the project would not generate or contribute to cumulative impacts related to these resources.

Oil and gas exploration and extraction activities would continue to occur within the existing Tejon and North Tejon oil field administrative boundaries and elsewhere in the project area under the terms of applicable oil and gas leases and consistent with Kern County performance standards and other state and federal laws and regulations. The project specific plan would implement PDF 1and MMs 1and 2 to protect oil & gas mineral resources and adjacent land uses in addition to the incorporation of all applicable Kern County oil and gas performance standards.

The projection methodology utilized by the County is appropriate for analyzing cumulative impacts from oil and gas development in the project area. Under this approach, it is reasonably foreseeable that oil and gas activities, including exploratory wells and testing, the construction and operation of extraction wells, and the construction and operation of related conveyance, wastewater, oil, and storage facilities, would increase in the project area, particularly in the existing oil field administrative locations. The extent of potential future oil and gas activities within the project site is subject to significant uncertainty. Based on existing DOGGR notices, future oil and gas activity could include:

- Three new wells have been drilled within the Tejon Field boundary from a 10 acre drilling island located in the northwest quarter of Section 5, T10N, R19W in an area proposed for industrial and commercial development. The oil and gas performance standards contained in MM-1 would provide for operation requirements for oil and gas development.
- Two exploratory wells have been drilled outside of the field boundaries within the project site in sections - 16 and 22, T10N, R19W. The area of the drill site in section 16 is zoned for mixed use including commercial and section 22 is zoned agricultural. The oil and gas performance standards contained in MM-1 would provide for operation requirements for oil and gas development and exploration activities and buffers from residential and commercial uses. In addition, mineral lease requirements in this area require that drilling be limited to compact drilling and production sites limited to 2.5 acres, setback requirements of 300 feet from buildings and visual screen requirements such as suitable berms, plantings and/or other forms of visual barriers so as to adequately conceal Lessee's wells, tank batteries or other production facilities.

Oil and gas development within the project site would occur in a manner consistent with future oil and gas development throughout Kern County that would otherwise occur under the County's existing and proposed performance standards and applicable state and federal laws incorporated by those standards. The oil and gas performance standards contained in MM-1 would provide for operation requirements for oil and gas development and exploration activities and buffers from residential and commercial uses. Therefore the project would not significantly change the extent to which project area oil and gas activities contributes to cumulative impacts within the County. The project would also not affect the extent to which oil and gas lessees can access oil and gas resources within the site because implementation of the MMs would allow for development to safely occur with oil and gas activities consistent with other urbanized oil producing areas in Kern County and elsewhere. As a result, the project would not generate or contribute to cumulative impacts related to oil and gas resources.

Thirty-five acres of a known regionally significant aggregate resource (MRZ-2a) has been identified within the specific plan boundary. By project design, there would be no development in this area and sensitive land uses are in excess of a mile from the MRZ-2a boundary; therefore combined impacts on mineral resources would not result in the loss of availability of a known mineral resource.

Cumulative impacts to mineral resources would occur if the cumulative projects would result in the loss of oil or aggregate mineral resources. Impacts on mineral resources would not be cumulatively significant.

Mitigation Measures
Compliance with the goals, policies, and implementation measures of the Kern County General is required. No mitigation measures are necessary.

Level of Significance after Mitigation
Cumulative impacts would be *less than significant*.

5.0 REFERENCES

California Division of Oil, Gas & Geothermal Resources, 2015, 2014 Preliminary Report of the California Oil and Gas Production Statistics, 28p.

California Division of Oil, Gas & Geothermal Resources (DOGGR), 2013, Revised Initial Study/Mitigated Negative Declaration Rancho Grande Sojitz Energy Venture, Inc., SCH #2012061074, Sections 3, 4, 9, 11, 15, 16, and 22, T 10N, R19W SBB&M, Kern County

California Division of Oil, Gas & Geothermal Resources (DOGGR, 2015), http://www.conservation.ca.gov/dog, accessed July 13, 2015

California Geological Survey, 2013, Non-Fuel Mineral Production in 2013, the Resource Agency, California Department of Conservation; <*http://www.conservation.ca.gov/cgs/minerals/min_prod/Documents/non_fuel_2013.pdf*>

Cole, J.W., 1988, Mineral Land Classification: Aggregate Materials in the Bakersfield Production-Consumption Region; California Department of Conservation Division of Mines and Geology Special Report 147, 27p.

Dibblee, T. W. Jr., 2005, Geolgic Map of the Grapevine/South ½ of Mettler Qualdrangles

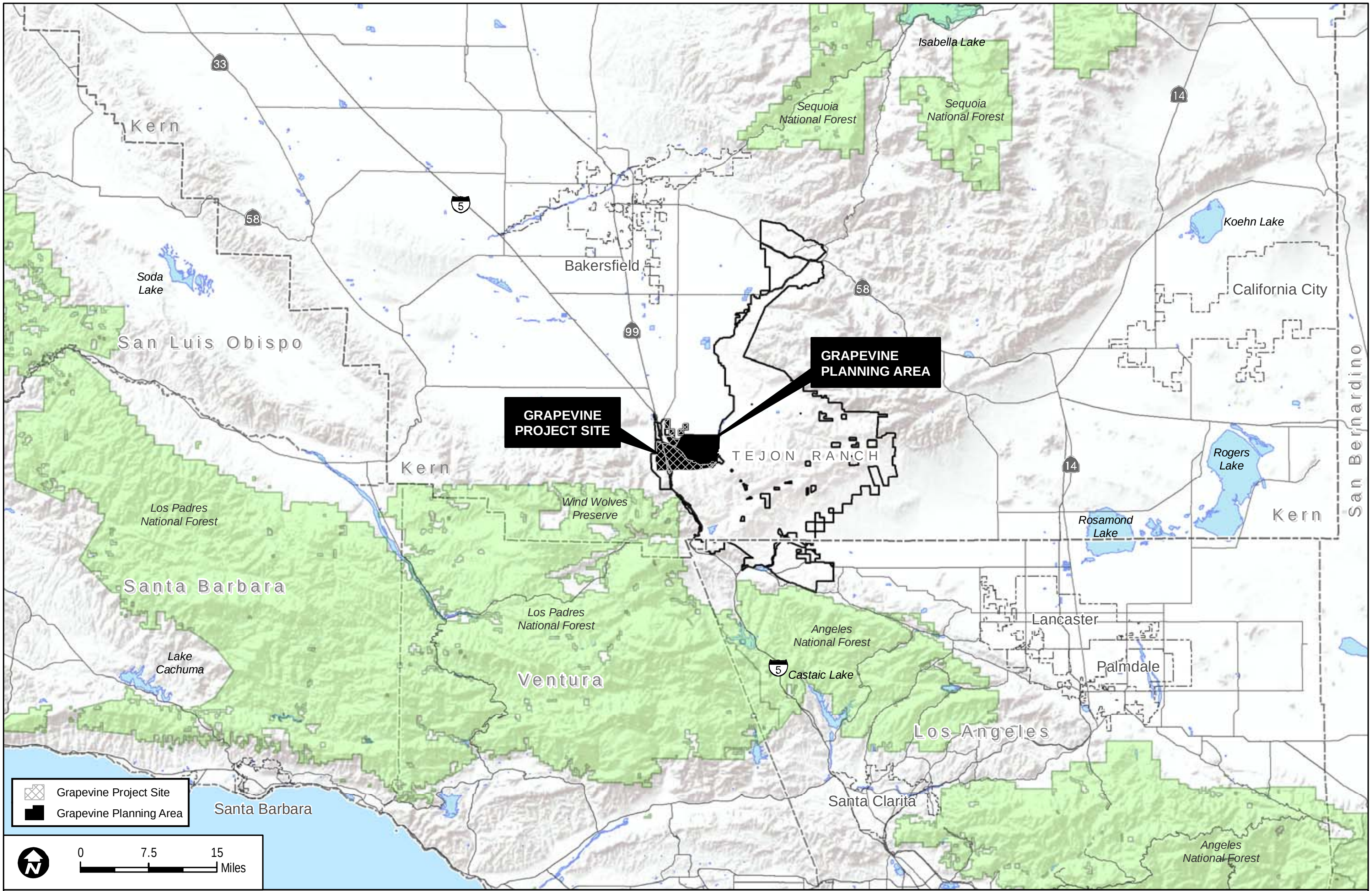
Dibblee, T. W. Jr., 2005, Geologic Map of the Pastoria Creek Qualdrangle

Dibblee, T. W. Jr., 2008, Geologic Map of the Arvin and Tejon Hills Quadrangles

SMGB (State Mining and Geology Board). 201. *Designation of Regionally Significant Aggregate Resources in the Bakersfield Production-Consumption Region*. SMGB Designation Report No. 11. Prepared by SMGB with assistance from the California Department of Conservation California Geological Survey. November 2011.

U. S. Geological Survey, 2015, Mineral Commodities Summaries 2014, 199 p.

FIGURES

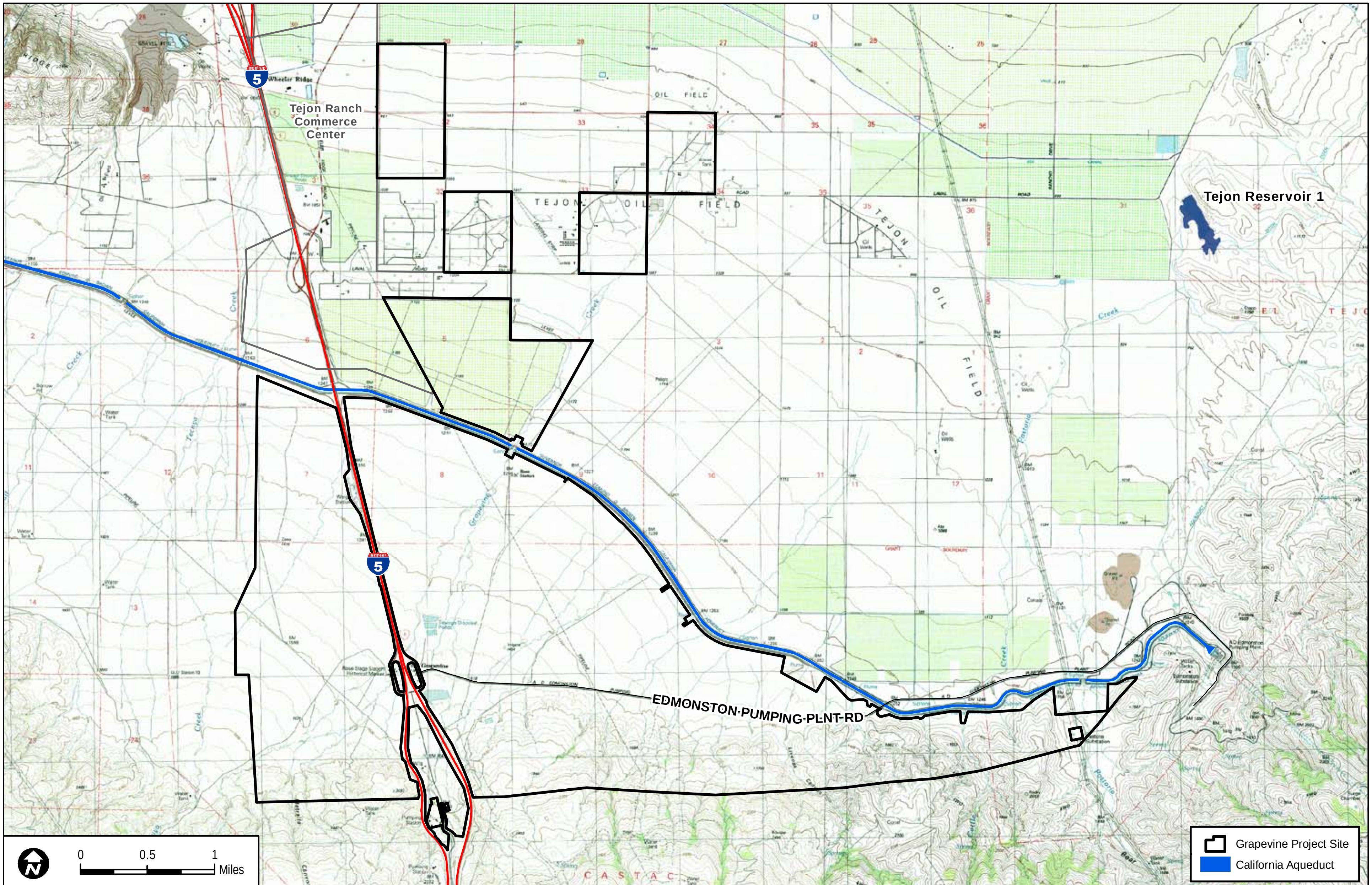


SOURCES: McIntosh & Associates 2013; TRC 2013a

FIGURE 1-1

Regional Location

GRAPEVINE PROJECT

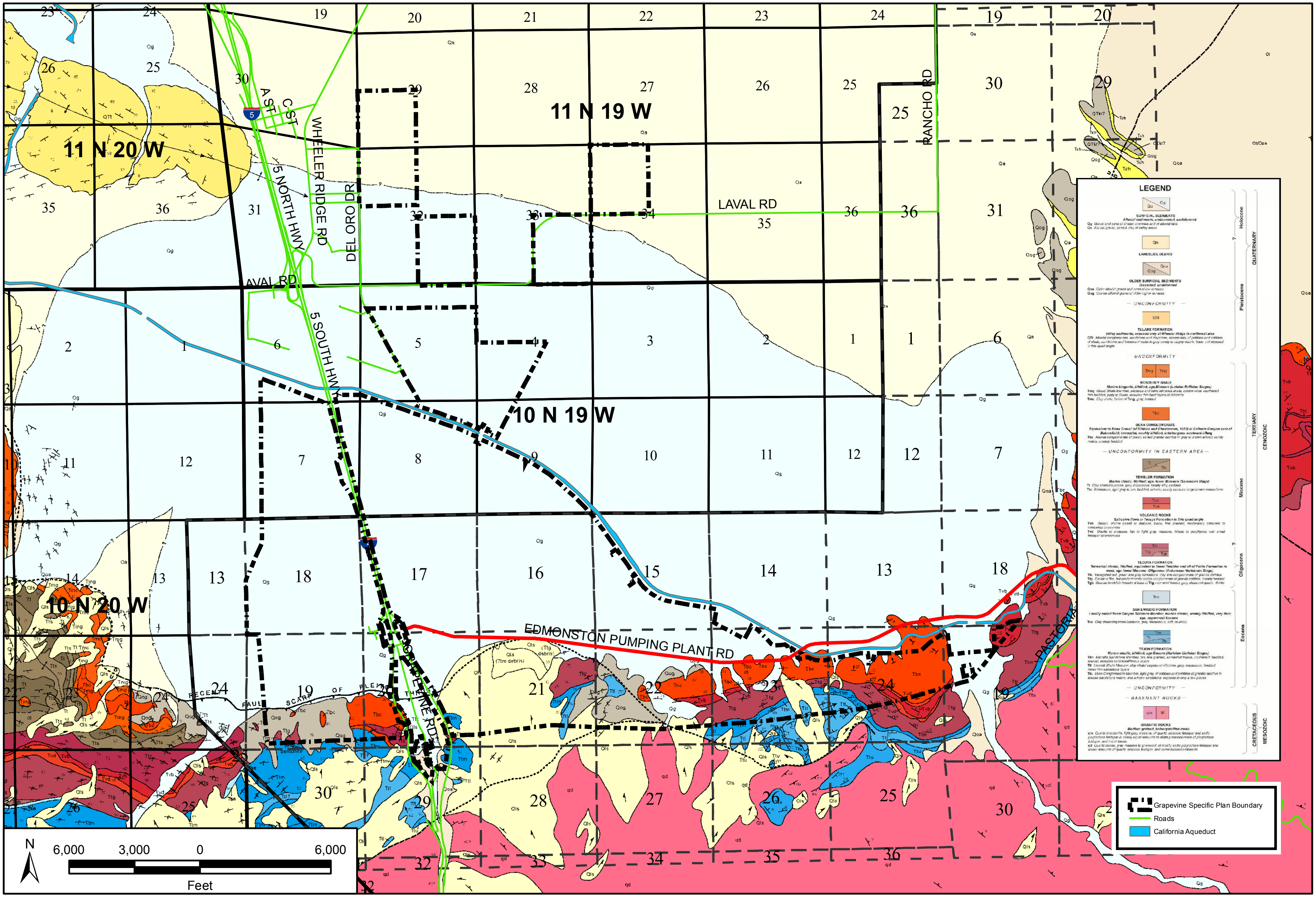


SOURCES: McIntosh & Associates 2013; TRC 2013b

FIGURE 1-2

Vicinity Map

GRAPEVINE PROJECT



Dibblee. T. W. JR. (2005,2008)

Figure 2-1

Geologic Map

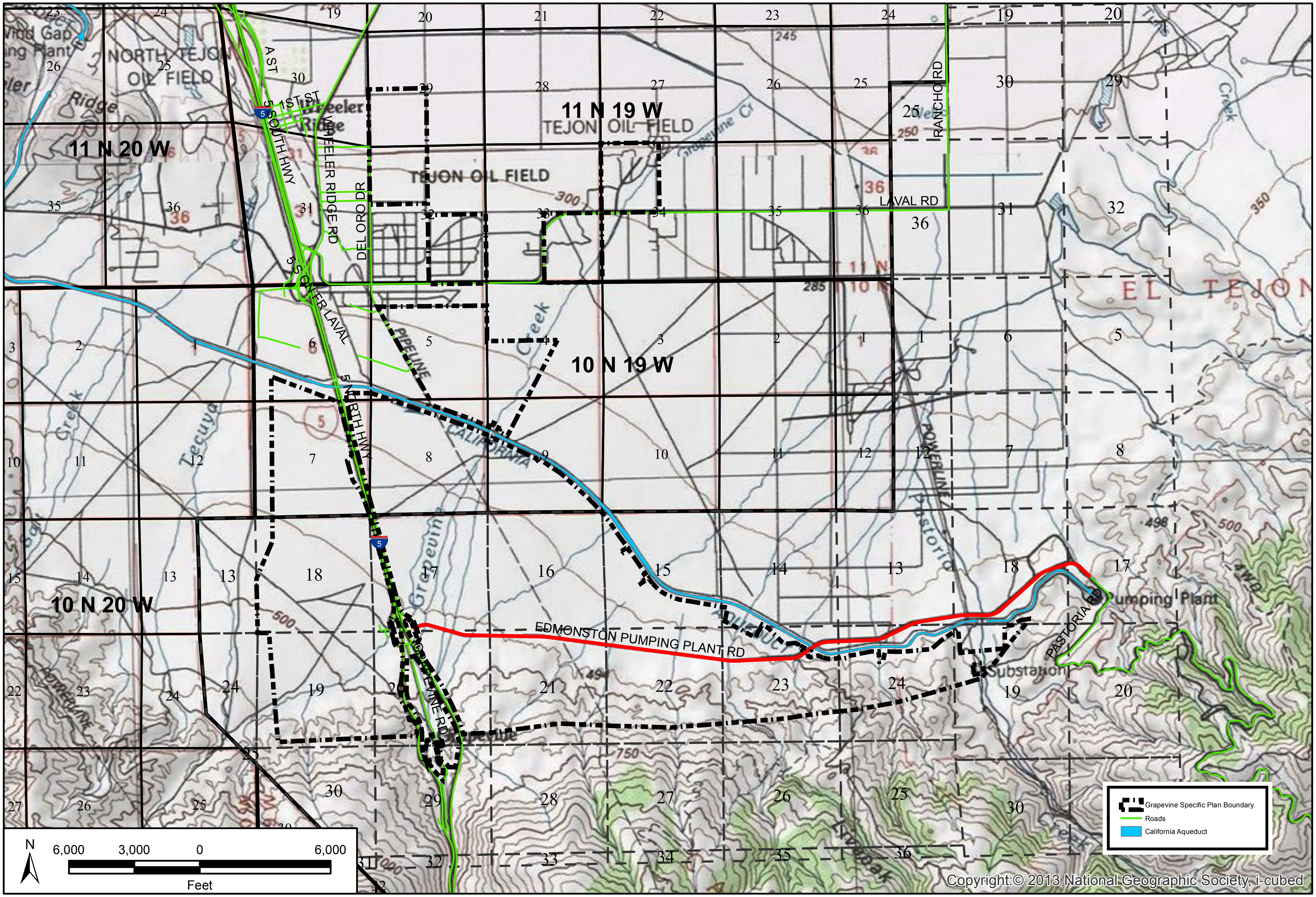


Figure 2-2

Topographic Map

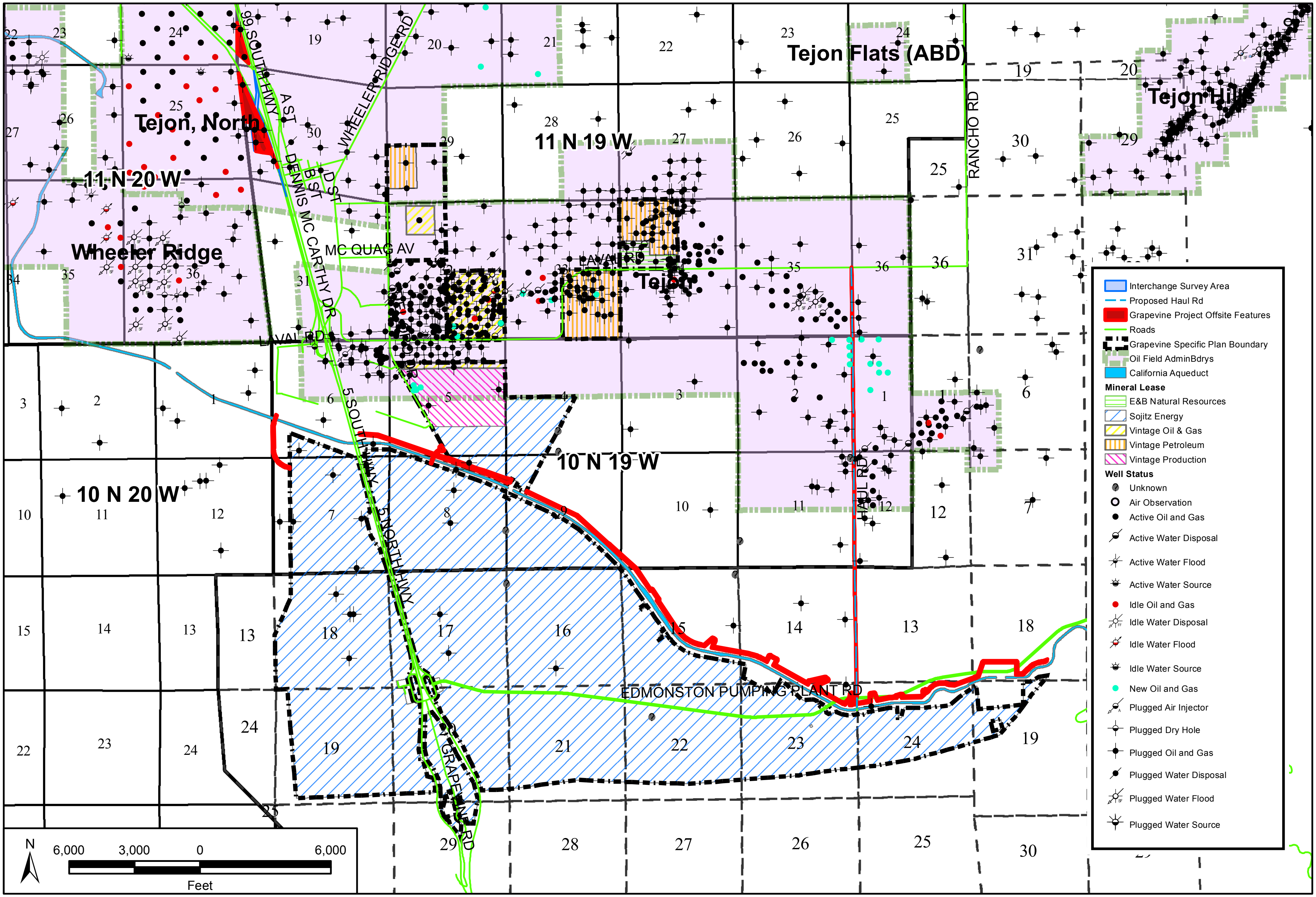


Figure 2-3

Oil Field and Lease Location Map

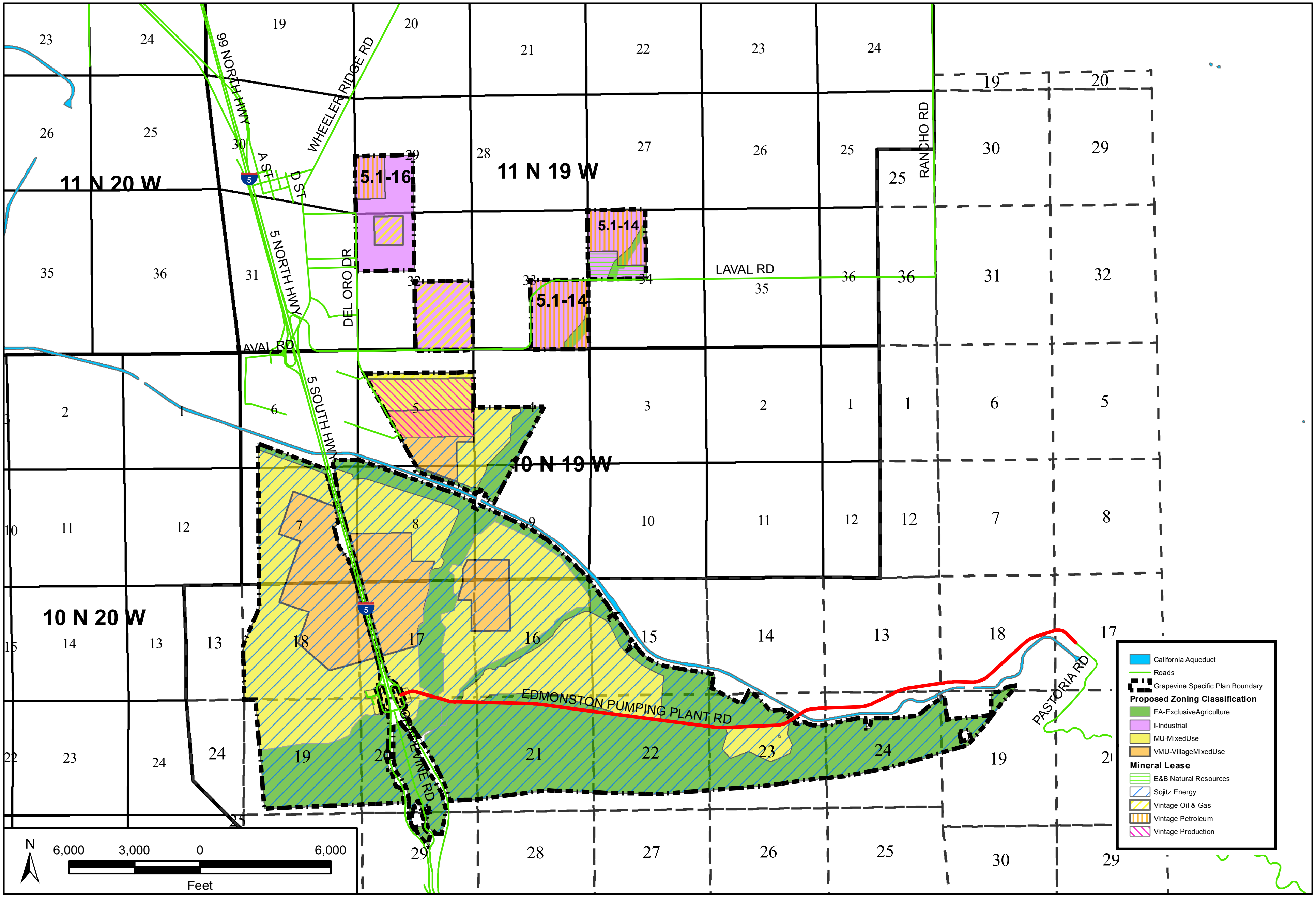


Figure 2-4

Mineral Lease and Proposed Land Use Designation Map

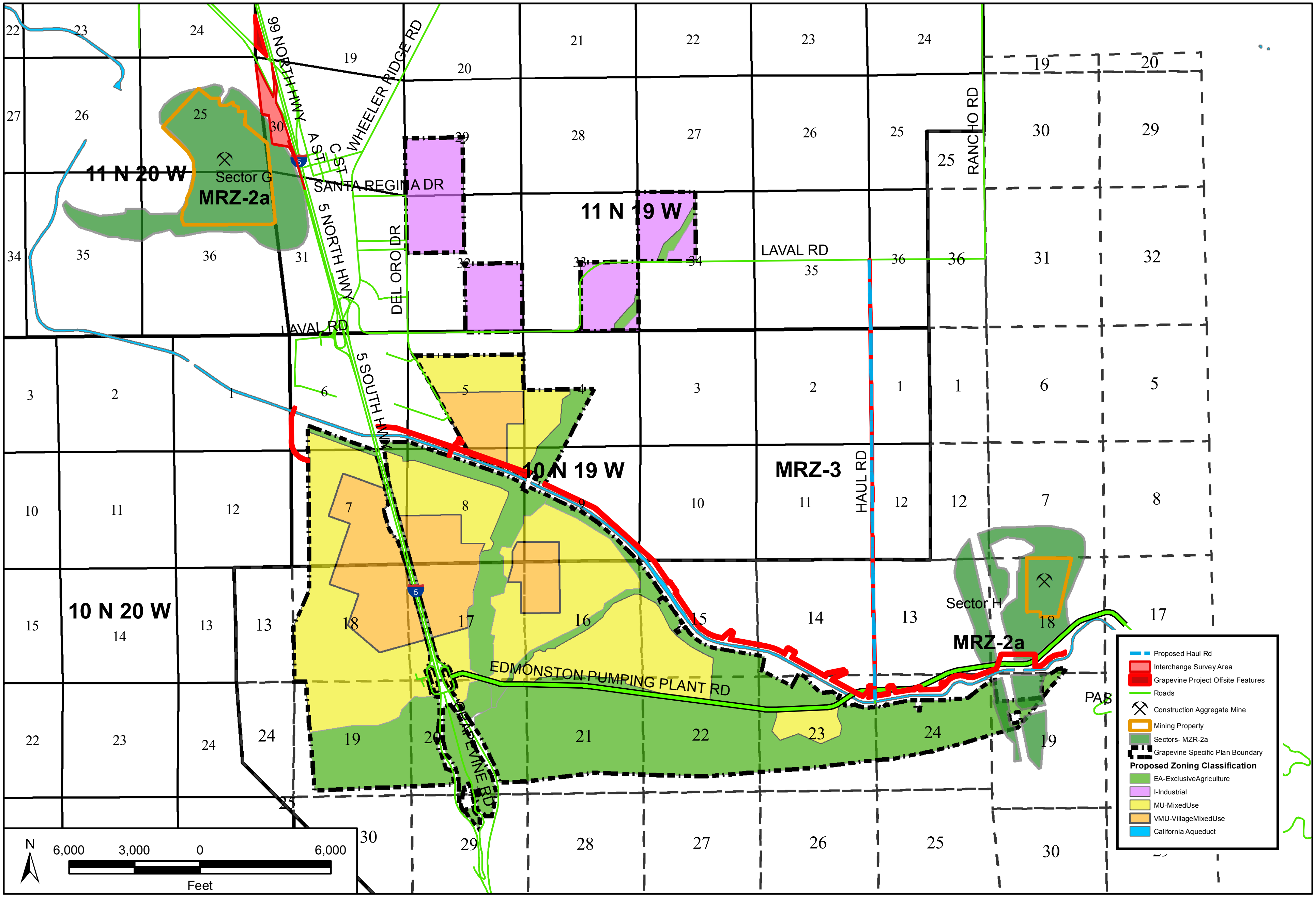


Figure 2-5

Regionally Significant Aggregate Resources Map

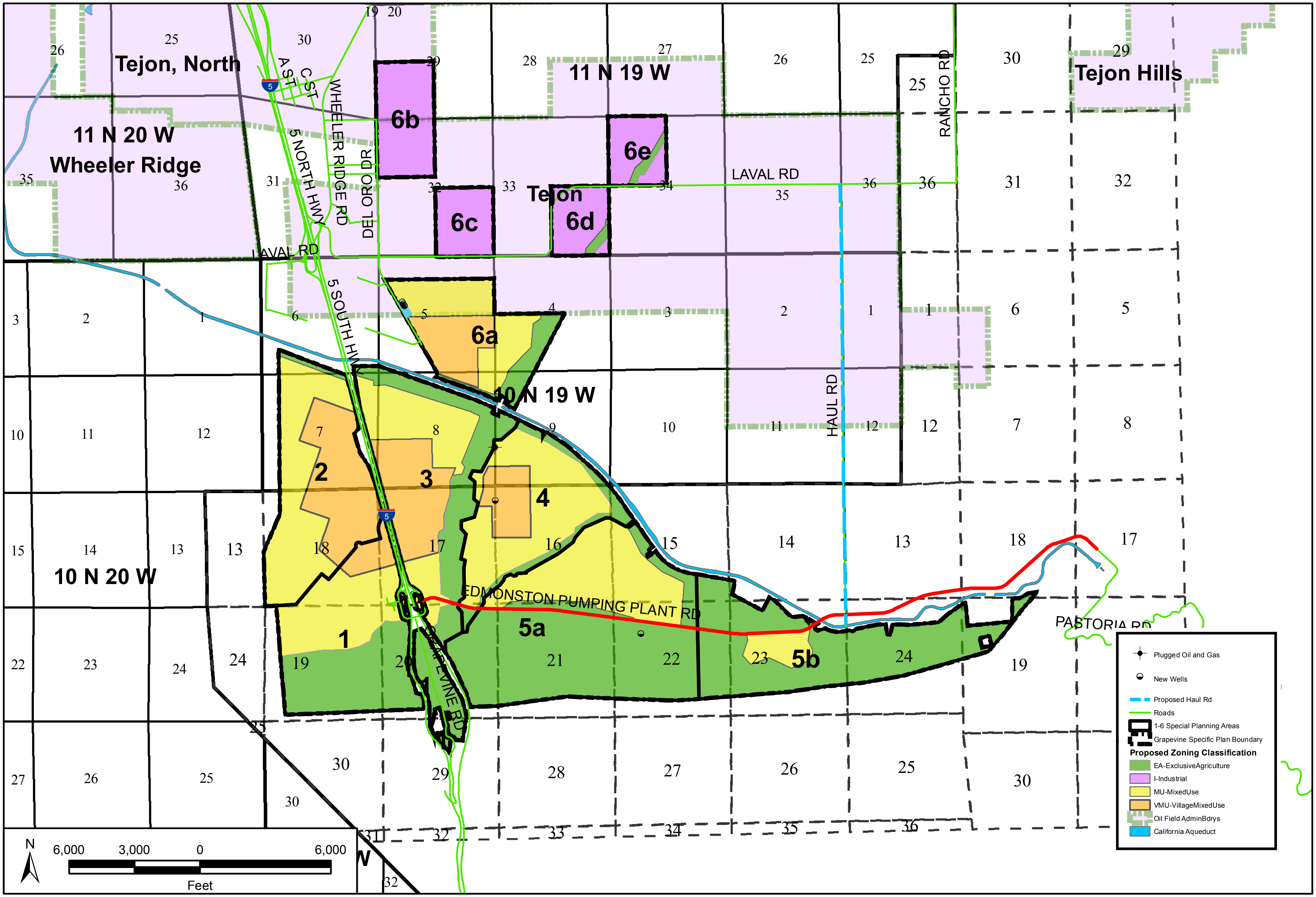


Figure 2-6

Project Development Map

APPENDIX I

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 412-0015

TEJON FIELD RULES

Date: 2/15/2012

Area(s) Eastern	Zone(s)/Pool(s) "Transition"-Santa Margarita

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface	Competent bed at least 10% of the production casing depth and no deeper than 1,500'.		Surface
Production	Competent bed at or below top of zone		Surface or at least 500' above uppermost oil, gas, or anomalous pressure zones and 100' above base of fresh water.
Liner (optional)	N/A		Not cemented (optional)

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling below Conductor	Low	Diverter	Hydraulic BOPE
Drilling below Surface Casing	Low	IIA 2M	Hydraulic BOPE
Completion	Low	II 2M or lubricator	Hydraulic BOPE
Additional Comments:			

BASE OF FRESH WATERS

Marker: N/A	Depth: 1,300 +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

A WSO test is no longer required due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

By Tim Kustic, State Oil and Gas Supervisor
Tim Kustic (*Title*)

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 407-0105

TEJON FIELD RULES

Date:
5/30/2007

Area(s)	Zone(s)/Pool(s)
Central	Olcese

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface	Competent bed at least 10% of proposed total depth		Surface
Intermediate	Competent bed at or below top of zone		500 feet above oil, gas, or anomalous pressure and 100 feet above base of fresh water
Liner	N/A		Not cemented

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling	Medium	IIIB3M	Hydraulic BOPE
Completion	Medium	Lubricator or IIB3M	Hydraulic BOPE

Additional Comments:

BASE OF FRESH WATERS

Marker: N/A	Depth: 1,600 +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

A WSO test is no longer required for the Olcese Zone due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

Hal Bopp ,State Oil and Gas Supervisor

By Original Signed by R. A. Adams , District Deputy
(Signature) *(Title)*

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 407-0106

TEJON FIELD RULES

Date: 5/30/2007

Area(s)	Zone(s)/Pool(s)
Central	Santa Margarita

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface	Competent bed at least 10% of proposed total depth		Surface
Intermediate	Competent bed at or below top of zone		500 feet above oil, gas, or anomalous pressure and 100 feet above base of fresh water
Liner	N/A		Not cemented

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling	Low	IIA2M	Hydraulic BOPE
Completion	Low	Lubricator or IIA2M	Hydraulic BOPE

Additional Comments:

BASE OF FRESH WATERS

Marker: N/A	Depth: 1,600 +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

A WSO test is no longer required for the Santa Margarita Zone due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

Hal Bopp, State Oil and Gas Supervisor

By Original Signed by R. A. Adams, District Deputy
(Signature) *(Title)*

Modified OGD125 (12/14/06)

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 407-0107

TEJON FIELD RULES

Date: 5/30/2007

Area(s)	Zone(s)/Pool(s)
Central	Transition

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface	Competent bed at least 10% of proposed total depth		Surface
Intermediate	Competent bed at or below top of zone		500 feet above oil, gas, or anomalous pressure and 100 feet above base of fresh water
Liner	N/A		Not cemented

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling	Medium	IIA2M	Hydraulic BOPE
Completion	Medium	Lubricator or IIA2M	Hydraulic BOPE

Additional Comments:

BASE OF FRESH WATERS

Marker: N/A	Depth: 1,600 +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

A WSO test is no longer required for the Transition Zone due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

Hal Bopp ,State Oil and Gas Supervisor

By Original Signed by R. A. Adams , District Deputy
(Signature) *(Title)*

Modified OGD125 (12/14/06)

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 407-0108

TEJON FIELD RULES

Date: 5/30/2007

Area(s)	Zone(s)/Pool(s)
Southeast	Lower Reserve

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface	Competent bed at or below top of zone		Surface
Liner	N/A		Not cemented

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling	Low	Diverter or IIA2M	Hydraulic BOPE
Completion	Low	Lubricator or IIA2M	Hydraulic BOPE

Additional Comments:

BASE OF FRESH WATERS

Marker: N/A	Depth: 1,100'-1,700' +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

A WSO test is no longer required for the Lower Reserve Zone due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

Hal Bopp ,State Oil and Gas Supervisor

By Original Signed by R. A. Adams , District Deputy
(Signature) *(Title)*

Modified OGD125 (12/14/06)

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 407-0109

TEJON FIELD RULES

Date: 5/30/2007

Area(s)	Zone(s)/Pool(s)
Southeast	Upper Reserve

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface	Competent bed at or below top of zone		Surface
Liner	N/A		Not cemented

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling	Low	Diverter or IIA2M	Hydraulic BOPE
Completion	Low	Lubricator or IIA2M	Hydraulic BOPE

Additional Comments:

BASE OF FRESH WATERS

Marker: N/A	Depth: 1,100'-1,700' +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

A WSO test is no longer required for the Upper Reserve Zone due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

Hal Bopp ,State Oil and Gas Supervisor

By Original Signed by R. A. Adams , District Deputy
(Signature) *(Title)*

Modified OGD125 (12/14/06)

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 407-0110

TEJON FIELD RULES

Date: 5/30/2007

Area(s)	Zone(s)/Pool(s)
Western	Pulv (Reserve)

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface	Competent bed at least 10% of proposed total depth		Surface
Production	Competent bed at or below top of zone		500 feet above oil, gas, or anomalous pressure and 100 feet above base of fresh water

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling	Medium	IIA2M	Hydraulic BOPE
Completion	Medium	Lubricator or IIA2M	Hydraulic BOPE

Additional Comments:

BASE OF FRESH WATERS

Marker: N/A	Depth: 1,200'-1,800' +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

A WSO test is no longer required for the Pulv (Reserve) Zone due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

Hal Bopp ,State Oil and Gas Supervisor

By Original Signed by R. A. Adams , District Deputy
(Signature) *(Title)*

Modified OGD125 (12/14/06)

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 407-0111

TEJON FIELD RULES

Date: 5/30/2007

Area(s)	Zone(s)/Pool(s)
Western	"Transition"-Santa Margarita*

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface	Competent bed at or below top of zone		Surface
Liner	N/A		Not cemented

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling	Medium	IIA2M	Hydraulic BOPE
Completion	Medium	Lubricator or IIA2M	Hydraulic BOPE

Additional Comments:

BASE OF FRESH WATERS

Marker: N/A	Depth: 1,200'-1,800' +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

***Portions also referred to as Chanac zone.**

A WSO test is no longer required for the "Transition"-Santa Margarita due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

Hal Bopp ,State Oil and Gas Supervisor

By Original Signed by R. A. Adams , District Deputy
(Signature) *(Title)*

Modified OGD125 (12/14/06)

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 407-0112

TEJON FIELD RULES

Date:
5/30/2007

Area(s)	Zone(s)/Pool(s)
Western	Valv

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface	Competent bed at least 10% of proposed total depth		Surface
Intermediate	Competent bed at or below top of zone	Run only in conjunction with liner.	500 feet above oil, gas, or anomalous pressure and 100 feet above base of fresh water
Production	Competent bed at or below top of zone	Run only in lieu of liner completion	500 feet above oil, gas, or anomalous pressure and 100 feet above base of fresh water
Liner	N/A	Run only in conjunction with intermediate casing.	Not cemented

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling	Medium	IIIB3M	Hydraulic BOPE
Completion	Medium	IIB3M	Hydraulic BOPE
Additional Comments:			

BASE OF FRESH WATERS

Marker: N/A	Depth: 1,200'-1,800' +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

A WSO test is no longer required for the Valv Zone due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

Hal Bopp ,State Oil and Gas Supervisor

By Original Signed by R. A. Adams , District Deputy
(Signature) *(Title)*

Modified OGD125 (12/14/06)

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 412-0040

TEJON, NORTH, FIELD RULES

Date: 2/27/2012

Area(s) N/A	Zone(s)/Pool(s) Olcese, JV, & 'Basal' Sand

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface	Competent bed at least 10% of proposed total depth, intermediate, or production casing depth, if higher, and no deeper than 1,500'	At operator's discretion, casing may be set deeper to cover base of fresh water.	Surface
Intermediate (optional)	Competent bed		Surface or at least 500' above uppermost oil, gas, or anomalous pressure zones and 100' above base of fresh water
Production	Competent bed at or below top of zone		Surface or at least 500' above uppermost oil, gas, or anomalous pressure zones and 100' above base of fresh water
Liner (optional)	Top of liner		Cemented or uncemented

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling below Surface Casing	Medium to High	IIIB 3M to 5M	Hydraulic BOPE. If intermediate casing is set, then only a IIIB 3M BOPE is required on surface casing.
Completion	Medium to High	II 3M to 5M or lubricator	Hydraulic BOPE
Additional Comments:			

BASE OF FRESH WATERS

Marker: N/A	Depth: 2,100 +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

A WSO test is no longer required due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

A liner lap test is not required if the production casing is set at or below the top of the production zone.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

By Tim Kustic, State Oil and Gas Supervisor
Tim Kustic (Title)

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION
DIVISION OF OIL, GAS, & GEOTHERMAL RESOURCES

NO.: 412-0041

TEJON, NORTH, FIELD RULES

Date: 2/27/2012

Area(s) N/A	Zone(s)/Pool(s) Vedder, San Emigdio, & Metralla

CASING PROGRAM

Casing String	Cementing Depth		Annular Cement Fill (Marker or Zone +___')
	Marker or Zone	Remarks	
Conductor	Competent bed		Surface
Surface Casing	Competent bed at least 10% of proposed total depth or production casing depth, if higher, and no deeper than 1,500'	At operator's discretion, casing may be set deeper to cover base of fresh water.	Surface
Intermediate Casing	Competent bed		Surface or at least 500' above uppermost oil, gas, or anomalous pressure zones and 100' above base of fresh water
Production Casing	Competent bed within zone		Surface or at least 500' above uppermost oil, gas, or anomalous pressure zones and 100' above base of fresh water

GEOLOGIC DATA

Reference: DOGGR publication TR-11, Volume I, California Oil & Gas Fields

BLOWOUT PREVENTION EQUIPMENT PROGRAM (Referenced from MO7)

Operation	Surface Pressure Category	DOGGR Class	Additional Requirements
Drilling below Surface Casing	Medium	IIIB 3M	Hydraulic BOPE
Drilling below Intermediate or Production Casing	High	IIIB 5M to 10M	Hydraulic BOPE
Completion	High	II 5M to 10M or lubricator	Hydraulic BOPE
Additional Comments:			

BASE OF FRESH WATERS

Marker: N/A	Depth: 2,100 +/-	Comments:

GENERAL COMMENTS

This rule applies only to drilling and completion operations for new production wells.

A WSO test is no longer required due to a successful water shut-off history. The Division will routinely monitor production data, and if anomalous water production is indicated, remedial action may be required.

Field rules apply to development wells only. All operations are subject to California Code of Regulations., Title 14, Division 2, Chapter 4.

By [signature], State Oil and Gas Supervisor
Tim Kustic (Title)

Appendix S
Noise Assessment Technical Report

NOISE ASSESSMENT TECHNICAL REPORT
for the
GRAPEVINE PROJECT

Prepared for:

Tejon Ranch Company Inc.
4436 Lebec Road
Tejon Ranch, California 93243
Contact: Diana Hurlbert

Prepared by:

DUDEK
31878 Camino Capistrano No. 200
San Juan Capistrano, California 92675
Contact: Mike Greene

DECEMBER 2015

Printed on 30% post-consumer recycled material.

TABLE OF CONTENTS

Section **Page No.**

TABLE OF CONTENTS (CONTINUED)

Section **Page No.**

APPENDIX

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Meaning
ADT	average daily trips
ANSI	American National Standards Institute
BNSF	Burlington North Santa Fe
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	community noise equivalent level
CVEF	Commercial Vehicle Enforcement Facility
dB	decibel
DOT	Department of Transportation
HVAC	heating-ventilation-air-conditioning
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
Hz	hertz
I-	Interstate
Ldn	day-night sound level
Leq	equivalent sound level
Lmax	maximum sound level
Lmin	minimum sound level
Lxx	percentile-exceeded sound levels
mph	miles per hour
NAC	noise abatement criteria
NSLU	noise-sensitive land use
PPV	peak-particle velocity
Ranch	Tejon Ranch
Ranchwide Agreement	Tejon Ranch Conservation and Land Use Agreement
RMS	root mean square
SR-	State Route
TNM	transportation noise model
TRCC	Tejon Ranch Commerce Center
UPRR	Union Pacific Railroad
VdB	vibration decibels

INTENTIONALLY LEFT BLANK

1 INTRODUCTION

1.1 Purpose

This technical noise report evaluates noise effects of the Grapevine Specific Plan (proposed project), including potential impacts from current and future ambient noise levels upon proposed land uses and noise generation potential from proposed land uses and activities resulting from implementation of the proposed project. Noise generation sources from future implementation of the proposed project include traffic, school-related playground and sports activities, and mechanical equipment and exterior activities from commercial and industrial uses.

1.2 Project Location and Description

1.2.1 Project Location

The Grapevine study area, which includes the 8,010-acre Specific Plan Area and 77 acres of off-site improvements, is located in the west-central portion of Tejon Ranch (the Ranch). The Ranch, an approximately 270,000-acre property, is currently held in private ownership by Tejon Ranchcorp. The Ranch includes a large portion of the Tehachapi Mountains and smaller portions of the San Joaquin and Antelope Valleys. Generally, the Ranch extends from Interstate 5 (I-5) on the western side to State Route 58 (SR-58) on the northern side and SR-138 on the southern side (refer to Figures 1 and 2).

The 8,010-acre Grapevine Specific Plan Area is entirely within unincorporated Kern County, just south of the junction of I-5 and SR-99. Downtown Bakersfield is approximately 25 miles north of the Specific Plan Area, while downtown Los Angeles is approximately 70 miles southeast. The majority of the Specific Plan Area is on the east side of I-5, but a smaller portion lies on the west side of I-5. The Specific Plan Area is bisected by the California Aqueduct (refer to Figure 2).

The study area is within the General Shafter Elementary and Kern Union High School Districts, and the Central Valley Regional Water Quality Control Board region. A majority of the site is within the Wheeler Ridge Maricopa Water Storage District. It is proposed that the study area would be annexed to Tejon–Castac Water District, which currently provides water and wastewater services to the adjacent Tejon Ranch Commerce Center (TRCC) (Figure 2), located immediately north of the proposed project on I-5. The study area is located along I-5, at the gateway to the Central Valley, and is immediately adjacent to the extensive open space that was conserved in the Tejon Ranch Conservation and Land Use Agreement (Ranchwide Agreement).

1.2.2 Project Description

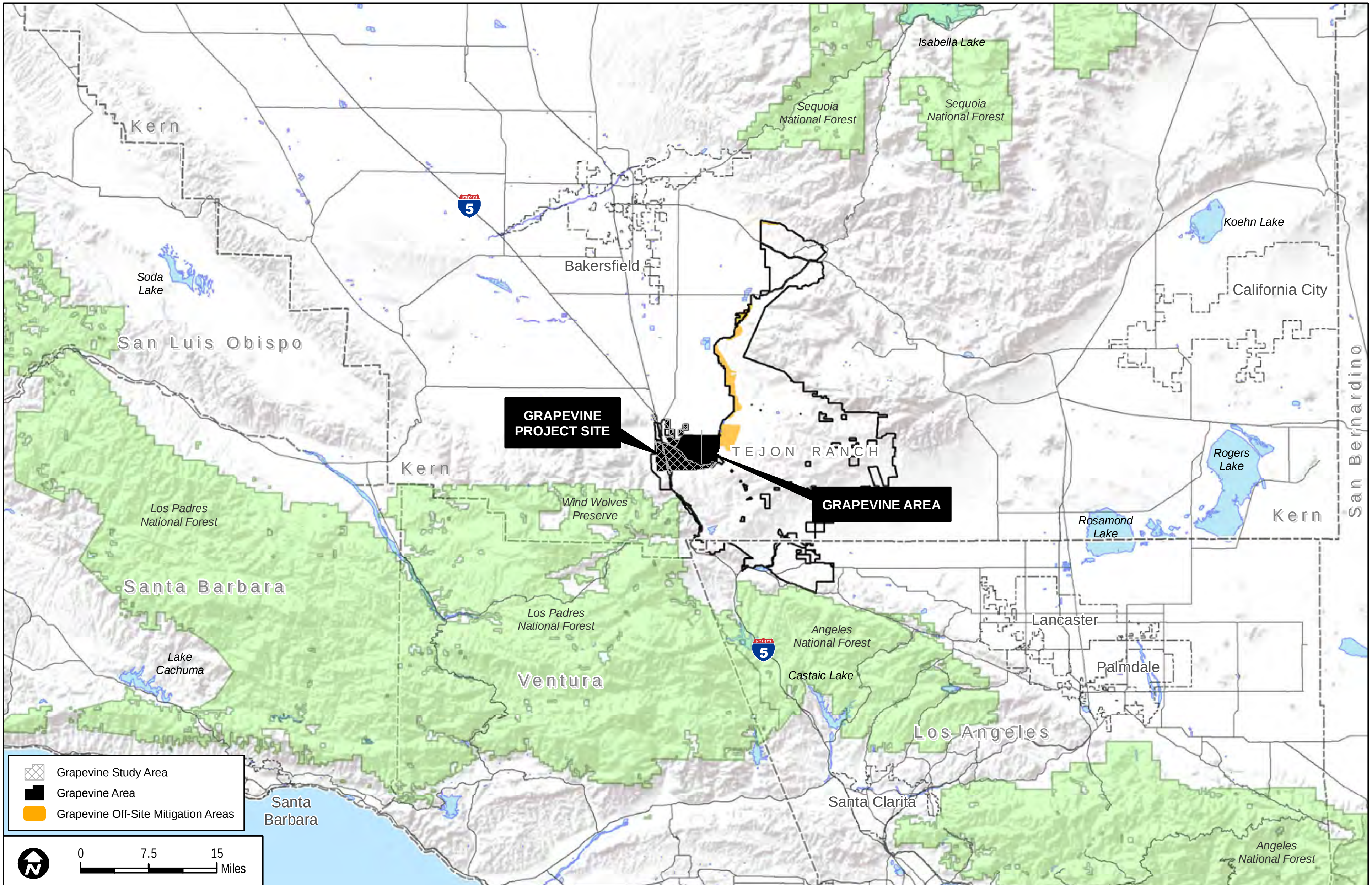
The study area is within the 15,644-acre Ranchwide Agreement Grapevine Development Area identified in the Ranchwide Agreement, a landmark agreement reached in 2008 to permanently preserve over 90% of the Ranch as open space and limit development to designated areas near existing infrastructure such as I-5.

The Grapevine Specific Plan Area includes approximately 8,010 acres, of which, approximately 3,232 acres (or about 40%) would be designated for ongoing open space uses (with grazing and open space as the predominant land uses), while approximately 4,778 acres (60%) would be developed as a residential community and employment center. The proposed new community would leverage and build upon the economic expansion and job growth that has occurred at TRCC (Figure 2), and would feature a series of compact neighborhoods linked by bicycle and pedestrian trails that provide convenient access to grocery and drugstores, professional services, schools, and parks.

The overall development for the entire Specific Plan is restricted to a maximum of 12,000 residential units and 5.1 million square feet of commercial and industrial floor area, is designed as a series of conveniently located village centers, each composed of a mix of housing, neighborhood-serving retail and office uses, schools, parks, and community services (Figure 3). Outside the village cores, the Specific Plan includes a mix of residential uses, office, research and development, regional commercial, freeway-oriented commercial, and light industrial/ warehouse uses (Figure 3). Other potential public facilities, including fire stations, a sheriff substation, transit facilities/park-and-rides, and water and wastewater treatment facilities, are proposed throughout the community.

While the overall development for the entire Specific Plan is restricted to a maximum of 12,000 dwelling units and 5.1 million square feet of commercial and industrial floor area, based on the built and permitted commercial/industrial uses at the adjacent TRCC, the proposed project may ultimately support up to 2,000 additional dwelling units.

The additional 2,000 units would be authorized only with a commensurate reduction of commercial/industrial square footage based on vehicle trip equivalency ratios, and only to the extent that the additional units would not cause any significant new adverse impacts, or increase the severity of previously identified adverse impacts. This mechanism to provide for a future increase in the number of residential units and correlated reduction in commercial and/or industrial uses is necessary to allow flexibility to respond to market demands and to ensure a jobs–housing balance over time, and would be monitored by Kern County staff.



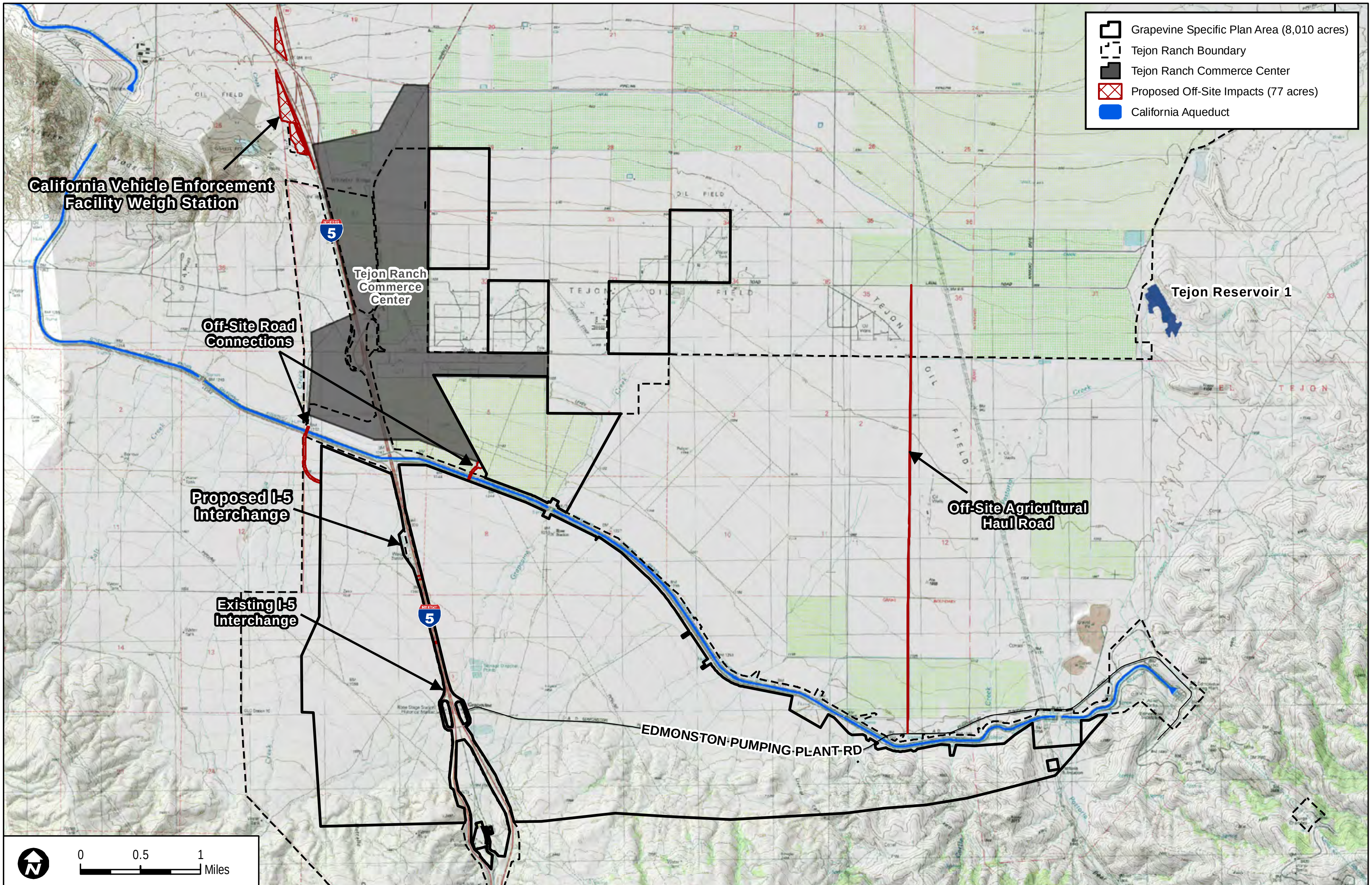
SOURCES: McIntosh & Associates (2013); TRC 2013a, 2013b

The Grapevine project site (McIntosh & Associates 2013) and Tejon Ranch (2013a) boundaries appear on subsequent figures; the source information will not be provided on subsequent figures.

FIGURE 1

Regional Location

INTENTIONALLY LEFT BLANK



SOURCES: McIntosh & Associates 2014; TRC 2013c

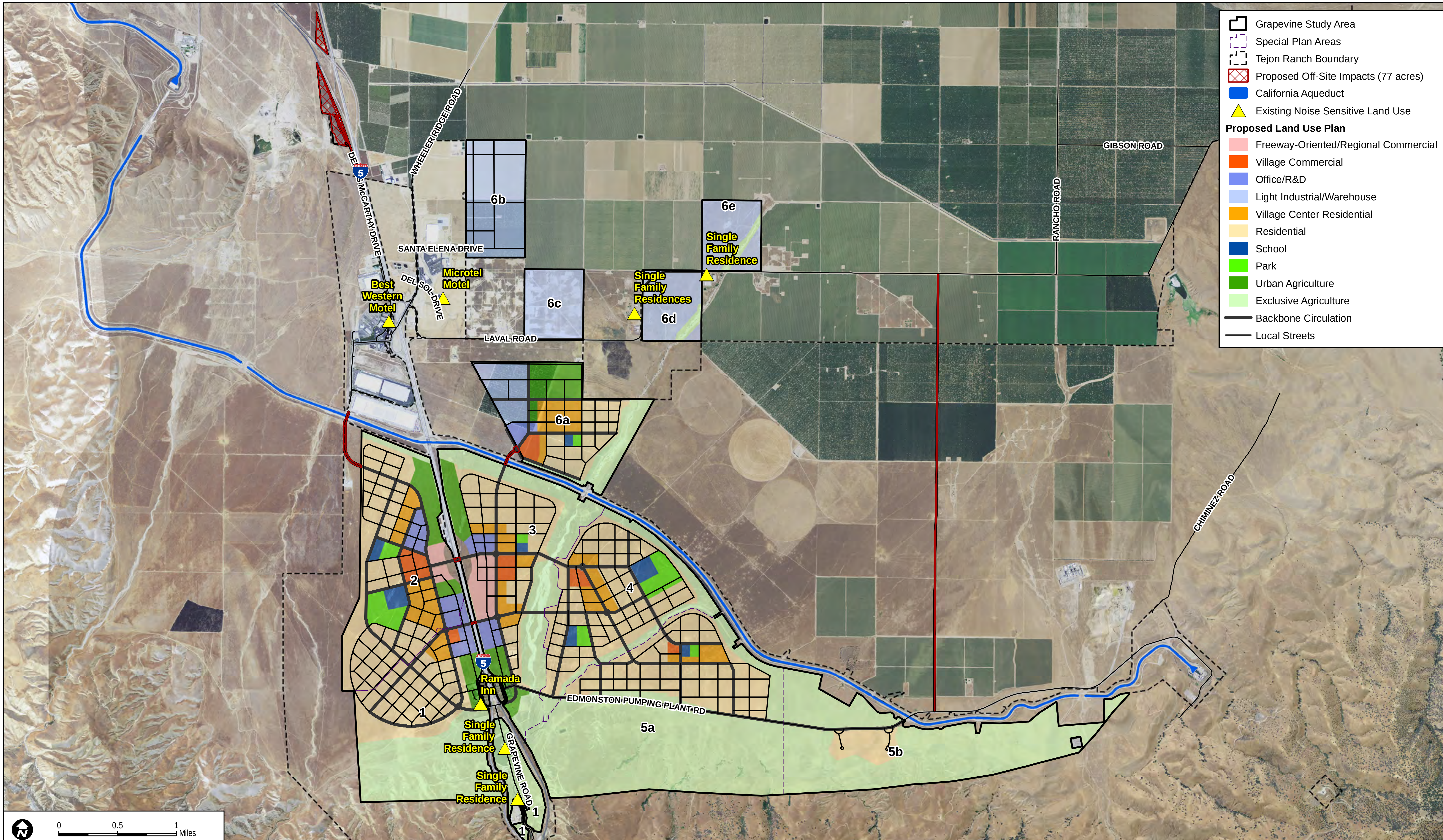
The California aqueduct (TRC 2013c) appears on subsequent figures; the source information will not be provided on subsequent figures.

FIGURE 2

Vicinity Map

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK



SOURCES: Ken Kay Associates 2015

FIGURE 3

Proposed Specific Plan Land Use Plan

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

Access to the first phases of the Grapevine community would be from the existing Grapevine Road and Laval Road interchanges. During later phases of development, the existing Grapevine Road/I-5 interchange may be expanded and relocated to the north, and the existing California Vehicle Enforcement Facility Weigh Station may be relocated to the west side of the junction of I-5 and SR-99. The proposed project would also improve an existing agricultural road east of the Specific Plan Area to provide access for truck traffic currently using Edmonston Pumping Plant Road to travel to properties east of the proposed project.

The proposed circulation network consists of primarily two- and four-lane arterials, collector streets, and local streets organized in a grid pattern (Figure 3). All roads within the study area would be public. Water and sewer service would be provided by the Tejon–Castac Water District.

A trails system is proposed that would include a non-vehicular circulation system to provide pedestrian, bicycle, equestrian, and multi-use trails throughout the proposed project, including in open space separated from, but aligned along both Grapevine Creek and a tributary to Cattle Creek, within the southern foothills, and along the open space adjacent to the California Aqueduct, and at other locations throughout the proposed project. Some of these trails would connect to on-street, Class 1 and 2 bike lanes. This trails network would contribute to the recreational experience within the Specific Plan Area while also providing opportunities for alternative means of transportation within the community. The trail system is designed to accentuate the natural and existing features of the proposed project site, thus, some of the trails would be located within the 3,232 acres of designated open space. The proposed trail system is conceptual. However, proposed trail impacts in designated open space have been conservatively estimated to assume a disturbance of approximately 17 acres of land.

1.2.3 Project Construction Scenario

The study area is divided into 11 planning areas ranging in size from approximately 190 to 1,630 acres. The development area within each planning area, however, ranges from 170 to 920 acres since approximately 3,200 acres of the total 8,010 acres would remain as exclusive agriculture. The portions of the site that are proposed to remain in exclusive agriculture/open space are primarily located along the southern edge of the California Aqueduct, along the southern portion of the study area at the foothills of the Tehachapi Mountains, and along Grapevine and Cattle Creeks.

Development would be phased over a period of 19-plus years. It is anticipated that construction would start with the development of Planning Area 6A and/or 3 and continue with the balance of the planning areas nearest to the initial phase. Buildout of each phase is projected to take approximately 2 to 4 years (Phase 1: 2 years, Phase 2: 4 years, Phase 3: 3 years, Phase 4: 4 years, Phase 5: 4 years, Phase 6: 2 years), with the first phase commencing in 2016. The portions of the site that are proposed to remain in exclusive agriculture/open space are primarily located along the southern edge of the California Aqueduct, along the southern portion of the study area at the foothills of the Tehachapi Mountains, and along Grapevine and Cattle Creeks.

1.2.4 Off-Site Project Improvements

The proposed project includes proposed relocation of the existing I-5/Grapevine interchange to the north, relocation of the existing weigh station/truck inspection facility to the west side of the junction of I-5 and SR-99, and improvement to an existing agricultural road to provide access for haul truck traffic.

The existing I-5/Grapevine interchange is located at the base of the Grapevine after the Tejon Pass between the Fort Tejon and Grapevine interchanges. The grade that culminates at the base is an approximately 5-mile stretch of I-5, including dedicated truck lanes located on the outside lanes of northbound and southbound I-5. In the northbound I-5 direction, there is one dedicated truck lane with a maximum speed limit of 35 miles per hour (mph) to accommodate heavy vehicles driving down the steep decline of the Grapevine. The southbound I-5 direction includes two dedicated truck lanes with a maximum speed limit of 55 mph for heavy vehicles driving up the Grapevine grade. The existing interchange is at the base of the Grapevine; to accommodate northbound passenger vehicles exiting at Grapevine, the northbound truck lane limit controls end on the grade.

Access to the first phases of the Grapevine community would be from I-5 at the existing Grapevine Road and Laval Road interchanges. During later phases of development, the existing Grapevine Road/I-5 interchange is proposed to be expanded and relocated to the north, while some functionality may be retained at the existing interchange location.

An existing southbound I-5 Commercial Vehicle Enforcement Facility (CVEF) is located approximately 1 mile north of the existing interchange. The CVEF is operated and managed by the California Highway Patrol and is a facility that includes truck scales for weighing commercial vehicles to confirm compliance with California Vehicle Code requirements. Operations at the CVEF also include inspections of commercial vehicles for unsafe conditions or equipment such as faulty brakes, steering, and structurally deficient trucks and trailers. To allow for the relocation and replacement of the Grapevine interchange, the CVEF may be relocated to a parcel owned by Tejon Ranchcorp on the west side of the junction of I-5 and SR-99. Two reconstruction scenarios are proposed for the new Grapevine interchange in the event that the existing CVEF is not moved. The preferred scenario is for the interchange to be constructed immediately south of the existing CVEF location and for the CVEF to be relocated to the north at the location mentioned above. Under both scenarios, the existing interchange (including any performance improvement features) may be used until capacity is reached at the existing Grapevine Road/I-5 interchange.

Additional off-site circulation system improvements would include two off-site bridges crossing the California Aqueduct, and potential construction of an off-site alternate truck route to the east of the study area connecting Edmonston Pumping Plant Road and Laval Road.

1.3 Noise Background and Terminology

Fundamentals of Environmental Noise

Vibrations, traveling as waves through air from a source, exert a force perceived by the human ear as sound. Sound pressure level (referred to as sound level) is measured on a logarithmic scale in decibels (dB) that represent the fluctuation of air pressure above and below atmospheric pressure. Frequency, or pitch, is a physical characteristic of sound and is expressed in units of cycles per second or hertz (Hz). The normal frequency range of hearing for most people extends from about 20 to 20,000 Hz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are quieter. As noise levels get louder, the human ear starts to hear the frequency spectrum more evenly. To accommodate for this phenomenon, a weighting system to evaluate how loud a noise level is to a human was developed. The frequency weighting, called “A” weighting, is typically used for quieter noise levels, which de-emphasizes the low-frequency components of the sound in a manner similar to the response of a human ear. This A-weighted sound level is called the “noise level” and is referenced in units of dBA.

Since sound is measured on a logarithmic scale, a doubling of sound energy results in a 3 dBA increase in the noise level. Changes in a community noise level of less than 3 dBA are not typically noticed by the human ear (Caltrans 1980). Changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. A 5 dBA increase is readily noticeable (EPA 1974). The human ear perceives a 10 dBA increase in sound level as a doubling of the sound level (i.e., 65 dBA sounds twice as loud as 55 dBA to a human ear).

An individual’s noise exposure occurs over a period of time; however, noise level is a measure of noise at a given instant in time. Community noise sources vary continuously, being the product of many noise sources at various distances, all of which constitute a relatively stable background or ambient noise environment. The background, or ambient, noise level gradually changes throughout a typical day, corresponding to distant noise sources such as traffic volume and changes in atmospheric conditions.

Noise levels are generally higher during the daytime and early evening when traffic (including airplanes), commercial, and industrial activity is the greatest. However, noise sources experienced during night-time hours when background levels are generally lower can be potentially more conspicuous and irritating to the receiver. In order to evaluate noise in a way that considers periodic fluctuations experienced throughout the day and night, a concept termed "community noise equivalent level" (CNEL) was developed, wherein noise measurements are weighted, added, and averaged over a 24-hour period to reflect magnitude, duration, frequency, and time of occurrence. A complete definition of CNEL is provided below.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (Leq), the minimum and maximum sound levels (Lmin and Lmax), percentile-exceeded sound levels (Lxx), the day-night sound level (Ldn), and the CNEL. Below are brief definitions of these measurements and other terminology used in this report.

- *Decibel (dB)* is a unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- *A-weighted decibel* (dBA) is an overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- *Equivalent sound level* (Leq) is the constant level that, over a given time period, transmits the same amount of acoustic energy as the actual time-varying sound. Equivalent sound levels are the basis for both the L_{dn} and CNEL scales.
- *Maximum sound level* (Lmax) is the maximum sound level measured during the measurement period.
- *Minimum sound level* (Lmin) is the minimum sound level measured during the measurement period.
- *Percentile-exceeded sound level* (Lxx) is the sound level exceeded X% of a specific time period. L_{10} is the sound level exceeded 10% of the time.
- *Day-Night Average Sound Level (Ldn)* The County of Kern describes community noise levels in terms of the Ldn (as well as CNEL [see below]). The Ldn is a 24-hour average A-weighted sound level with a 10 dB penalty added to the nighttime hours from 10:00 p.m. to 7:00 a.m. The 10 dB penalty is applied to account for increased noise sensitivity during the nighttime hours.
- *Community Noise Equivalent Level (CNEL)* is the average equivalent A-weighted sound level during a 24-hour day. CNEL accounts for the increased noise sensitivity during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) by adding 5 dB to the sound levels in the evening and 10 dB to the sound levels at night.

Exterior Noise Distance Attenuation

Noise sources are classified in two forms: (1) point sources, such as stationary equipment or a group of construction vehicles and equipment working within a spatially limited area at a given time; and (2) line sources, such as a roadway with a large number of pass-by sources (motor vehicles). Sound generated by a point source typically diminishes (attenuates) at a rate of 6.0 dBA for each doubling of distance from the source to the receptor at acoustically “hard” sites and at a rate of 7.5 dBA for each doubling of distance from source to receptor at acoustically “soft” sites. Sound generated by a line source (i.e., a roadway) typically attenuates at a rate of 3 dBA and 4.5 dBA per doubling distance, for hard and soft sites, respectively. Sound levels can also be attenuated by man-made or natural barriers. For the purpose of a sound attenuation discussion, a “hard” or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt or concrete ground surfaces, as well as very hard-packed soils. An acoustically “soft” or absorptive site is characteristic of unpaved loose soil or vegetated ground.

With respect to examples of this distance-attenuation relationship for exterior noise, a 60 dBA noise level measured at 50 feet from a lift-station pump within a paved substation site would diminish to 54 dBA at 100 feet from the source, and to 48 dBA at 200 feet from the source. This scenario is addressed by the point source attenuation for a hard site (6 dBA with each doubling of the distance). For the scenario where soft side conditions exist between the point source and receptor, represented by a corridor of vegetation or open ground along the substation perimeter, an attenuation rate of 7.5 dBA per doubling of distance would apply; the lift-station pump noise measured as a 60 dBA noise level at 50 feet would diminish to 52.5 dBA at 100 feet from the source and to 45 dBA at 200 feet from the source, where soft ground with or without vegetation exists between the sound source and the receptor location.

Structural Noise Attenuation

Sound levels can also be attenuated by man-made or natural barriers. Solid walls, berms, or elevation differences typically reduce noise levels by 5 to 10 dBA (Caltrans 1980). Structures can also provide noise reduction by insulating interior spaces from outdoor noise. The outside-to-inside noise attenuation provided by typical structures in California ranges between 17 to 30 dBA with open and closed windows, respectively, as shown in Table 1.

Table 1
Outside-to-Inside Noise Attenuation (dBA)

Building Type	Open Windows	Closed Windows[1]
Residences	17	25
Schools	17	25

Table 1
Outside-to-Inside Noise Attenuation (dBA)

Building Type	Open Windows	Closed Windows[1]
Churches	20	30
Hospitals/Offices/Hotels	17	25
Theaters	17	25

Note: [1] As shown, structures with closed windows can attenuate exterior noise by a minimum of 25 to 30 dBA.
Source: Transportation Research Board, National Research Council, 2000.

Fundamentals of Vibration

Vibration is an oscillatory motion that can be described in terms of displacement, velocity, or acceleration. The response of humans to vibration is very complex. However, it is generally accepted that human response is best approximated by the vibration velocity level associated with the vibration occurrence.

Heavy equipment operation, including stationary equipment that produces substantial oscillation or construction equipment that causes percussive action against the ground surface, may be perceived by building occupants as perceptible vibration. It is also common for groundborne vibration to cause windows, pictures on walls, or items on shelves to rattle. Although the perceived vibration from such equipment operation can be intrusive to building occupants, the vibration is seldom of sufficient magnitude to cause even minor cosmetic damage to buildings.

When evaluating human response, groundborne vibration is usually expressed in terms of root mean square (RMS) vibration velocity. RMS is defined as the average of the squared amplitude of the vibration signal. As for sound, it is common to express vibration amplitudes in terms of decibels defined as:

$$L_v = 20\log\left(\frac{v_{rms}}{v_{ref}}\right)$$

where Vrms is the RMS vibration velocity amplitude in inches/second and Vref is the decibel reference of $1\text{x}10^{-6}$ inches/second.

To avoid confusion with sound decibels, the abbreviation VdB is used for vibration decibels. The vibration threshold of perception for most people is around 65 VdB. Vibration levels in the 70 to 75 VdB range are often noticeable but generally deemed acceptable, and levels in excess of 80 VdB are often considered unacceptable (FTA 2006).

1.4 Noise Regulation and Management

1.4.1 Federal

Federal Aviation Administration Standards

Enforced by the Federal Aviation Administration (FAA), Code of Federal Regulations (CFR) Title 14, Part 150, prescribes the procedures, standards, and methodology governing the development, submission, and review of airport noise exposure maps and airport noise compatibility programs, including the process for evaluating and approving or disapproving those programs. Title 14 also identifies those land uses that are normally compatible with various levels of exposure to noise by individuals. The FAA has determined that interior sound levels up to 45 dBA Ldn (or CNEL) are acceptable within residential buildings. The FAA also considers residential land uses to be compatible with exterior noise levels at or less than 65 dBA Ldn (or CNEL).

Federal Highway Administration Standards

CFR Title 23, Part 772, sets procedures for the abatement of highway traffic noise and construction noise. Title 23 is implemented by the federal Department of Transportation (DOT) Federal Highway Administration (FHWA). The purpose of this regulation is to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria (NAC), and to establish requirements for information to be given to local officials for use in the planning and design of highways. All highway projects that are developed in conformance with this regulation shall be deemed to be in conformance with the DOT-FHWA Noise Standards. Title 23 establishes an NAC of 67 dBA $L_{eq(h)}$ applicable to federal highway projects for evaluating impacts to land uses including residences, recreational uses, hotels, hospitals, and libraries (23 CFR Chapter 1, Part 772, Section 772.19). Additionally, FHWA requires that individual states establish an allowable noise level increase (at or above which the increase is deemed to be "substantial" and abatement should be considered) for Type 1[1] highway projects. Currently, the definition of a "substantial increase" ranges from 5 to 15 dB, depending upon the state.

---

[1] A Type I project as defined in 23 CFR 772, is a federal or federal-aid project for:

1. The construction of a highway on a new location;
2. The physical alteration of an existing highway where there is either: a. Substantial horizontal alteration; b. Substantial vertical alteration;
3. The addition of a through-traffic lane(s).
4. The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane;
5. The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange;
6. Restriping existing pavement for the purpose of adding a through traffic lane or an auxiliary lane;
7. The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

Federal Transit Administration and Federal Railroad Administration Standards

Although the Federal Transit Administration (FTA) standards are intended for federally funded mass-transit projects, the impact assessment procedures and criteria included in the FTA Transit Noise and Vibration Impact Assessment Manual (May 2006) are routinely used for projects proposed by local jurisdictions. The FTA and Federal Railroad Administration (FRA) have published guidelines for assessing the impacts of groundborne vibration associated with rail projects, which have been applied by other jurisdictions to other types of projects. The FTA measure of the threshold of architectural damage for conventional sensitive structures is 0.2 inches/second peak-particle velocity (PPV).

1.4.2 State

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, declares that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also identifies a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the state to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

California Noise Insulation Standards

In 1974, the California Commission on Housing and Community Development adopted noise insulation standards for hotels, motels, dormitories, and multifamily residential buildings (Title 24, Part 2, California Code of Regulations [CCR]). Title 24 establishes standards for interior room noise (attributable to outside noise sources). The regulations also specify that acoustical studies must be prepared whenever a multifamily residential building or structure is proposed to be located near an existing or adopted freeway route, expressway, parkway, major street, thoroughfare, rail line, rapid transit line, or industrial noise source, and where such noise source(s) create an exterior CNEL (or Ldn) of 60 dBA or greater. Such acoustical analysis must demonstrate that the residence has been designed to limit intruding noise to an interior CNEL (or Ldn) of at least 45 dBA (California’s Title 24 Noise Standards, Chap. 2-35).

Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects (California Department of Transportation)

The California Department of Transportation's (Caltrans) protocol specifies the policies, procedures, and practices that are to be used by agencies that sponsor federal or federal-aid highway projects involving new construction or reconstruction. The NAC specified in the protocol are the same as those specified in 23 CFR 772. The protocol defines a noise increase as substantial when the predicted noise levels with project implementation exceed existing noise levels by 12 dBA. The protocol also states that a sound level is considered to approach an NAC level when the sound level is within 1 dB of the NAC identified in 23 CFR 772 (e.g., 66 dBA is considered to approach the NAC of 67 dBA, but 65 dBA is not).

Section 216 of the California Streets and Highways Code

Section 216 of the California Streets and Highways Code relates to the noise effects of a proposed freeway project on public and private elementary and secondary schools. Under this code, a noise impact occurs if, as a result of a proposed freeway project, noise levels exceed 52 dBA L_{eq}(h) in the interior of public or private elementary or secondary classrooms, libraries, multipurpose rooms, or other spaces. This requirement does not replace the "approach or exceed" NAC criterion under FHWA Activity Category D for classroom interiors, but it is a requirement that must be addressed in addition to the requirements of 23 CFR 772.

If a project results in a noise impact under this code, noise abatement must be provided to reduce classroom noise to a level at or below 52 dBA Leq(h). If noise levels exceed 52 dBA Leq(h) prior to construction of a proposed freeway project, then noise abatement must be provided to reduce noise to the level that existed prior to construction of the project.

1.4.3 Kern County

Kern County General Plan

Policy 5 of the Noise Element of the Kern County General Plan (County of Kern 2004) establishes a maximum exterior noise exposure level of 65 dBA Ldn (or CNEL) for noise-sensitive uses, including residences, schools, hospitals, parks, and churches. Policy 5 states that new development of residential or other noise-sensitive land uses (NSLUs) is not permitted in noise-impacted areas unless effective mitigation measures are incorporated into the specific design of such projects to reduce noise levels to 65 dBA Ldn (or CNEL) or less within outdoor activity areas and 45 dBA Ldn (or CNEL) or less within interior living spaces.

Based on Policy 1 of the Noise Element of the Kern County General Plan, new development of industrial, commercial, or other noise-generating land uses will not be permitted if resulting noise levels would exceed 65 dBA Ldn (or CNEL) at the boundary of areas planned and zoned for residential or other NSLUs.

Kern County includes working landscapes that have background noise levels from on site as well as off site (e.g., highway) uses, and also have periodic construction-related or seasonal noise levels. These ambient noise levels vary by location and over time, but are considered part of the County's setting for California Environmental Quality Act (CEQA) purposes. The County's General Plan Noise Element establishes the applicable CEQA significance threshold for noise impacts, and there is no actual or implied "zero decibel" or "any audible noise increase" that is appropriate or applicable to the study area.

Kern County Zoning Ordinance

Section 19.04.252 of the Kern County Zoning Ordinance defines *exterior noise level* as "the noise level near the exterior of a structure usually within fifty (50) feet of the structure."

Section 19.80.030.S (1) restricts noise generated by commercial or industrial uses within 500 feet of a residential use or residential zone district. The commercial or industrial use shall not generate noise that exceeds an average 65 dB Ldn between the hours of 7:00 a.m. and 10:00 p.m. and shall not generate noise that exceeds 65 dB, or which would result in an increase of 5 dB or more from ambient sound levels, whichever is greater, between the hours of 10:00 p.m. and 7:00 a.m. Commercial or industrial facilities that are located in the M-3 zone district are exempt from these noise-generation restrictions.

Kern County Noise Ordinance

Section 8.36.020 of the Kern County Municipal Code (Noise Ordinance) establishes construction noise control standards that would apply to any project construction activity. Construction activity noise restrictions are as follows.

> 8.36.020 - Prohibited sounds.
>
> It is unlawful for any person to do, or cause to be done, any of the following acts within the unincorporated areas of the county:
>
> H. To create noise from construction, between the hours of nine (9:00) p.m. and six (6:00) a.m. on weekdays and nine (9:00) p.m. and eight (8:00) a.m. on weekends, which is audible to a person with average hearing faculties or

capacity at a distance of one hundred fifty (150) feet from the construction site, if the construction site is within one thousand (1,000) feet of an occupied residential dwelling except as provided below:

1. The development services agency director or his designated representative may for good cause exempt some construction work for a limited time.
2. Emergency work is exempt from this section.

INTENTIONALLY LEFT BLANK

2 EXISTING NOISE CONDITIONS

2.1 Transportation Noise Sources

Aviation

The nearest public airports to the study area are the Bakersfield Airport located approximately 25 miles due north, and the Taft-Kern County Airport located approximately 30 miles to the northwest. High-altitude overflights for aircraft using the Bakersfield or Taft-Kern County Airport occur over the study area, but do not contribute to the ambient noise environment within the study area. Mapped noise contours for the Bakersfield Airport are contained within the Bakersfield City limits; mapped noise contours for Taft-Kern County Airport extend less than one-half mile from the runways. A private airstrip exists approximately 1.5 miles due east of the TRCC, on the west side of Laval Road. The airstrip is oriented diagonally on a rectangular piece of land at the east end of the Tejon oil field, and was probably used in the early history of the oil field. There are no improvements such as hangers, fuel service, or radio communication associated with this 3,200-foot dirt landing strip, and no aircraft are known to actively use the strip on a regular basis. The orientation of the dirt strip runway is such that any limited approach and departure operations would be conducted over adjacent cultivated agriculture areas.

Roadways

Vehicular traffic along I-5 is a principal contributor to the existing noise environment within the study area, with several existing local roads being secondary contributors. Regional access to the study area is provided by I-5, and the main portion of the study area also straddles I-5 on the east and west (the largest continuous portion of the Specific Plan lies between the south side of the California Aqueduct and north of Grapevine Road). Primary access to the main portion of the study area is provided by the Grapevine Road interchange on I-5. Grapevine Road East connects to Edmonston Pumping Plant Road, which generally forms the southern boundary for Specific Plan development areas on the east side of I-5. Arterial roads are proposed to extend north from Edmonston Pumping Plant Road to serve future Specific Plan land uses; these arterials would be connected by east/west arterial roads to form a basic grid pattern circulation system. Grapevine Road West extends a short distance to provide access to an existing gas station and motel in the western Specific Plan portion; a future grid street system is proposed to extend from this point northward along the west side of I-5 to the California Aqueduct.

Northern portions of the Specific Plan are generally accessed via the Laval Road interchange on I-5. Land use areas 6c, 6d, and 6e are located along portions of Laval Road East; land use area 6a is accessed from farm roads connecting to Laval Road East. Land use area 6b is accessed from farm roads connecting to Wheeler Ridge Road, which extends from the Laval Road/I-5 interchange.

Railroads

Two rail lines bring passengers and freight through the southern San Joaquin Valley: Union Pacific Railroad (UPRR) and Burlington North Santa Fe (BNSF). Both of these lines are located on the eastern extreme of the San Joaquin Valley. At the closest point to the study area, the railroad tracks pass through Tehachapi approximately 30 miles northeast of the Grapevine Specific Plan. Railroad operations on these lines are not anticipated to contribute to the ambient noise environment within the study area.

2.2 Commercial – Industrial Noise Sources

The majority of the study area is currently open range land, with limited orchard on a few of the northerly portions. In the main portion of the study area, south of the California Aqueduct, a small cluster of commercial structures exists on either side of I-5 at the Grapevine Road interchange; a gas station, motel, and restaurant are located along the Grapevine Road West loop, two restaurants are located along the Grapevine Road east loop. Because of their close proximity to I-5, operational noise from these commercial establishments is generally not audible above the vehicle traffic noise associated with I-5. At the eastern end of Edmonston Pumping Plant Road, there are three industrial sites, including an aggregate mineral quarry, electrical power substation, and the Edmonston Pumping Plant for the California Aqueduct. The quarry and electrical substation are not within either the boundaries of the Specific Plan or the Ranch; the pumping station is within the Ranch but is outside of the Specific Plan Area. The closest Grapevine Specific Plan development area (5a) is located approximately 2 miles to the west of these industrial facilities.

In the northern portion of the study area, extending northward from the California Aqueduct, the TRCC straddles I-5 on the west and east. A factory outlet center is located on the east side of the Laval Road interchange on I-5, with more industrial uses located along Wheeler Ridge Road north of this interchange. A truck transit center and several trucking distribution centers are among the existing uses along Wheeler Ridge Road. Light industrial and warehouse uses are proposed in land use areas 6b, 6c, 6d, and 6e, which are located immediately adjacent or within 1 mile east of the Wheeler Ridge Road portion of TRCC. These land uses are not noise sensitive and would not be adversely affected by existing or future commercial and industrial uses in the TRCC. Proposed land use area 6a of the Specific Plan is located adjacent to the east side at the southern end of the TRCC; land use area 6a is proposed to include warehouse uses on the west side, along with parks, schools, and residences. At the present time, the TRCC factory outlet center is the closest commercial use to area 6a, approximately one-half mile to the west.

The study area is generally surrounded by open range land or cultivated agriculture. The Ranch surrounds the main portion of the study area, with areas outside of the Specific Plan permanently preserved as agriculture or natural open space. The northern portion of the study area is abutted on the north and east by cultivated agriculture and to the west by the TRCC.

2.3 Vicinity Noise-Sensitive Land Uses

NSLUs are land uses that may be subject to stress and/or interference from excessive noise. The Noise Element of the Kern County General Plan (County of Kern 2004) identifies residences, schools, hospitals, parks, churches, and other similar land uses to be NSLU. Industrial and commercial land uses are generally not considered sensitive to noise, with the exception of commercial lodging facilities. There is currently only one on-site NSLU, a Ramada Inn Limited motel on the west side of Grapevine Road West. This motel is located in an area designated for parks under the Specific Plan, although future revisions of the zoning in this area may occur and the motel land use may remain.[2] NSLUs in the immediate vicinity of the study area (shown in Figure 3) include:

- Single-family residence located 0.35 mile south of Grapevine Road interchange, between I-5 northbound and southbound travel lanes;
- Single-family residence located 0.78 mile south of Grapevine Road interchange, between I-5 northbound and southbound travel lanes;
- Best Western motel (5521 Dennis McCarthy Drive, west side of I-5 at Laval Road interchange); and
- Microtel Motel (5620 Del Sol Drive, east side of I-5 at Laval Road interchange).
- Single-family residences (approximately 15) located immediately west of land use area 6d, which is proposed for light industrial/warehouse use.
- Single-family residence located immediately east of land use 6d and south of land use 6e.

[2] The motel currently has a relatively high noise exposure level from I-5, and it would remain so in the future. The motel's exterior use area (a pool and patio area) are well-shielded from the I-5 freeway noise and other future surrounding land uses by being situated within an interior courtyard.

2.4 Proximate Vibration-Sensitive Land Uses

Land uses in which groundborne vibration could potentially interfere with operations or equipment, such as research, manufacturing, hospitals, and university research operations (FTA 2006) are considered "vibration-sensitive." The degree of sensitivity depends on the specific equipment that would be affected by the groundborne vibration. Excessive levels of groundborne vibration of either a regular or an intermittent nature can result in annoyance to residential uses. There are no known vibration-sensitive land uses within 15 miles of the study area.

2.5 Existing Noise Levels

Existing (pre-project) noise conditions present in the study area and in the vicinity of NSLUs in the region were inventoried by Dudek in November 2013. Two types of sound-level measurements were taken: 24-hour measurements were performed within each of the land use areas where NSLUs are proposed, at locations removed from existing roadways and short-term (varying from 15 to 30 minutes) measurements were performed along existing roadways to characterize noise levels associated with transportation facilities and for calibration of the transportation noise model.

Sound-level measurements were performed using a total of four different integrating sound-level meters: A Larson Davis Model 800 American National Standards Institute (ANSI) Type I, a Larson Davis Model 720 ANSI Type II, and two SoftdB Piccolo Models ANSI Type II. ANSI Type I and Type II sound-level meters both have sufficient accuracy to be used for environmental noise evaluation. The sound-level meters were calibrated before and after each series of measurements using a Larson Davis Model CAL150 calibrator.

A total of seven long-term measurements (24-hour duration) were taken where a proposed NSLU would be developed on site. Table 2 summarizes the minimum (L_{min}) and maximum (L_{max}) sound levels recorded for each monitor location during the 24-hour measurement, as well as the calculated 24-hour weighted average noise level (Ldn). The conceptual future land uses proximate to the sound monitor location, dates of the measurement, and sound sources affecting the monitoring location are also provided in Table 2 for each monitor location. The long-term monitoring locations (denoted LT#) are illustrated on Figure 4.

Table 2
Ambient Sound Level Measurements (dBA)

Site	Location	Noise Sources	Dates	L_{dn}	L_{max}	L_{min}
LT1	South-central portion of Land Use Area 1, future low density residential, open space	Distant vehicular traffic on I-5	11/7/2013 – 11/8/2013	58	63.3	49

Table 2
Ambient Sound Level Measurements (dBA)

Site	Location	Noise Sources	Dates	L_{dn}	L_{max}	L_{min}
LT2	Western-central portion of Land Use Area 2, future low density residential, park, school	Distant vehicular traffic on I-5	11/7/2013 – 11/8/2013	56	58	45
LT3	Central portion of Land use Area 3, future Village Central Residential, park	Vehicular traffic on I-5	11/7/2013 – 11/8/2013	61	60.3	44.7
LT4	Western-central portion of Land Use Area 4, future Village Central Residential and low density residential	Distant vehicular traffic on I-5	11/6/2013 – 11/7/2013	53	49.8	41.4
LT5	South-central portion of Land Use Area 5a, future low density residential, Village Central Residential, park, school	Traffic along Edmonston Pumping Plant Road	11/6/2013 – 11/7/2013	45	47.5	33.5
LT6	Eastern portion of Land Use Area 5b, future low density residential	Traffic along Edmonston Pumping Plant Road, distant industrial uses including aggregate quarry, electrical sub-station, Edmonston Pumping Plant	11/6/2013 – 11/7/2013	58	57	38.4
LT7	Central portion of Land use Area 6a, future Village Central Residential, park	Distant vehicular traffic on I-5 and commercial / industrial uses in TRCC (0.5 mile west)	11/6/2013 – 11/7/2013	49	45.6	39.2

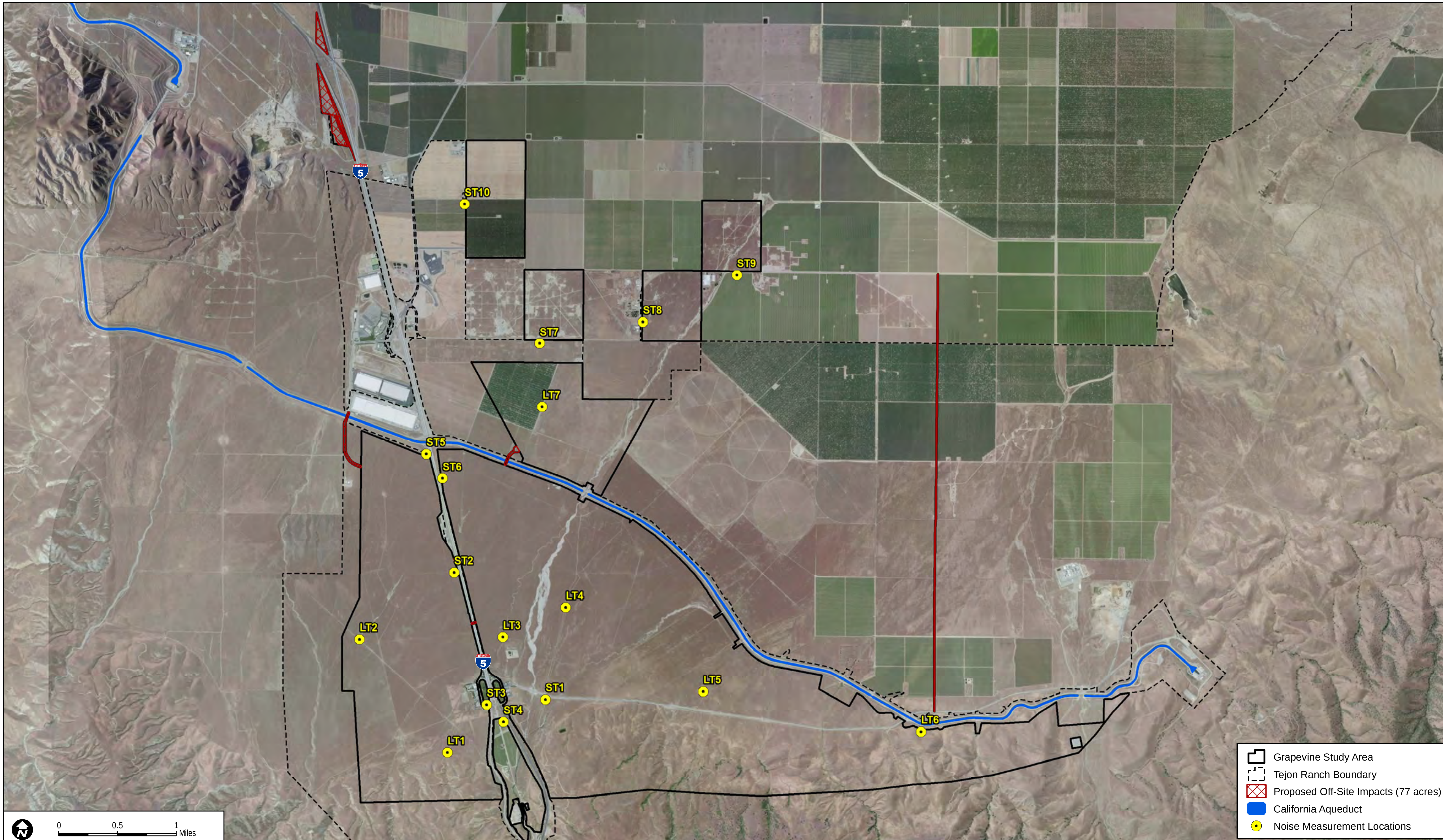
The results of the ambient noise survey from long-term measurements reflect noise levels that range between 45 and 61 dBA L_{dn} (or CNEL) within various land use areas of the Specific Plan where NSLUs are proposed to be located. The primary noise source contributing to the ambient noise environment within future development areas of the Specific Plan was traffic, despite the selection of noise monitor locations distant from principal roadways. I-5 is a major roadway and contributor to the ambient noise environment in the vicinity of the study area. As described previously, the siting of NSLU should avoid areas with ambient noise levels exceeding 65 dBA L_{dn} (or CNEL); the ambient noise levels recorded at each of the long-term monitor locations would fall within acceptable levels for NSLU as specified in the Kern County General Plan.

Since roadway traffic is often a primary contributor to the noise environment in any community, short-term noise measurements were also conducted adjacent to the existing roadways within the Specific Plan. These measurements are useful in characterizing ambient noise levels along roadways, as well as providing sound data and manual traffic counts used to calibrate the transportation noise model. A total of 10 short-term noise measurements were conducted. The results of short-term roadway traffic noise measurements are presented in Table 3.

Table 3
Roadway Noise Level Measurements (Existing) (dBA)

ST #	Measure-ment Date	Measurement Time Period	L_{eq}	L_{max}	L_{min}	Remarks
1	11/6/2013	9:30 – 9:45	69.1	83.9	42	Pumping Plant Rd #1, 2-lane arterial
2	11/6/2013	11:15 – 11:20	79.1	85.1	69.6	SB I-5, 1/4 mile south of weigh station
3	11/6/2013	11:45 – 11:50	67.7	74.2	58.2	Across wash from Grapevine Ramada
4	11/6/2013	12:50 – 12:55	66.5	76.5	56.1	Near bottom of grade, 300' south of GV Rd undercrossing
5	11/7/2013	14:00 – 14:10	80.6	91.2	68.5	I-5 SB
6	11/7/2013	14:45 – 14:50	81.8	96.1	69.3	I-5 NB
7	11/7/2013	16:10 – 16:25	62.7	80.9	38.8	Adjacent to Laval Road, 6c
8	11/7/2013	16:50 – 17:05	50.2	71.3	43.9	Adjacent to Laval Road, 6d; Very light traffic, mostly background noise (oil pump, distant industrial plant)
9	11/7/2013	16:40 – 16:50	62.7	83.8	35.4	Adjacent to Laval Road, 6E
10	11/7/2013	15:30 – 15:45	38.3	54.2	34.4	Very low ambient noise levels, north end of study area dirt road, distance Caterpillar plant noise

The short-term roadway noise measurement locations (denoted ST#) are illustrated on Figure 4. The highest recorded average noise levels were associated with traffic on I-5, and ranged from 67 to 82 dBA L_{eq} with distances between approximately 150 and 40 feet from the edge of pavement. Noise along Edmonston Pumping Plant Road was recorded as 69 dBA L_{eq} at a distance of approximately 25 feet from the edge of pavement. Laval Road, which is adjacent to many of the proposed land use areas in the northern portion of the Specific Plan, had recorded noise levels between 50 and 63 dBA L_{eq} at a distance of approximately 20 feet from the edge of pavement. With the exception of I-5, current roadway noise for existing local roadways would generally not exceed acceptable levels for NSLU at a distance of greater than 25 feet from the edge of the roadway.



SOURCES: Ken Kay Associates 2015

FIGURE 4
Noise Measurement Locations

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

3 SIGNIFICANCE CRITERIA

Based on the criteria identified in Appendix G of the CEQA Guidelines, the proposed project would have a significant impact on noise if it would result in:

1. The exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
2. The exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?
3. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

3.1 County of Kern Noise Significance Criteria

Section 3.2 of the Noise Element of the Kern County General Plan (County of Kern 2004) defines noise-sensitive areas to include:

- Residential areas
- Schools
- Convalescent and acute care hospitals
- Parks and recreational areas
- Churches.

The above types of occupancies or development are also commonly referred to as NSLUs.

Policy 5 of the Noise Element specifies the exterior noise limit for NSLU to be 65 dBA Ldn (or CNEL) within outdoor activity areas or 45 dBA Ldn (or CNEL) within interior living spaces. Consequently, significant impacts would occur if new residences, schools, hospitals, park and recreation areas, or churches were constructed in areas with existing ambient, or future predicted, noise levels exceeding 65 dBA Ldn (or CNEL).

For transportation-related noise, impacts are considered significant if proposed project-generated traffic exposes existing or potential NSLU to sound levels in excess of 65 dBA Ldn (or CNEL). In areas where the ambient noise exceeds 65 dBA Ldn (or CNEL), a 3 dBA Ldn (or CNEL) or greater increase due to the proposed project is considered significant.

Based on Policy 1 of the Noise Element of the Kern County General Plan (County of Kern 2004), impacts relating to operational noise are considered significant when proposed project-related commercial or industrial noise would result in exposure of NSLUs to noise levels exceeding 65 dBA Ldn (or CNEL).

With respect to noise generation during construction, Section 8.36.020 of the Kern County Municipal Code (Noise Ordinance) establishes construction noise control standards that would apply to any proposed project construction activity. Generally, noise-generating construction activities are restricted to the period between 6 a.m. and 9 p.m. weekdays and between 8 a.m. and 9 p.m. on weekends. Construction noise outside these allowable periods would be considered significant if it is audible to a person at a distance of 150 feet of the construction activity, if the construction site is within 1,000 feet of an occupied residential dwelling.

Impacts related to excessive groundborne vibration would be significant if the proposed project results in the exposure of persons to or generation of excessive groundborne vibration equal to or in excess of 0.2 in/sec PPV. Construction activities within 200 feet and pile driving within 600 feet would be potentially disruptive to vibration-sensitive operations (Caltrans 2004).

4 IMPACTS AND MITIGATION

4.1 Transportation Noise Exposure Impact Analysis

Aviation Noise

The study area is located approximately 25 miles due south of Bakersfield Airport and 30 miles southeast of the Taft-Kern County Airport. The study area is not located within the airport approach and departure zone for either the Bakersfield Airport or the Taft-Kern County Airport, and the mapped noise contours for these airports do not extend to the vicinity of the study area (County of Kern 2012). A private airstrip exists approximately 1.5 miles due east of the TRCC, on the west side of Laval Road. There are no improvements such as hangers, fuel service, or radio communication associated with this 3,200-foot dirt landing strip, and no aircraft are known to actively use the strip on a regular basis. The Grapevine Specific Plan includes the parcels abutting the airport property on the west and east, and designates these parcels for light industry or warehousing. These land uses are not noise-sensitive and would therefore not be impacted by any infrequent ground-based activity at the airstrip. With the orientation of the dirt strip runway, any limited aircraft operations would have arrival and departure patterns above open space or agriculture portions of the Grapevine Specific Plan. Thus, this unimproved private airstrip is not anticipated to have operational noise that would affect NSLUs within the Grapevine Specific Plan Area. It is not foreseeable that additional aviation uses would be introduced in the immediate vicinity of the study area. In addition, the implementation of the proposed project would not result in a significant impact on future air traffic operations. Therefore, NSLUs would not be exposed to excessive noise levels from aviation noise as a result of the proposed project. The final buildout of the proposed project would have a less-than-significant impact related to exposure to aircraft noise.

Roadway Noise

Project design features incorporated to reduce roadway noise include the following:

- The proposed project's Specific Plan/Land Plan requires a 50-foot buffer from the I-5 freeway be preserved.

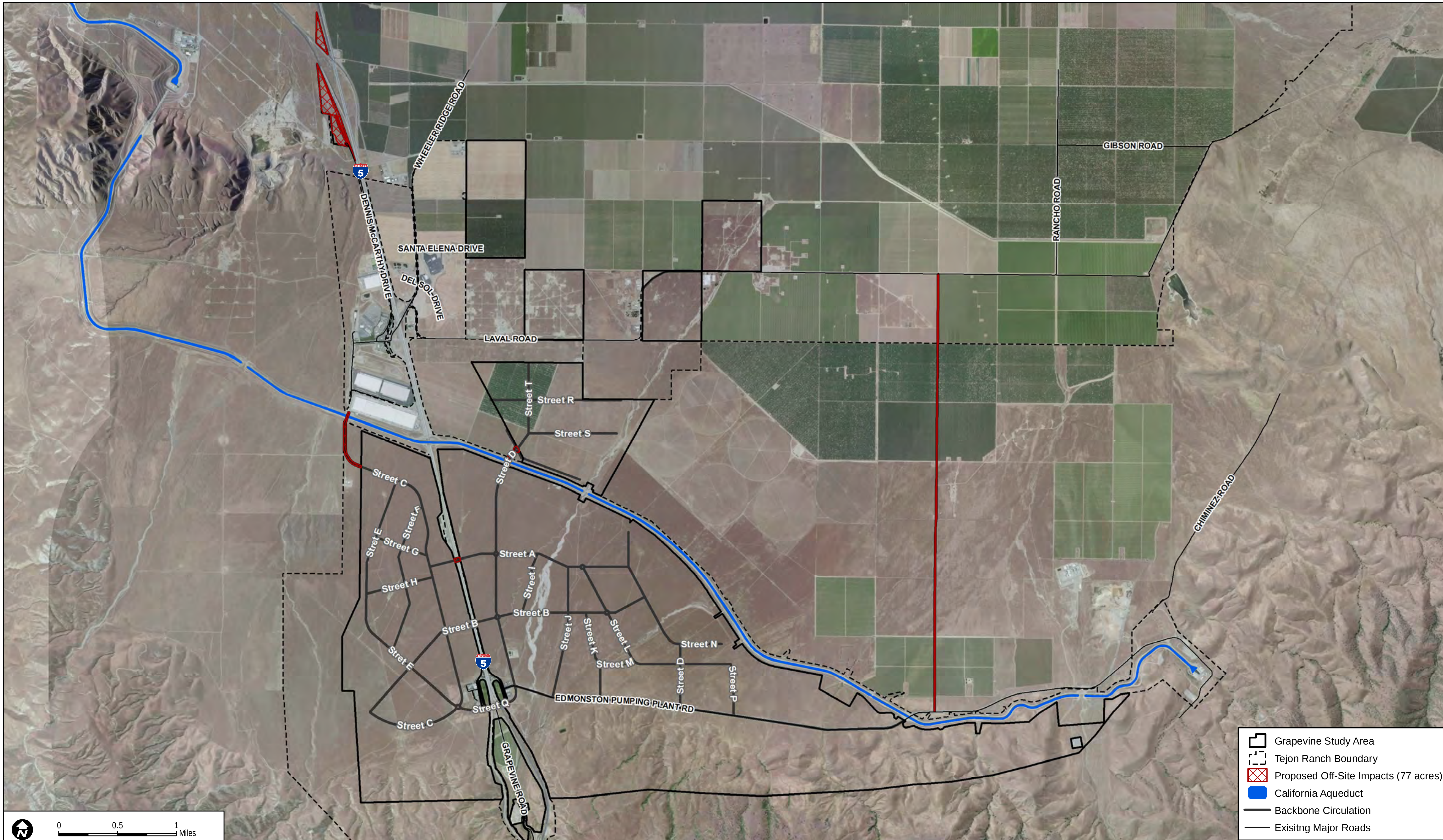
Traffic Noise Exposure

The FHWA transportation noise model (TNM Version 2.5) was calibrated first, before using the model to evaluate existing and future noise levels from traffic. Traffic counts were made during the noise measurements. To calibrate the noise model, the same traffic volume and vehicle composition ratios counted during the noise measurements were used along with the observed vehicle speed (which may differ from the posted speed limit for the roadway). Using vehicle counts and observed speeds, the modeled noise values were within 2 dB of the measured noise levels, which confirms the accuracy of the inputs used in the noise model. The proposed project transportation engineers (Fehr & Peers) provided trip generation data and resulting roadway traffic volumes for each of the major roadways within the Grapevine Specific Plan, including I-5. For future roadway segments evaluation, Fehr & Peers provided speed limit, vehicle composition ratios, and traffic volumes for the proposed project and for cumulative projects. Proposed project roadway segments evaluated in the traffic study and noise study are illustrated in Figure 5.

As part of the CNEL calculation process, it is assumed the average hourly traffic volume in the analysis is approximately equal to 10% of the average daily trips (ADT). Ten percent of the ADT is generally accepted to be roughly equivalent to the worst-case hourly traffic volume; using this value in the noise model results in an average hourly equivalent noise level that is approximately equal to the CNEL for the corresponding ADT and actual hourly traffic distribution. Thus, this relationship results in a CNEL value that is representative of traffic noise resulting from typical daytime, evening, and nighttime traffic distribution.

To assess noise exposure for NSLUs situated along roadways, the analysis uses the greatest anticipated future roadway traffic volume. This is the scenario associated with the proposed project plus cumulative traffic forecast. Using the planned roadway sections and identified future traffic volumes (from proposed project development and cumulative traffic), traffic noise along each of the proposed project-related roadways was modeled using TNM 2.5. Receptor points in the noise model were placed at 50-foot intervals outward from the roadway centerline, in order to identify the distance at which the 65 dBA CNEL contour would occur from the roadway centerline. The border of the 65 dBA CNEL contour marks the line, outside of which, noise from traffic would not represent a significant impact upon future NSLUs, such as residences, parks, schools, and hospitals. The results of the modelling are presented in Table 4.

Generally, noise from heavily traveled roadways would experience a decrease of approximately 3 dBA for every doubling of distance from the roadway. The noise model does not take into account the sound-attenuating effect of intervening structures, barriers, vegetation, or topography. Therefore, the noise levels predicted by the model are conservative.



SOURCES: Ken Kay Associates 2015

FIGURE 5

Roadway Network

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

For most of the proposed project roadways, the only improvements within 50 feet of the roadway centerline would include paved travel lanes and parkway, with or without a sidewalk. Therefore, where the future roadway traffic noise level at 50 feet from the roadway centerline was determined to be 65 dBA CNEL or less, significant impacts upon adjacent NSLUs would not be anticipated to occur. On the other hand, where the future traffic noise level is predicted to exceed 65 dBA CNEL at 50 feet from the roadway centerline, potentially significant noise impacts upon adjacent NSLUs could occur.

As illustrated in Table 4, 20 of the 27 proposed project roadway segments analyzed for future traffic-related noise would have noise levels that exceed 65 dBA CNEL at 50 feet or more from the roadway centerline, including land uses that would be noise-sensitive (i.e., residential uses, parks, and schools). Consequently, future proposed NSLUs could be exposed to traffic-related noise levels that exceed 65 dBA CNEL, resulting in a potentially significant noise impact.

Table 4
Future Roadway Noise Contours
Cumulative Traffic Levels Including the Proposed Project

Street Segment	Land Use Designations	dBA CNEL @ 50 feet from C.L.	Distance (in feet) to 65 dBA CNEL Boundary
Land Use Area 1			
Street B, from Street C to Street E	Residential	62	25
Street C, from Street B to Street Q	V.C. Residential, Vill. Commercial, Residential	69	150
Land Use Area 2			
Street C, from Industrial Parkway to Street G	Village Center (V.C.) Residential, Village Commercial, Residential	71	250
Street C, from Street G to Street A	Village Commercial, Freeway Commercial	73	400
Street C, from Street A to Street H	Village Commercial, Freeway Commercial	72	300
Street C, from Street H to Street B	V. C. Residential, Village Commercial, Office	69	150
Street E, from Street C to Street B	Residential, Park, School	61	25
Interstate 5	Park, Freeway Commercial, Office/R&D	87	750
Land Use Area 3			
Street A, from Street D to Street I	V.C. Residential, Park, School	74	400
Street B, from Street C to Street E	Village Center Residential, Village Comm.	62	25
Street D, Edmonston PP Rd. to Street B	Village Center Residential, Residential, Park	66	75
Street D, Street B to Street A	V.C. Residential, Village Commercial	71	200
Street D, Street A to Del Oro Dr.	Village Center Residential, Residential	67	100
Street I, Street B to Street A	Village Center Residential, Residential	65	50
Interstate 5	Park, Freeway Commercial, Office/R&D	87	750

Table 4
Future Roadway Noise Contours
Cumulative Traffic Levels Including the Proposed Project

Street Segment	Land Use Designations	dBA CNEL @ 50 feet from C.L.	Distance (in feet) to 65 dBA CNEL Boundary
Land Use Area 4			
Street A, from Street J to L	Village Center Residential, Village Comm.	71	175
Street A, from Street L to N	Village Center Residential, Residential	68	100
Street B, from Street I to J	Residential	67	75
Street B, from Street J to L	Village Center Residential, Residential	66	75
Street B, from Street L to N	Village Center Residential, Residential	57	10
Street J, from Street A to B	Village Commercial, Residential	67	75
Street J, from Street B to Edmonston PP Rd.	Residential, School, Park	67	75
Street L, from Street A to B	Residential, School, Park	63	25
Land Use Area 5a			
Edmonston PP Rd., Street J to K	Residential	66	75
Land Use Area 5a			
Edmonston PP Rd., East of K Street	Residential	66	75
Land Use Area 6a			
Street D, Del Oro Rd to Street S	Village Commercial, Office/R&D	66	75
Street T, from Street R to Street S	Village Center Residential, Park	65	50

Distances calculated in feet from the roadway centerline and rounded (generally) to 25-foot increments. Noise levels are based upon traffic volume data provided by Fehr & Peers (2015). See Appendix A for TNM 2.5 model results.

Off-Site Noise Impacts Associated With Project Traffic

Traffic-related noise impacts, especially in the context of a Specific Plan analysis, must primarily evaluate the future noise environment resulting from long-range community buildout. This is performed using the traffic volumes anticipated from full development under the Specific Plan, compared with background or cumulative traffic from all other development in the region. Future project traffic volumes within the development are largely derived from the proposed project itself, and are addressed by noise barriers and other measures (see Section 4.2, Transportation Noise Exposure Mitigation Measures). With distribution of proposed project-generated trips onto the area roadway network off site, the noise attributable to proposed project-contributed trips versus regional traffic becomes largely indistinguishable. While an extensive level of cumulative development is not anticipated to occur within the Grapevine/Wheeler Ridge area, many areas accessed via I-5 are anticipated to experience substantial growth, leading to increases in traffic volumes on I-5 and the local interchanges in the study area. However, the number of NSLUs outside the Specific Plan in the study area are very limited.

Table 5 compares the traffic-related noise level at the identified off-site NSLUs for existing, existing plus project, cumulative, and cumulative with proposed project traffic levels.

Table 5
Traffic Related Noise Levels
Off-Site NSLU (dBA CNEL)

Receiver	Existing	Existing with Project	Cumulative	Cumulative with Proposed Project
Residences South of Proposed Project	61.9	64.3	66.2	67.6
Best Western	69	71.1	72.6	73.5
Microtel Inn & Suites	62.4	68.3	64	68.5
Residences west of area 6d[3]	51.1	53.5	51.1	53.5
Residence south of area 6e[3]	57.4	59.8	57.4	59.8

Proposed project-related traffic noise increases would be less than 3 dB (2.4 dBA) at the residences south of the study area, located between the I-5 northbound and southbound lanes. The proposed project would also increase the noise level at these residences by only 1.4 dBA CNEL above the levels associated with cumulative traffic. The proposed project-related traffic noise increase would also be less than 3 dBA (2.1 dBA) at the Best Western, and would increase the cumulative traffic noise level by only 0.9 dBA. At the residences adjacent to areas 6d and 6e, the proposed project-related traffic noise increase is estimated to be approximately 2.4 dBA. Therefore, the proposed project would not cause a significant noise impact at these NSLUs, and would not contribute substantially toward a cumulatively significant impact.

At the Microtel, the proposed project would increase traffic-related noise levels by 5.9 dBA CNEL and would increase traffic-related noise levels above cumulative traffic noise by 4.5 dBA CNEL. The Microtel has been constructed within the last year, employing noise control construction methods to address immediate proximity to I-5 traffic. The Microtel does not have any exterior use areas that would be subject to the County 65 dBA CNEL exterior noise criterion. Therefore, even though traffic-related noise increases at the Microtel attributed to the

3 Traffic volume estimates based upon Fehr & Peers traffic estimate for this segment of Laval Road of approximately 400 ADT (up to 40 AM/PM peak-hour trips) for existing and cumulative, and up to 30 AM/PM peak-hour trips with the project (e-mail from Robert Hananouchi, 11/25/15)

proposed project would exceed 3 dBA CNEL, the facility is not deemed to be significantly impacted by the predicted proposed project-related traffic noise increase

Railroad Noise

UPRR and BNSF lines are located on the eastern extreme of the San Joaquin Valley. At the closest point to the study area, the railroad tracks pass through Tehachapi approximately 30 miles northeast of the Grapevine Specific Pan. No noise contours have been established for UPRR or BNSF operations in Kern County; however, the Kings County General Plan calculated the 60 dBA noise contour for UPRR operations. According to the Kings County General Plan, the 60 dBA (Ldn) noise contour extends 375 feet from the rail line. This contour represents the worst-case scenario based on four trains passing daily, including one nighttime train, and including train horns (County of Kings 2004). All proposed NSLUs in the study area would be located at least 30 miles away from the rail line and rail noise from the UPRR and BNSF rail corridors would not be audible. Therefore, NSLU would not be exposed to excessive noise levels from railroad noise as a result of the proposed project, and no impact would occur.

4.2 Transportation Noise Exposure Mitigation Measures

The following mitigation measures would reduce potential noise impacts due to proposed project-related traffic to the extent feasible.

Noise-1 **I-5 Noise Barrier**. The 65 dBA CNEL noise contour from I-5 would extend up to 750 feet from the freeway centerline. At the present time, the Proposed Specific Plan Land Use Map does not have NSLUs located within 750 feet of the I-5 centerline. However, the Land Use Map is preliminary in nature and subject to change.. Therefore, if a park or other NSLU is proposed within the 65 dBA contour associated with I-5, a noise barrier (typically a wall, berm, or a combination of berm and wall) would be required in order to protect such uses. Based upon the preliminary information available, the height of the noise barrier or barriers would range from approximately 10 to 20 feet depending upon the specific location, elevation, and site design of the NSLU or NSLUs. The noise attenuation barrier's height, length, location, and material will be determined through a detailed acoustical analysis performed by a County-approved acoustical engineer or equivalent, prior to approval of building permits for the individual project. The model will take into account the traffic volume, mix of cars and medium and heavy trucks, road gradient, and the characteristics of the project site and intervening terrain.

Noise-2 **Site-Specific Acoustic Analysis**. Future residences or other NSLUs (e.g., schools, hospitals, hotels, etc.) proposed within the 65 dBA CNEL noise contour of any proposed project roadway depicted on Figure 5 would require a site-specific acoustical analysis conducted by a County-approved acoustical engineer or equivalent. The acoustical analysis shall demonstrate that the proposed residence (or school) would not be exposed to an exterior noise level that would exceed 65 dBA CNEL within outdoor activity areas and 45 dBA CNEL within interior living spaces, in accordance with the Kern County General Plan policies. Measures to reduce noise levels may include, but would not be limited to, double-paned windows, setback of structures from the roadway, or installation of a noise barrier. Based upon the preliminary information available, barrier heights would range from approximately 6 to 10 feet depending upon the specific location, elevation, and site design of the NSLU. In instances where the windows and doors must remain closed to achieve the required acoustical isolation, mechanical ventilation or air conditioning must be provided.

Residual Significance After Mitigation

Implementation of Mitigation Measure Noise-1 would require the applicant to install a noise barrier if a park or other noise-sensitive use is located within the 65 dBA contour associated with I-5. Such noise barrier would reduce potentially significant noise exposure levels to insignificance.

Implementation of Mitigation Measure Noise-2 would require that exterior noise levels for future residential development and other NSLU are reduced to the standard established by the Kern County General Plan and impacts would thereby be reduced to a less-than-significant level.

4.3 Cumulative Transportation Noise Impacts

Aviation and Railroad Noise

No additional aviation or railroad uses are planned to be introduced in the immediate vicinity of the study area, according to the Kern County Airport Land Use Commission (County of Kern 2012) and RailAmerica (2010). In addition, the proposed project does not propose any new air traffic or railroad operations. No NSLU would be exposed to excessive noise levels from aviation or railroad noise as a result of the proposed project. Therefore, a significant cumulative impact would not occur.

Roadway Noise

The proposed project, along with future regional growth, and other projects to be developed within the proposed project vicinity would result in increases in traffic that would cumulatively increase traffic noise at six off-site NSLUs (see Table 5). While the noise levels from cumulative traffic with the proposed project is anticipated to increase the noise levels at four of the off-site NSLUs (the two residences south of the proposed project, the Best Western Motel, and the Microtel Inn) by more than 3 dBA CNEL compared to existing noise levels, the proposed project would not contribute noise of 3 dBA at five of the sites (two residences south of the proposed project, two residences adjacent to areas 6d and 6e,[4] and the Best Western); the proposed project would therefore not substantially contribute to a cumulatively significant impact at these NSLUs. At the sixth site, a new Microtel motel, even though the proposed project would cause an increase of more than 3 dBA CNEL, and cumulative traffic noise would also increase by more than 3 dBA CNEL over existing, this facility has no exterior use areas that would be subject to compliance with the County exterior noise criterion. Modern noise control construction techniques have been incorporated into the new Microtel, and interior noise levels would be anticipated to continue to meet the interior noise criterion in the future.

4.4 Noise Generation – Project Land Uses

The implementation of the proposed project would also result in changes to existing noise levels in the study area by developing new stationary sources of noise and by increasing human activity throughout the study area. These sources may affect NSLUs both on and off the study area. Proposed NSLUs associated with the proposed project include schools, recreational areas, residential development, and potentially lodging facilities. Potential noise generating land uses on site include mixed-use commercial, public or quasi-public uses including utility and service districts such as police and fire stations, schools, and parks. The Master Infrastructure Plan associated with the proposed project includes equipment that has the potential to generate noise such as pump stations and water treatment facilities.

4.4.1 Commercial Development

Potential operational noise sources associated with commercial development within the study area include heating-ventilation-air-conditioning (HVAC) equipment, commercial truck

[4] These homes are located immediately adjacent to existing industrial, commercial ag & oil extracting activities, and are therefore located in a somewhat noisy existing environment. Because the proposed project does not propose a large increase in square footage of uses for areas 6d and 6e, it is anticipated that the noise generated by the proposed project would not result in a significant increase in noise levels.

deliveries, exterior sound amplification (public address systems), and any sizable surface parking lots (exterior parking areas not enclosed in a garage or parking structure).

Mechanical HVAC equipment located on the ground or on rooftops of new buildings have the potential to generate noise levels which average 71 dBA CNEL at a distance of 50 feet when equipment is operating continuously for 24 hours. Depending on where it is located, HVAC equipment could have the potential to generate noise that may exceed 65 dBA at nearby residences and other NSLUs. For a single point source such as a piece of mechanical equipment, the sound level normally decreases by about 6 dBA for each doubling of distance from the source under "hard-surface" conditions typical of a developed commercial site. Therefore, it is assumed that HVAC equipment would generate noise levels that exceed 65 dBA within approximately 100 feet of the equipment. Consequently, any on-site residences or other noise-sensitive land use proposed within 100 feet of an HVAC system associated with a new commercial use, or any development that proposes HVAC equipment within 100 feet of an existing off-site residence, could result in a potentially significant impact.

The nearest off-site residences are located to the south of the study area. The nearest residences are located approximately 0.35 and 0.78 mile south of the existing Grapevine Road loop. Therefore, the proposed project would not result in a significant impact to off-site receptors related to on-site HVAC equipment.

In addition to HVAC systems, commercial land uses also have the potential to generate noise from truck deliveries and other mechanical equipment. Noise levels associated with commercial uses generally range from 65 dBA and 69 dBA at a distance of 50 feet from the noise source (PBS&J 2009). Assuming commercial land uses would be operating from 9:00 a.m. to 9:00 p.m. with a noise level of 69 dBA at 50 feet from the noise source, commercial development would have the potential to result in noise levels above 65 dBA CNEL within approximately 70 feet of the source. For the hours of 9:00 p.m. to 9:00 a.m. future average noise levels associated with truck deliveries and mechanical equipment at commercial land uses was assumed to be 50 dBA Leq (PBS&J 2009). Commercial land uses would be located in Village Commercial land use districts throughout each portion of the Specific Plan, with immediately adjacent Central Village Residential land uses immediately adjacent in nearly every instance. Therefore, any proposed noise-sensitive land use located within 70 feet of commercial development could be exposed to noise levels that exceed the acceptable noise level threshold of 65 dBA CNEL resulting in a potentially significant impact.

Noise sources from parking lots include car alarms, door slams, radios, tire squeals. These sources typically range from about 30 to 66 dBA at a distance of 100 feet (Gordon Bricken & Associates 1996), and are generally short-term and intermittent. Parking lots have the potential to generate noise levels that exceed 65 dBA depending on the location of the source; however, noise sources from the parking lot would be different from each other in kind, duration, and location, so that the overall effects would be separate and in most cases would not affect noise-sensitive receptors at the same time. Therefore, noise generated from parking lots would be less than significant.

4.4.2 Residential Development

Noise generated from residential uses is generally described as "nuisance noise." Nuisance noise is defined as intermittent or temporary neighborhood noise from sources such as amplified music, barking dogs, and landscape maintenance equipment that may be disturbing to other residents. Nuisance noise impacts are more likely to occur in the more densely developed areas of the study area (such as the Central Village Residential) where residences would be closer together and neighbors would be more likely to hear a neighbor's music or lawnmower. Most residential development would be very low or low density residential development, and would be unlikely to be affected by neighboring nuisance noise. In the cases of medium or high density residential development, residents would be more likely to be exposed to nuisance noise from neighboring residences. However, Section 8.36.020 (Prohibited sounds) of the Kern County Municipal Code restricts the use of sound equipment that would produce sound "audible to a person of average hearing faculties or capacity" at a distance of one hundred fifty (150) feet from the property line of the property on which the sound equipment is located. Thus, loud music that would be audible to a neighbor in a residential zone is prohibited. Compliance with this regulation would limit exposure to excessive nuisance noise. Therefore, nuisance noise in residential neighborhoods would not result in significant impact.

4.4.3 Recreational Facilities

Contemplated recreational facilities within the study area would include public parks. Community centers, school playgrounds, and parks would generate incidental recreational noise such as cheering or children at play. A noise measurement taken outside of residences on Portola Avenue near the Exeter High School identified a noise level of 59 dBA Leq approximately 70 feet from Exeter High School, while students were outside. Therefore, any residences located within approximately 35 feet of a school, park, or community center could potentially be exposed to excessive noise levels (i.e., noise levels exceeding 65 dBA Leq). This potential impact could be easily avoided by ensuring that a minimum distance of 35 feet is maintained between school, park, or community center activity areas (playgrounds, athletic fields) and any adjacent residential neighborhood.

4.4.4 Infrastructure Systems Operation

Water Supply and Water Treatment

Up to a total of four turn-outs/pump stations from the California Aqueduct are proposed to serve the proposed project. The pump station location at the extreme western end of the Specific Plan Area is located in an industrial zone; the other three pump station locations appear to be within or adjacent to residential areas or parks. The pump stations would be designed as a conventional concrete canal intake structure with vertical turbine pumps mounted on the intake bays.

Pump stations are likely to generate noise that may be audible beyond the facility site due to the motors that are used to pump the water. During normal operation, pump stations are powered by electric motors; during emergencies, diesel engine generators are used. Assuming that the pump station would run continuously, the County's noise standard of 65 dBA CNEL will be used as the threshold for pump-station operation impacts upon NSLUs (on-site and off-site). Operational noise generated from the pump station motors could potentially exceed 65 dBA CNEL at neighboring residences, parks, or schools, depending on the exact location and capacity of the pump station. The pump station location at the extreme western end of the Specific Plan Area is located in an industrial zone, and would not have the potential for significant noise impacts. The other three locations appear to be within or adjacent to residential areas or parks, and therefore the potential exists for these three pump stations to generate significant noise impacts at these NSLUs. It is typical for pump stations to be placed within a masonry enclosure to insulate pump station functions and attenuate operational noise. However, it is unknown at this time whether the proposed pump stations would be enclosed. Therefore, it is assumed that the pump stations have the potential to result in significant impact to neighboring residences. Additionally, the pump stations would require an emergency generator. The emergency generator would create temporary periodic noise when tested. Typically emergency generators are tested once or twice a month for about 30 minutes. However, generator testing is generally short in duration, infrequent, and occurs during weekday daylight house; therefore, noise impacts from the emergency generator are considered less than significant.

A total of up to four water treatment plants are also proposed. All four water treatment plant locations are in relatively close proximity to proposed residential areas or parks. The proposed water treatment plants would each have the potential to generate noise during operation that could impact residential development proposed to be located in close proximity. Noise measurements taken at the City of Lindsay Water Treatment Facility are considered representative of operational noise levels for a surface water treatment plant associated with surface water delivered via the California Aqueduct (the City of Lindsey receives all of its municipal water supply from a US Bureau of Reclamation canal, so the facility is very similar to that envisioned for the proposed project). The measurement at the Linsey water treatment plant resulted in a noise level of 65 dBA Leq at an approximate distance of 25 feet from the operating equipment. Assuming the facility operated with a noise level of 65 dBA at 25 feet from the plant for 24 hours, the facility would result in a CNEL of 65 dBA at about 55 feet. Consequently, if residences, parks, or schools are proposed to be located within 55 feet of the facility boundary for any of the water treatment plants, significant operational noise impacts could result.

Water Reclamation - Waste Water Treatment

Two water reclamation (wastewater treatment) facilities are proposed to serve the proposed project. There are two alternative locations for the Grapevine Wastewater Treatment Facility (WWTF), which are each adjacent to residential and park uses. There are two alternative locations for the Scalping WWTF, which each appear to be located within office/research and design (R&D). Each water reclamation facility would include a pump station, oxidation ditches or tanks, secondary clarifiers, filters, and disinfection. It is assumed that the proposed water treatment facility would have the potential to exceed 65 dBA CNEL within approximately 55 feet of the facility, based on sound levels generated by the City of Lindsay Water Treatment Facility. Therefore, if proposed residential development or other NSLUs are located within 55 feet of either water reclamation facility, a significant impact would occur.

Wastewater Collection, Potable and Reclaimed Water Storage, Pump, and Distribution Operations

To support function of the wastewater collection system, water storage facilities, and potable and reclaimed water distribution systems, pump stations would be required throughout the study area. Pump stations may be installed both in very low density residential areas, and in medium-density residential land use areas. As described above, operational noise generated from the pump stations may generate noise levels higher than 65 dBA CNEL and would have the potential to impact nearby residences unless measures are implemented to adequately reduce noise levels.

All pumps would be electric and would be powered from the electric supply grid. However, during a power outage, backup power for the pump stations may be provided through an emergency generator. Some pump stations would involve storage reservoirs or would be located near reservoirs. Therefore, pumping would not be considered time essential and an emergency generator would not be necessary. However, other pump stations would not include a reservoir and an emergency generator would be necessary. The emergency generators would create temporary periodic noise when tested. However, as described above, generator testing is generally short in duration, infrequent, and occurs during daylight hours on weekdays; therefore, noise impacts from emergency generators are considered less than significant.

Other Infrastructure Improvements

Other infrastructure improvements such as pipelines, storage tanks, and electrical lines do not include equipment or functions that would generate operational noise. No significant impact would occur from operation of these facilities.

4.5 Mitigation - Project Land Use Noise Generation

The following mitigation measures would minimize noise generated from operational sources including HVAC equipment, truck deliveries, pump stations, water treatment systems, and the water reclamation facility.

Noise-3 **HVAC Equipment Shielding.** For all HVAC equipment located within 100 feet of a residence or other noise-sensitive land use, noise from HVAC equipment shall be reduced by either the installation of acoustical shielding around all new rooftop HVAC equipment, or by placing the HVAC equipment below grade in basement space, such that exterior noise levels do not exceed 65 dBA CNEL at the property line of the nearest noise-sensitive land use.

Noise-4 **School, Park, Community Center Buffer.** A distance of not less than 35 feet shall be established between proposed school, park, or community center activity areas (playgrounds, athletic fields etc.) and neighboring residential neighborhoods.

Noise-5 **Pump Station, Water Treatment, Wastewater Treatment Equipment Shielding.** Pump stations located adjacent to residential land uses or water treatment / wastewater treatment facilities located within 55 feet of residential land uses shall place pumps, emergency generators, and any other motorized equipment within a masonry enclosure that minimizes noise levels outside the enclosure. Prior to operation, the noise levels from stationary motorized equipment (including emergency generators) shall be measured to ensure that operation of the equipment would not exceed an exterior noise level of 65 dBA CNEL at the nearest residential property line.

Residual Significance After Mitigation

With implementation of the above measures, potential impacts associated with operational noise would be reduced to a less than significant level.

4.6 Cumulative Land Use Noise Impacts

The implementation of cumulative development projects would have the potential to increase ambient noise from new operational noise sources (such as HVAC equipment, parking lots, and truck deliveries) and by increasing human activity throughout the study area and surrounding area. As discussed above, mechanical HVAC equipment located on the ground or on rooftops of new buildings have the potential to generate noise levels that exceed 65 dBA within approximately 100 feet of the equipment. Additionally, commercial development would have the potential to result in noise levels above 65 dBA CNEL within approximately 70 feet of the source. Noise sources from parking lots typically range from about 30 to 66 dBA at a distance of 100 feet. Therefore, new projects associated with the cumulative development would have the potential to result in ambient noise levels that exceed 65 dBA CNEL.

Nonetheless, impacts from operational noise would be site-specific and future development of land use improvements within the study area would be required to conform to policies in the Kern County General Plan to minimize exposure to excessive noise levels. In addition, proposed project-related operational noise impacts would be mitigated to below a level of significance with the incorporation of the above measures. Therefore, no cumulative operation noise impact would occur and as a result of implementation of the proposed project.

4.7 Construction Noise

Construction of the development proposed in the proposed project would generate noise that could expose nearby receptors to elevated noise levels that may disrupt communication and routine activities. The magnitude of the impact would depend on the type of construction activity, equipment, duration of the construction phase, distance between the noise source and receiver, and intervening structures. Noise from construction equipment generally exhibits point source acoustical characteristics. A point source sound is attenuated (is reduced) at a rate of 6 decibels per doubling of distance from the source for “hard site” conditions and at 7.5 decibels per doubling of distance for “soft site” conditions. These rules apply to the propagation of sound waves with no obstacles between source and receivers, such as topography (ridges or berms) or structures. The range of maximum noise levels for various types of construction equipment is depicted in Table 6. Typical operating cycles may involve two minutes of full power, followed by three or four minutes at lower levels.

Table 6
Construction Equipment Noise Emission Levels

Equipment	Typical Sound Level (dB) - 50 feet from Source
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pile-driver (Impact)	101
Pile-driver (Sonic)	96
Pneumatic Tool	85
Pump	76
Rail Saw	90
Rock Drill	98
Roller	74
Saw	76
Scraper	89
Truck	88

Source: FTA 2006

4.7.1 On-Site Construction Activity

The construction timeframe for the entire buildout of the proposed project is expected to begin in 2016 and last approximately 19 years. The annual construction is estimated to be relatively uniform throughout the building period. All proposed development would involve grading and site preparation, as well as utilities installation, building construction, external/internal building work, paving and landscaping. Standard equipment, such as dozers, loaders, scrapers, and miscellaneous trucks would be used for construction of most the proposed project facilities. Given the fairly large size of the study area, and varied geologic conditions, blasting may be required in some portions of the site. A typical blasting operation includes drilling a hole, filling the hole with explosive material, capping the hole, and detonating the material. Sound levels from a rock drill have been measured at 90 to 100 dBA at 50 feet. Blasting is a short-term event, typically lasting no more than several seconds. Additionally, a rock crushing crushing/processing facility could be used during some construction activities where rock removal is involved. Noise measurements that have been conducted for portable rock crushing operations indicated that rock crushing activity would generate a 1-hour average noise level of approximately 80 dBA at a distance of 100 feet from the primary crusher (Dudek 2007).

Construction within each area of the Plan would not take place all at once; some areas would be completed before other structures within the phase are under construction. Therefore, build-out of the proposed project would have the potential to expose on-site residences, schools, or lodging facilities developed previously to construction noise, especially in areas proposed for higher density development, such as the Village Center Residential and Village Commercial areas.

Although the on-site residences, schools, and lodging facilities could be exposed to high construction noise levels, the exposure would be short-term, and would cease upon proposed project construction. It is anticipated that construction activities associated with build-out of the proposed project would take place between 6 a.m. and 9 p.m. weekdays and between 8 a.m. and 9 p.m. on weekends, which is the limit specified in the Kern County noise ordinance. However, construction activities could take place outside these time periods for portions of the proposed project where technical requirements dictate (such as large continuous concrete pours for commercial buildings). As a result a significant construction noise impact could potentially occur.

The nearest off-site NSLUs to the study area are the residences located adjacent to Laval Road west of Area 6d and 6e, respectively. Depending upon the eventual design of Areas 6d and 6e, construction noise activities could take place within 160 feet (for the residences adjacent to Area 6d) and within approximately 50 feet (for Area 6e). Although the adjacent residences could be exposed to high construction noise levels which could result in annoyance, the exposure would be short-term, and would cease upon proposed project construction. It is anticipated that construction activities associated with build-out of the proposed project would take place between 6 a.m. and 9 p.m. weekdays and between 8 a.m. and 9 p.m. on weekends, which is the limit specified in the Kern County noise ordinance. However, construction activities could take place outside these time periods for portions of the proposed project where technical requirements dictate (such as large continuous concrete pours for commercial buildings). As a result, a significant construction noise impact could potentially occur.

The next-nearest off-site NSLUs to the study area are approximately 0.35 mile and 0.78 mile south of Grapevine Road interchange, between I-5 northbound and southbound travel lanes. Due to the distance from the study area, noise associated with on-site construction would not affect these off-site residences. Therefore, no noise impacts would occur to these off-site residences from future construction of proposed project components.

4.7.2 Infrastructure Systems Construction

Infrastructure systems on-site would be developed concurrently with construction of proposed project improvements. Therefore, similar to the construction of the proposed project development, installation of infrastructure may have the potential to affect on-site residences already constructed.

Excavating would be required for pipelines and other underground utilities. Some building construction, external/internal building work, paving and landscaping would be required for structures such as pump stations, the wastewater reclamation facility, and the water treatment plant. Standard equipment, such, dozers, loaders, scrapers, and miscellaneous trucks, would be used for construction of most infrastructure projects. Construction of infrastructure required for the proposed project would have the potential to expose noise-sensitive and uses to excessive short-term construction noise. It is anticipated that construction activities associated with build-out of the proposed project would take place between 6 a.m. and 9 p.m. weekdays and between 8 a.m. and 9 p.m. on weekends); however, construction activities could take place outside these time periods. As a result a significant construction noise impact could occur.

4.8 Mitigation - Construction Noise

Implementation of the following mitigation measure would reduce temporary noise impacts from construction activities.

Noise-6 **Construction Activity Limits**. Construction activity occurring within 500 feet of occupied residential or other NSLU shall be restricted to the hours between 6 a.m. and 9 p.m. weekdays and between 8 a.m. and 9 p.m. on weekends.

Residual Significance After Mitigation

Implementation of the above measure would reduce potential impacts associated with construction noise to a less than significant level.

4.9 Cumulative Construction Noise Impacts

Construction noise impacts are localized in nature because they are limited to the construction site where construction equipment is operating. As discussed above, sound levels from typical construction equipment range from 60 dBA to 90 dBA Leq at 50 feet from the source (FHWA 2006). Construction noise decreases approximately 6 dBA (urban area, hard-surface conditions) to 7.5 dBA (undeveloped area with loose dirt or vegetated ground cover) with every doubling of distance. Therefore, construction noise would be reduced to less than 60 dBA approximately 0.25 mile from the construction site, assuming worst case construction noise of 90 dBA Leq, hard site conditions, and no intervening topography or structures. Additionally, construction noise is temporary and would cease at completion of the cumulative project. Only construction projects occurring simultaneously within 0.25 mile of each other would result in a significant cumulative temporary noise impact. The Specific Plan Area is separated from off-site land uses through distance and open spaces with rolling hill topography, which provides a noise buffer between on-site activities and off-site future construction projects. Therefore, construction on the Specific Plan Area would not be located in close proximity to another construction project(s) and would not contribute to a significant cumulative temporary ambient noise impact.

4.10 Groundborne Vibration

4.10.1 Impacts

The main concern associated with groundborne vibration is annoyance, however, vibration-sensitive instruments and operations, such as those found in hospitals and laboratories, can be disrupted at much lower levels. In extreme cases, vibration can cause damage to buildings, particularly those that are old or otherwise fragile. No vibration-sensitive land uses are proposed as part of the proposed project; however, excessive levels of groundborne vibration may be an annoyance to residences. Some common sources of groundborne vibration are trains, and construction activities such as blasting, pile-driving and heavy earth-moving equipment. Vibration-sensitive land uses within 600 feet of a railroad may be exposed to disruptive vibration (FTA 2006). Beyond 600 feet, vibration impacts would not occur. Since the proposed project is located more than 30 miles away from the UPRR and BNSF rail lines, vibration from this source would not be felt in the study area. Therefore, the primary source of groundborne vibration occurring as part of the proposed project is construction activity.

According to Caltrans, the highest measured vibration level during highway construction was 2.88 in/sec PPV at 10 feet from a pavement breaker. Other typical construction activities and equipment, such as 8 and D-9 Caterpillars, earthmovers, and trucks have not exceeded 0.10 in/sec PPV at 10 feet. Vibration sensitive instruments and operations may require special consideration during construction. Vibration criteria for sensitive equipment and operations are not defined and are often case specific. As a guide, major construction activity within 200 feet and pile driving within 600 feet may be potentially disruptive to sensitive operations (Caltrans 2002). No pile driving is anticipated to be necessary; however, construction activities on site may require blasting, which is also a significant source of groundborne vibration. There are no known vibration-sensitive land uses (i.e., research, manufacturing, or medical facilities using vibration-sensitive devices) within 15 miles of the study area.

New construction in the Specific Plan Area would have the potential to expose developed on-site residences to groundborne vibration, especially in high-density residential areas, such as the Village Center Residential areas, because construction activities would likely take place within 200 feet of a residence. However, ground vibrations from construction activities do not often reach the levels that can damage structures or affect activities that are not vibration-sensitive, although the vibrations may be felt by nearby persons in close proximity and result in annoyance (FTA 2006). In addition, the construction activity that would occur in close proximity to occupied residences would not include blasting or pile driving, and would therefore not result in a significant impact from groundborne vibration.

4.10.2 Mitigation Measures

The proposed project would not result in a significant groundborne vibration impact; therefore, no mitigation is required.

Significance After Mitigation

Mitigation is not required, because impacts would be less than significant without mitigation.

4.11 Cumulative Vibration Impacts

As described above, major construction activity within 200 feet may be potentially disruptive to sensitive operations (Caltrans 2002). In order to result in a cumulative vibration impact, major construction activities would have to be located within 200 feet of another project. Due to the localized nature of vibration impacts and the fact that all construction would not occur at the same time or at the same location, cumulative development in the surrounding Tulare County would not result in the exposure of people to or the generation of excessive groundborne vibration and/or noise levels. Therefore, a cumulative groundborne vibration impact would not occur.

INTENTIONALLY LEFT BLANK

5 REFERENCES

Caltrans (California Department of Transportation). 1987. California Vehicle Noise Emission Levels, (FHWA/CA/TL-87/03).

Caltrans. 1980. *Fundamentals and Abatement of Highway Traffic Noise*. September 1980.

Caltrans. 2002. *Transportation Related Earthborne Vibrations (TAV-02-01-R9201)*. February 2002.

Caltrans. 2004. Transportation Related Earthborne Vibrations (TAV-04-01-R0201). January 2004.

Caltrans. 2009. Technical Noise Supplement. Sacramento, California: Caltrans, Division of Environmental Analysis. November 2009.

County of Kern. 2004. *Kern County General Plan, Noise Element.*

County of Kern. 2012. Airport Land Use Compatibility Plan.

County of Kings. 2004. *Kings County General Plan, Noise Element.* Adopted December 28, 2003. Last updated January 27, 2004.

Dudek. 2007. *Acoustical Assessment Report – Fanita Project, City of Santee.* August 2007.

EPA (U.S. Environmental Protection Agency). 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. Washington, D.C. March 1974.

FTA (Federal Transit Administration, Office of Planning and Environment). 2006. *Transit Noise & Vibration Impact Assessment.* May 2006.

Fehr & Peers. 2015. *Traffic Impact Analysis- Grapevine Project, Kern County, California.* October 2015.

Fehr & Peers / e-mail from R. Hananouchi. *Traffic Volumes on Laval Road (east of Del Oro Drive)*. November 2015.

Gordon Bricken & Associates. 1996. *Parking Lot Noise Estimates*.

PBS&J. 2009. *Noise Study Report on Highway 215 Widening.*

RailAmerica. 2010.

INTENTIONALLY LEFT BLANK

APPENDIX A

TNM 2.5 Traffic Model Runs
Inputs and Results

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cal Run ST1 _2**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Laval Rd E	90.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point358	358	37,148,312.0	12,708,412.0	1,120.00					
Roadway113	35.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
Roadway116	100.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
Roadway115	35.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	
		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	35.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
Roadway129	75.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
I5 NB Offamp	35.0	point609	609	37,150,884.0	12,691,390.0	1,500.00				Average	
		point605	605	37,150,932.0	12,691,551.0	1,510.00				Average	
		point606	606	37,151,040.0	12,691,584.0	1,515.00				Average	

		point607	607	37,151,168.0	12,691,523.0	1,520.00						
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00					Average	
		point363	363	37,147,644.0	12,715,708.0	980.00					Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00					Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00					Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00						
I-5 NB - S of Project	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11					Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86					Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81					Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63					Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54					Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17					Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15					Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22					Average	
		point10	10	37,150,956.0	12,690,697.0	1,525.57						
I-5 SB - N of Laval Rd	60.0	point351	351	37,144,632.0	12,715,664.0	1,160.00					Average	
		point348	348	37,146,312.0	12,708,896.0	1,170.00						
I5 SB Onramp	35.0	point610	610	37,150,288.0	12,691,462.0	1,520.00					Average	
		point587	587	37,150,376.0	12,691,601.0	1,510.00					Average	
		point589	589	37,150,472.0	12,691,584.0	1,500.00					Average	
		point590	590	37,150,564.0	12,691,479.0	1,490.00						
Dennis McCarthy Dr	45.0	point426	426	37,146,220.0	12,708,669.0	1,170.00					Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00					Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00					Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00					Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00					Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00						
Laval Rd	90.0	point743	743	37,144,528.0	12,707,155.0	1,150.00					Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00					Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00						
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00					Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00					Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00					Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00					Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00						
Laval Rd E-2	12.0	point756	756	37,148,312.0	12,708,412.0	1,120.00					Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00					Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00					Average	
		point342	342	37,147,568.0	12,709,945.0	1,120.00						
I-5 NB - Grapevine to Laval Rd	60.0	point791	791	37,150,956.0	12,690,697.0	1,525.57					Average	

		point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
		point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
		point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
		point719	719	37,149,448.0	12,696,794.0	1,374.66				Average	
		point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
		point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
		point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
		point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
		point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
		point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	
		point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	
		point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 SB-S of Project	60.0	point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50					
I-5 NB-N. of Laval Rd	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17				Average	
		point830	830	37,149,384.0	12,696,561.0	1,374.49				Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	
		point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	
		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	

		point44	44	37,150,824.0	12,690,687.0	1,525.60					
Grapevine Rd West	50.0	point617	617	37,150,412.0	12,692,013.0	1,480.00				Average	
		point616	616	37,150,412.0	12,691,912.0	1,490.00				Average	
		point615	615	37,150,244.0	12,691,571.0	1,520.00				Average	
		point614	614	37,150,204.0	12,691,402.0	1,530.00				Average	
		point612	612	37,150,476.0	12,690,329.0	1,538.00				Average	
		point812	812	37,150,524.0	12,690,307.0	1,537.50				Average	
		point707	707	37,150,732.0	12,690,361.0	1,535.00					
Grapevine Road East	50.0	point146	146	37,151,216.0	12,690,473.0	1,550.00				Average	
		point816	816	37,151,432.0	12,690,534.0	1,545.00				Average	
		point623	623	37,151,500.0	12,690,625.0	1,535.00				Average	
		point619	619	37,151,220.0	12,691,565.0	1,520.00				Average	
		point620	620	37,150,988.0	12,691,709.0	1,510.00				Average	
		point621	621	37,150,780.0	12,691,877.0	1,500.00				Average	
		point613	613	37,150,696.0	12,692,047.0	1,490.00					
Edmonston Pumping Plant Rd	35.0	point156	156	37,151,376.0	12,691,167.0	1,525.00				Average	
		point157	157	37,151,832.0	12,691,306.0	1,500.00				Average	
		point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
		point798	798	37,153,608.0	12,690,806.0	1,480.00				Average	
		point799	799	37,154,252.0	12,690,716.0	1,450.00				Average	
		point801	801	37,155,832.0	12,690,652.0	1,420.00				Average	
		point802	802	37,157,604.0	12,690,592.0	1,400.00				Average	
		point803	803	37,159,760.0	12,690,254.0	1,375.00				Average	
		point804	804	37,161,912.0	12,689,916.0	1,350.00				Average	
		point805	805	37,161,992.0	12,689,907.0	1,350.00				Average	
		point806	806	37,163,484.0	12,689,688.0	1,300.00				Average	
		point807	807	37,165,736.0	12,689,344.0	1,250.00				Average	
		point808	808	37,168,656.0	12,689,314.0	1,200.00				Average	
		point810	810	37,169,252.0	12,689,409.0	1,200.00				Average	
		point809	809	37,169,832.0	12,689,734.0	1,200.00					

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cal Run ST1 _2**

Roadway Name	Points Name	No.	Segment Autos V veh/hr	Autos S mph	MTrucks V veh/hr	MTrucks S mph	HTrucks V veh/hr	HTrucks S mph	Buses V veh/hr	Buses S mph	Motorcycles V veh/hr	Motorcycles S mph
Laval Rd E	point340	340	0	0	0	0	0	0	0	0	0	0
	point354	354	0	0	0	0	0	0	0	0	0	0
	point355	355	0	0	0	0	0	0	0	0	0	0
	point356	356	0	0	0	0	0	0	0	0	0	0
	point357	357	0	0	0	0	0	0	0	0	0	0
	point358	358										
Roadway113	point375	375	0	0	0	0	0	0	0	0	0	0
	point376	376										
Roadway116	point387	387	0	0	0	0	0	0	0	0	0	0
	point388	388	0	0	0	0	0	0	0	0	0	0
	point389	389	0	0	0	0	0	0	0	0	0	0
	point390	390										
Roadway115	point398	398	0	0	0	0	0	0	0	0	0	0
	point378	378	0	0	0	0	0	0	0	0	0	0
	point379	379	0	0	0	0	0	0	0	0	0	0
	point380	380										
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0
	point400	400										
Roadway129	point422	422	0	0	0	0	0	0	0	0	0	0
	point403	403	0	0	0	0	0	0	0	0	0	0
	point404	404	0	0	0	0	0	0	0	0	0	0
	point405	405	0	0	0	0	0	0	0	0	0	0
	point406	406										
I5 NB Offamp	point609	609	0	0	0	0	0	0	0	0	0	0

	point605	605	0	0	0	0	0	0	0	0	0	0
	point606	606	0	0	0	0	0	0	0	0	0	0
	point607	607										
Wheeler Ridge Rd	point364	364	0	0	0	0	0	0	0	0	0	0
	point363	363	0	0	0	0	0	0	0	0	0	0
	point361	361	0	0	0	0	0	0	0	0	0	0
	point374	374	0	0	0	0	0	0	0	0	0	0
	point382	382										
I-5 NB - S of Project	point1	1	0	0	0	0	0	0	0	0	0	0
	point3	3	0	0	0	0	0	0	0	0	0	0
	point4	4	0	0	0	0	0	0	0	0	0	0
	point5	5	0	0	0	0	0	0	0	0	0	0
	point6	6	0	0	0	0	0	0	0	0	0	0
	point7	7	0	0	0	0	0	0	0	0	0	0
	point8	8	0	0	0	0	0	0	0	0	0	0
	point9	9	0	0	0	0	0	0	0	0	0	0
	point10	10										
I-5 SB - N of Laval Rd	point351	351	0	0	0	0	0	0	0	0	0	0
	point348	348										
I5 SB Onramp	point610	610	0	0	0	0	0	0	0	0	0	0
	point587	587	0	0	0	0	0	0	0	0	0	0
	point589	589	0	0	0	0	0	0	0	0	0	0
	point590	590										
Dennis McCarthy Dr	point426	426	0	0	0	0	0	0	0	0	0	0
	point418	418	0	0	0	0	0	0	0	0	0	0
	point419	419	0	0	0	0	0	0	0	0	0	0
	point420	420	0	0	0	0	0	0	0	0	0	0
	point399	399	0	0	0	0	0	0	0	0	0	0
	point401	401										
Laval Rd	point743	743	0	0	0	0	0	0	0	0	0	0
	point424	424	0	0	0	0	0	0	0	0	0	0
	point416	416										
Wheeler Ridge Rd-2	point755	755	0	0	0	0	0	0	0	0	0	0
	point383	383	0	0	0	0	0	0	0	0	0	0
	point393	393	0	0	0	0	0	0	0	0	0	0
	point394	394	0	0	0	0	0	0	0	0	0	0
	point386	386										

Laval Rd E-2	point756	756	0	0	0	0	0	0	0	0	0	0
	point359	359	0	0	0	0	0	0	0	0	0	0
	point360	360	0	0	0	0	0	0	0	0	0	0
	point342	342										
I-5 NB - Grapevine to Laval Rd	point791	791	918	65	42	65	384	65	0	0	0	0
	point11	11	918	65	42	65	384	65	0	0	0	0
	point12	12	918	65	42	65	384	65	0	0	0	0
	point720	720	918	65	42	65	384	65	0	0	0	0
	point719	719	918	65	42	65	384	65	0	0	0	0
	point721	721	918	65	42	65	384	65	0	0	0	0
	point722	722	918	65	42	65	384	65	0	0	0	0
	point723	723	918	65	42	65	384	65	0	0	0	0
	point724	724	918	65	42	65	384	65	0	0	0	0
	point13	13	918	65	42	65	384	65	0	0	0	0
	point14	14	918	65	42	65	384	65	0	0	0	0
	point15	15	918	65	42	65	384	65	0	0	0	0
	point344	344										
I-5 SB-S of Project	point792	792	0	0	0	0	0	0	0	0	0	0
	point45	45	0	0	0	0	0	0	0	0	0	0
	point46	46	0	0	0	0	0	0	0	0	0	0
	point47	47	0	0	0	0	0	0	0	0	0	0
	point48	48	0	0	0	0	0	0	0	0	0	0
	point49	49	0	0	0	0	0	0	0	0	0	0
	point50	50	0	0	0	0	0	0	0	0	0	0
	point51	51	0	0	0	0	0	0	0	0	0	0
	point43	43	0	0	0	0	0	0	0	0	0	0
	point52	52	0	0	0	0	0	0	0	0	0	0
	point53	53	0	0	0	0	0	0	0	0	0	0
	point54	54										
I-5 NB-N. of Laval Rd	point796	796	0	0	0	0	0	0	0	0	0	0
	point345	345	0	0	0	0	0	0	0	0	0	0
	point346	346										
I-5 SB-Laval Rd to Grapevine	point797	797	918	65	42	65	384	65	0	0	0	0
	point349	349	918	65	42	65	384	65	0	0	0	0
	point341	341	918	65	42	65	384	65	0	0	0	0
	point17	17	918	65	42	65	384	65	0	0	0	0
	point18	18	918	65	42	65	384	65	0	0	0	0

	point725	725	918	65	42	65	384	65	0	0	0	0
	point726	726	918	65	42	65	384	65	0	0	0	0
	point729	729	918	65	42	65	384	65	0	0	0	0
	point830	830	918	65	42	65	384	65	0	0	0	0
	point727	727	918	65	42	65	384	65	0	0	0	0
	point728	728	918	65	42	65	384	65	0	0	0	0
	point19	19	918	65	42	65	384	65	0	0	0	0
	point42	42	918	65	42	65	384	65	0	0	0	0
	point44	44										
Grapevine Rd West	point617	617	0	0	0	0	0	0	0	0	0	0
	point616	616	0	0	0	0	0	0	0	0	0	0
	point615	615	0	0	0	0	0	0	0	0	0	0
	point614	614	0	0	0	0	0	0	0	0	0	0
	point612	612	0	0	0	0	0	0	0	0	0	0
	point812	812	0	0	0	0	0	0	0	0	0	0
	point707	707										
Grapevine Road East	point146	146	0	0	0	0	0	0	0	0	0	0
	point816	816	0	0	0	0	0	0	0	0	0	0
	point623	623	0	0	0	0	0	0	0	0	0	0
	point619	619	0	0	0	0	0	0	0	0	0	0
	point620	620	0	0	0	0	0	0	0	0	0	0
	point621	621	0	0	0	0	0	0	0	0	0	0
	point613	613										
Edmonston Pumping Plant Rd	point156	156	16	50	4	50	76	50	0	0	0	0
	point157	157	16	50	4	50	76	50	0	0	0	0
	point167	167	16	50	4	50	76	50	0	0	0	0
	point798	798	16	50	4	50	76	50	0	0	0	0
	point799	799	16	50	4	50	76	50	0	0	0	0
	point801	801	16	50	4	50	76	50	0	0	0	0
	point802	802	16	50	4	50	76	50	0	0	0	0
	point803	803	16	50	4	50	76	50	0	0	0	0
	point804	804	16	50	4	50	76	50	0	0	0	0
	point805	805	16	50	4	50	76	50	0	0	0	0
	point806	806	16	50	4	50	76	50	0	0	0	0
	point807	807	16	50	4	50	76	50	0	0	0	0
	point808	808	16	50	4	50	76	50	0	0	0	0
	point810	810	16	50	4	50	76	50	0	0	0	0

		point809	809												

Dudek						**2 October 2015**					
M Greene						**TNM 2.5**					
INPUT: RECEIVERS											
PROJECT/CONTRACT:	**P/N 7667**										
RUN:	**Grapevine Project - Cal Run ST1 _2**										
Receiver											
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST1	1	1	37,153,636.0	12,690,764.0	1,480.00	5.00	69.10	66	10.0	8.0	Y
ST2	3	1	37,149,324.0	12,696,630.0	1,370.00	5.00	79.10	66	10.0	8.0	Y

Dudek		**2 October 2015**
M Greene		**TNM 2.5**
		Calculated with TNM 2.5
RESULTS: SOUND LEVELS		
PROJECT/CONTRACT:	**P/N 7667**	
RUN:	**Grapevine Project - Cal Run ST1 _2**	
BARRIER DESIGN:	**INPUT HEIGHTS**	**Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.**
ATMOSPHERICS:	**68 deg F, 50% RH**	

Receiver												
Name	**No.**	**#DUs**	**Existing**	**No Barrier**					**With Barrier**			
			LAeq1h	**LAeq1h**		**Increase over existing**		**Type**	**Calculated**	**Noise Reduction**		
				Calculated	**Crit'n**	**Calculated**	**Crit'n Sub'l Inc**	**Impact**	**LAeq1h**	**Calculated**	**Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST1	1	1	69.1	68.2	66	-0.9	10	Snd Lvl	68.2	0.0	8	-8.0
ST2	3	1	79.1	78.3	66	-0.8	10	Snd Lvl	78.3	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	2	0.0	0.0	0.0
All Impacted	2	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cal Run ST3**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Laval Rd E	90.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point358	358	37,148,312.0	12,708,412.0	1,120.00					
Roadway113	35.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
Roadway116	100.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
Roadway115	35.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	
		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	35.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
Roadway129	75.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
I5 NB Offamp	35.0	point609	609	37,150,884.0	12,691,390.0	1,500.00				Average	
		point605	605	37,150,932.0	12,691,551.0	1,510.00				Average	
		point606	606	37,151,040.0	12,691,584.0	1,515.00				Average	

		point607	607	37,151,168.0	12,691,523.0	1,520.00					
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average	
		point363	363	37,147,644.0	12,715,708.0	980.00				Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00					
I-5 NB - S of Project	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
		point10	10	37,150,956.0	12,690,697.0	1,525.57					
I-5 SB - N of Laval Rd	60.0	point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
		point348	348	37,146,312.0	12,708,896.0	1,170.00					
I5 SB Onramp	35.0	point610	610	37,150,288.0	12,691,462.0	1,520.00				Average	
		point587	587	37,150,376.0	12,691,601.0	1,510.00				Average	
		point589	589	37,150,472.0	12,691,584.0	1,500.00				Average	
		point590	590	37,150,564.0	12,691,479.0	1,490.00					
Dennis McCarthy Dr	45.0	point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	90.0	point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00					
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00					
Laval Rd E-2	12.0	point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	
		point342	342	37,147,568.0	12,709,945.0	1,120.00					
I-5 NB - Grapevine to Laval Rd	60.0	point791	791	37,150,956.0	12,690,697.0	1,525.57				Average	

		point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
		point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
		point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
		point719	719	37,149,448.0	12,696,794.0	1,374.66				Average	
		point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
		point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
		point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
		point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
		point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
		point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	
		point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	
		point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 SB-S of Project	60.0	point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50					
I-5 NB-N. of Laval Rd	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17				Average	
		point830	830	37,149,384.0	12,696,561.0	1,374.49				Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	
		point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	
		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	

		point44	44	37,150,824.0	12,690,687.0	1,525.60					
Grapevine Rd West	50.0	point617	617	37,150,412.0	12,692,013.0	1,480.00				Average	
		point616	616	37,150,412.0	12,691,912.0	1,490.00				Average	
		point615	615	37,150,244.0	12,691,571.0	1,520.00				Average	
		point614	614	37,150,204.0	12,691,402.0	1,530.00				Average	
		point612	612	37,150,476.0	12,690,329.0	1,538.00				Average	
		point812	812	37,150,524.0	12,690,307.0	1,537.50				Average	
		point707	707	37,150,732.0	12,690,361.0	1,535.00					
Grapevine Road East	50.0	point146	146	37,151,216.0	12,690,473.0	1,550.00				Average	
		point816	816	37,151,432.0	12,690,534.0	1,545.00				Average	
		point623	623	37,151,500.0	12,690,625.0	1,535.00				Average	
		point619	619	37,151,220.0	12,691,565.0	1,520.00				Average	
		point620	620	37,150,988.0	12,691,709.0	1,510.00				Average	
		point621	621	37,150,780.0	12,691,877.0	1,500.00				Average	
		point613	613	37,150,696.0	12,692,047.0	1,490.00					
Edmonston Pumping Plant Rd	35.0	point156	156	37,151,376.0	12,691,167.0	1,525.00				Average	
		point157	157	37,151,832.0	12,691,306.0	1,500.00				Average	
		point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
		point798	798	37,153,608.0	12,690,806.0	1,480.00				Average	
		point799	799	37,154,252.0	12,690,716.0	1,450.00				Average	
		point801	801	37,155,832.0	12,690,652.0	1,420.00				Average	
		point802	802	37,157,604.0	12,690,592.0	1,400.00				Average	
		point803	803	37,159,760.0	12,690,254.0	1,375.00				Average	
		point804	804	37,161,912.0	12,689,916.0	1,350.00				Average	
		point805	805	37,161,992.0	12,689,907.0	1,350.00				Average	
		point806	806	37,163,484.0	12,689,688.0	1,300.00				Average	
		point807	807	37,165,736.0	12,689,344.0	1,250.00				Average	
		point808	808	37,168,656.0	12,689,314.0	1,200.00				Average	
		point810	810	37,169,252.0	12,689,409.0	1,200.00				Average	
		point809	809	37,169,832.0	12,689,734.0	1,200.00					

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cal Run ST3**

Roadway	Points		Segment									
Name	Name	No.	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Laval Rd E	point340	340	0	0	0	0	0	0	0	0	0	0
	point354	354	0	0	0	0	0	0	0	0	0	0
	point355	355	0	0	0	0	0	0	0	0	0	0
	point356	356	0	0	0	0	0	0	0	0	0	0
	point357	357	0	0	0	0	0	0	0	0	0	0
	point358	358										
Roadway113	point375	375	0	0	0	0	0	0	0	0	0	0
	point376	376										
Roadway116	point387	387	0	0	0	0	0	0	0	0	0	0
	point388	388	0	0	0	0	0	0	0	0	0	0
	point389	389	0	0	0	0	0	0	0	0	0	0
	point390	390										
Roadway115	point398	398	0	0	0	0	0	0	0	0	0	0
	point378	378	0	0	0	0	0	0	0	0	0	0
	point379	379	0	0	0	0	0	0	0	0	0	0
	point380	380										
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0
	point400	400										
Roadway129	point422	422	0	0	0	0	0	0	0	0	0	0
	point403	403	0	0	0	0	0	0	0	0	0	0
	point404	404	0	0	0	0	0	0	0	0	0	0
	point405	405	0	0	0	0	0	0	0	0	0	0
	point406	406										
I5 NB Offamp	point609	609	0	0	0	0	0	0	0	0	0	0

	point605	605	0	0	0	0	0	0	0	0	0	0
	point606	606	0	0	0	0	0	0	0	0	0	0
	point607	607										
Wheeler Ridge Rd	point364	364	0	0	0	0	0	0	0	0	0	0
	point363	363	0	0	0	0	0	0	0	0	0	0
	point361	361	0	0	0	0	0	0	0	0	0	0
	point374	374	0	0	0	0	0	0	0	0	0	0
	point382	382										
I-5 NB - S of Project	point1	1	924	70	24	70	480	70	0	0	0	0
	point3	3	924	70	24	70	480	70	0	0	0	0
	point4	4	924	70	24	70	480	70	0	0	0	0
	point5	5	924	70	24	70	480	70	0	0	0	0
	point6	6	924	70	24	70	480	70	0	0	0	0
	point7	7	924	70	24	70	480	70	0	0	0	0
	point8	8	924	70	24	70	480	70	0	0	0	0
	point9	9	924	70	24	70	480	70	0	0	0	0
	point10	10										
I-5 SB - N of Laval Rd	point351	351	0	0	0	0	0	0	0	0	0	0
	point348	348										
I5 SB Onramp	point610	610	0	0	0	0	0	0	0	0	0	0
	point587	587	0	0	0	0	0	0	0	0	0	0
	point589	589	0	0	0	0	0	0	0	0	0	0
	point590	590										
Dennis McCarthy Dr	point426	426	0	0	0	0	0	0	0	0	0	0
	point418	418	0	0	0	0	0	0	0	0	0	0
	point419	419	0	0	0	0	0	0	0	0	0	0
	point420	420	0	0	0	0	0	0	0	0	0	0
	point399	399	0	0	0	0	0	0	0	0	0	0
	point401	401										
Laval Rd	point743	743	0	0	0	0	0	0	0	0	0	0
	point424	424	0	0	0	0	0	0	0	0	0	0
	point416	416										
Wheeler Ridge Rd-2	point755	755	0	0	0	0	0	0	0	0	0	0
	point383	383	0	0	0	0	0	0	0	0	0	0
	point393	393	0	0	0	0	0	0	0	0	0	0
	point394	394	0	0	0	0	0	0	0	0	0	0
	point386	386										

Laval Rd E-2	point756	756	0	0	0	0	0	0	0	0	0	0
	point359	359	0	0	0	0	0	0	0	0	0	0
	point360	360	0	0	0	0	0	0	0	0	0	0
	point342	342										
I-5 NB - Grapevine to Laval Rd	point791	791	924	70	24	70	480	70	0	0	0	0
	point11	11	924	70	24	70	480	70	0	0	0	0
	point12	12	924	70	24	70	480	70	0	0	0	0
	point720	720	924	70	24	70	480	70	0	0	0	0
	point719	719	924	70	24	70	480	70	0	0	0	0
	point721	721	924	70	24	70	480	70	0	0	0	0
	point722	722	924	70	24	70	480	70	0	0	0	0
	point723	723	924	70	24	70	480	70	0	0	0	0
	point724	724	924	70	24	70	480	70	0	0	0	0
	point13	13	924	70	24	70	480	70	0	0	0	0
	point14	14	924	70	24	70	480	70	0	0	0	0
	point15	15	924	70	24	70	480	70	0	0	0	0
	point344	344										
I-5 SB-S of Project	point792	792	924	70	24	70	480	70	0	0	0	0
	point45	45	924	70	24	70	480	70	0	0	0	0
	point46	46	924	70	24	70	480	70	0	0	0	0
	point47	47	924	70	24	70	480	70	0	0	0	0
	point48	48	924	70	24	70	480	70	0	0	0	0
	point49	49	924	70	24	70	480	70	0	0	0	0
	point50	50	924	70	24	70	480	70	0	0	0	0
	point51	51	924	70	24	70	480	70	0	0	0	0
	point43	43	924	70	24	70	480	70	0	0	0	0
	point52	52	924	70	24	70	480	70	0	0	0	0
	point53	53	924	70	24	70	480	70	0	0	0	0
	point54	54										
I-5 NB-N. of Laval Rd	point796	796	0	0	0	0	0	0	0	0	0	0
	point345	345	0	0	0	0	0	0	0	0	0	0
	point346	346										
I-5 SB-Laval Rd to Grapevine	point797	797	924	70	24	70	480	70	0	0	0	0
	point349	349	924	70	24	70	480	70	0	0	0	0
	point341	341	924	70	24	70	480	70	0	0	0	0
	point17	17	924	70	24	70	480	70	0	0	0	0
	point18	18	924	70	24	70	480	70	0	0	0	0

	point725	725	924	70	24	70	480	70	0	0	0	0
	point726	726	924	70	24	70	480	70	0	0	0	0
	point729	729	924	70	24	70	480	70	0	0	0	0
	point830	830	924	70	24	70	480	70	0	0	0	0
	point727	727	924	70	24	70	480	70	0	0	0	0
	point728	728	924	70	24	70	480	70	0	0	0	0
	point19	19	924	70	24	70	480	70	0	0	0	0
	point42	42	924	70	24	70	480	70	0	0	0	0
	point44	44										
Grapevine Rd West	point617	617	0	0	0	0	0	0	0	0	0	0
	point616	616	0	0	0	0	0	0	0	0	0	0
	point615	615	0	0	0	0	0	0	0	0	0	0
	point614	614	0	0	0	0	0	0	0	0	0	0
	point612	612	0	0	0	0	0	0	0	0	0	0
	point812	812	0	0	0	0	0	0	0	0	0	0
	point707	707										
Grapevine Road East	point146	146	0	0	0	0	0	0	0	0	0	0
	point816	816	0	0	0	0	0	0	0	0	0	0
	point623	623	0	0	0	0	0	0	0	0	0	0
	point619	619	0	0	0	0	0	0	0	0	0	0
	point620	620	0	0	0	0	0	0	0	0	0	0
	point621	621	0	0	0	0	0	0	0	0	0	0
	point613	613										
Edmonston Pumping Plant Rd	point156	156	16	50	4	50	76	50	0	0	0	0
	point157	157	16	50	4	50	76	50	0	0	0	0
	point167	167	16	50	4	50	76	50	0	0	0	0
	point798	798	16	50	4	50	76	50	0	0	0	0
	point799	799	16	50	4	50	76	50	0	0	0	0
	point801	801	16	50	4	50	76	50	0	0	0	0
	point802	802	16	50	4	50	76	50	0	0	0	0
	point803	803	16	50	4	50	76	50	0	0	0	0
	point804	804	16	50	4	50	76	50	0	0	0	0
	point805	805	16	50	4	50	76	50	0	0	0	0
	point806	806	16	50	4	50	76	50	0	0	0	0
	point807	807	16	50	4	50	76	50	0	0	0	0
	point808	808	16	50	4	50	76	50	0	0	0	0
	point810	810	16	50	4	50	76	50	0	0	0	0

		point809	809											

Dudek						**2 October 2015**						
M Greene						**TNM 2.5**						
INPUT: RECEIVERS												
PROJECT/CONTRACT:	**P/N 7667**											
RUN:	**Grapevine Project - Cal Run ST3**											
Receiver												
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST3	1	1	37,150,616.0	12,690,534.0	1,510.00	5.00	67.70	66	10.0	8.0	Y

Dudek 2 October 2015
M Greene TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: P/N 7667
RUN: Grapevine Project - Cal Run ST3
BARRIER DESIGN: INPUT HEIGHTS

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

ATMOSPHERICS: 68 deg F, 50% RH

Receiver												
Name	No.	#DUs	Existing	No Barrier					With Barrier			
			LAeq1h	LAeq1h		Increase over existing		Type	Calculated	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc	Impact	LAeq1h	Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST3	1	1	67.7	68.1	66	0.4	10	Snd Lvl	68.1	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	1	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek 2 October 2015
M Greene TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: P/N 7667
RUN: Grapevine Project - Cal Run ST4

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Laval Rd E	90.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point358	358	37,148,312.0	12,708,412.0	1,120.00					
Roadway113	35.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
Roadway116	100.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
Roadway115	35.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	
		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	35.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
Roadway129	75.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
I5 NB Offamp	35.0	point609	609	37,150,884.0	12,691,390.0	1,500.00				Average	
		point605	605	37,150,932.0	12,691,551.0	1,510.00				Average	
		point606	606	37,151,040.0	12,691,584.0	1,515.00				Average	

		point607	607	37,151,168.0	12,691,523.0	1,520.00					
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average	
		point363	363	37,147,644.0	12,715,708.0	980.00				Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00					
I-5 NB - S of Project	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
		point835	835	37,151,192.0	12,690,314.0	1,546.90				Average	
		point10	10	37,150,956.0	12,690,697.0	1,525.57					
I-5 SB - N of Laval Rd	60.0	point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
		point348	348	37,146,312.0	12,708,896.0	1,170.00					
I5 SB Onramp	35.0	point610	610	37,150,288.0	12,691,462.0	1,520.00				Average	
		point587	587	37,150,376.0	12,691,601.0	1,510.00				Average	
		point589	589	37,150,472.0	12,691,584.0	1,500.00				Average	
		point590	590	37,150,564.0	12,691,479.0	1,490.00					
Dennis McCarthy Dr	45.0	point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	90.0	point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00					
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00					
Laval Rd E-2	12.0	point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	
		point342	342	37,147,568.0	12,709,945.0	1,120.00					

I-5 NB - Grapevine to Laval Rd	60.0	point791	791	37,150,956.0	12,690,697.0	1,525.57					Average	
		point11	11	37,150,784.0	12,691,266.0	1,499.33					Average	
		point12	12	37,150,708.0	12,691,583.0	1,489.48					Average	
		point720	720	37,150,080.0	12,694,188.0	1,432.07					Average	
		point719	719	37,149,448.0	12,696,794.0	1,374.66					Average	
		point721	721	37,149,196.0	12,697,836.0	1,351.69					Average	
		point722	722	37,148,944.0	12,698,879.0	1,328.72					Average	
		point723	723	37,148,688.0	12,699,921.0	1,305.76					Average	
		point724	724	37,148,436.0	12,700,964.0	1,282.79					Average	
		point13	13	37,148,184.0	12,702,006.0	1,259.83					Average	
		point14	14	37,148,076.0	12,702,449.0	1,243.42					Average	
		point15	15	37,147,608.0	12,704,330.0	1,187.65					Average	
		point344	344	37,146,780.0	12,707,546.0	1,180.00						
I-5 SB-S of Project	60.0	point792	792	37,150,824.0	12,690,687.0	1,525.60					Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50					Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30					Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00					Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20					Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00					Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20					Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40					Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40					Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80					Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90					Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50						
I-5 NB-N. of Laval Rd	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00					Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00					Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00						
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00					Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00					Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00					Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42					Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98					Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26					Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53					Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17					Average	
		point830	830	37,149,384.0	12,696,561.0	1,374.49					Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81					Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08					Average	
		point19	19	37,150,456.0	12,692,247.0	1,476.36					Average	

		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	
		point44	44	37,150,824.0	12,690,687.0	1,525.60					
Grapevine Rd West	50.0	point617	617	37,150,412.0	12,692,013.0	1,480.00				Average	
		point616	616	37,150,412.0	12,691,912.0	1,490.00				Average	
		point615	615	37,150,244.0	12,691,571.0	1,520.00				Average	
		point614	614	37,150,204.0	12,691,402.0	1,530.00				Average	
		point612	612	37,150,476.0	12,690,329.0	1,538.00				Average	
		point812	812	37,150,524.0	12,690,307.0	1,537.50				Average	
		point707	707	37,150,732.0	12,690,361.0	1,535.00					
Grapevine Road East	50.0	point146	146	37,151,216.0	12,690,473.0	1,550.00				Average	
		point816	816	37,151,432.0	12,690,534.0	1,545.00				Average	
		point623	623	37,151,500.0	12,690,625.0	1,535.00				Average	
		point619	619	37,151,220.0	12,691,565.0	1,520.00				Average	
		point620	620	37,150,988.0	12,691,709.0	1,510.00				Average	
		point621	621	37,150,780.0	12,691,877.0	1,500.00				Average	
		point613	613	37,150,696.0	12,692,047.0	1,490.00					
Edmonston Pumping Plant Rd	35.0	point156	156	37,151,376.0	12,691,167.0	1,525.00				Average	
		point157	157	37,151,832.0	12,691,306.0	1,500.00				Average	
		point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
		point798	798	37,153,608.0	12,690,806.0	1,480.00				Average	
		point799	799	37,154,252.0	12,690,716.0	1,450.00				Average	
		point801	801	37,155,832.0	12,690,652.0	1,420.00				Average	
		point802	802	37,157,604.0	12,690,592.0	1,400.00				Average	
		point803	803	37,159,760.0	12,690,254.0	1,375.00				Average	
		point804	804	37,161,912.0	12,689,916.0	1,350.00				Average	
		point805	805	37,161,992.0	12,689,907.0	1,350.00				Average	
		point806	806	37,163,484.0	12,689,688.0	1,300.00				Average	
		point807	807	37,165,736.0	12,689,344.0	1,250.00				Average	
		point808	808	37,168,656.0	12,689,314.0	1,200.00				Average	
		point810	810	37,169,252.0	12,689,409.0	1,200.00				Average	
		point809	809	37,169,832.0	12,689,734.0	1,200.00					

Dudek			**2 October 2015**									
M Greene			**TNM 2.5**									
INPUT: TRAFFIC FOR LAeq1h Volumes												
PROJECT/CONTRACT:	**P/N 7667**											
RUN:	**Grapevine Project - Cal Run ST4**											
Roadway	**Points**											
Name	**Name**	**No.**	**Segment**									
			Autos		**MTrucks**		**HTrucks**		**Buses**		**Motorcycles**	
			V	**S**	**V**	**S**	**V**	**S**	**V**	**S**	**V**	**S**
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Laval Rd E	point340	340	0	0	0	0	0	0	0	0	0	0
	point354	354	0	0	0	0	0	0	0	0	0	0
	point355	355	0	0	0	0	0	0	0	0	0	0
	point356	356	0	0	0	0	0	0	0	0	0	0
	point357	357	0	0	0	0	0	0	0	0	0	0
	point358	358										
Roadway113	point375	375	0	0	0	0	0	0	0	0	0	0
	point376	376										
Roadway116	point387	387	0	0	0	0	0	0	0	0	0	0
	point388	388	0	0	0	0	0	0	0	0	0	0
	point389	389	0	0	0	0	0	0	0	0	0	0
	point390	390										
Roadway115	point398	398	0	0	0	0	0	0	0	0	0	0
	point378	378	0	0	0	0	0	0	0	0	0	0
	point379	379	0	0	0	0	0	0	0	0	0	0
	point380	380										
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0
	point400	400										
Roadway129	point422	422	0	0	0	0	0	0	0	0	0	0
	point403	403	0	0	0	0	0	0	0	0	0	0
	point404	404	0	0	0	0	0	0	0	0	0	0
	point405	405	0	0	0	0	0	0	0	0	0	0
	point406	406										
I5 NB Offamp	point609	609	0	0	0	0	0	0	0	0	0	0

	point605	605	0	0	0	0	0	0	0	0	0	0
	point606	606	0	0	0	0	0	0	0	0	0	0
	point607	607										
Wheeler Ridge Rd	point364	364	0	0	0	0	0	0	0	0	0	0
	point363	363	0	0	0	0	0	0	0	0	0	0
	point361	361	0	0	0	0	0	0	0	0	0	0
	point374	374	0	0	0	0	0	0	0	0	0	0
	point382	382										
I-5 NB - S of Project	point1	1	114	70	30	70	396	70	0	0	0	0
	point3	3	114	70	30	70	396	70	0	0	0	0
	point4	4	114	70	30	70	396	70	0	0	0	0
	point5	5	114	70	30	70	396	70	0	0	0	0
	point6	6	114	70	30	70	396	70	0	0	0	0
	point7	7	114	70	30	70	396	70	0	0	0	0
	point8	8	114	70	30	70	396	70	0	0	0	0
	point9	9	114	70	30	70	396	70	0	0	0	0
	point835	835	114	70	30	70	396	70	0	0	0	0
	point10	10										
I-5 SB - N of Laval Rd	point351	351	0	0	0	0	0	0	0	0	0	0
	point348	348										
I5 SB Onramp	point610	610	0	0	0	0	0	0	0	0	0	0
	point587	587	0	0	0	0	0	0	0	0	0	0
	point589	589	0	0	0	0	0	0	0	0	0	0
	point590	590										
Dennis McCarthy Dr	point426	426	0	0	0	0	0	0	0	0	0	0
	point418	418	0	0	0	0	0	0	0	0	0	0
	point419	419	0	0	0	0	0	0	0	0	0	0
	point420	420	0	0	0	0	0	0	0	0	0	0
	point399	399	0	0	0	0	0	0	0	0	0	0
	point401	401										
Laval Rd	point743	743	0	0	0	0	0	0	0	0	0	0
	point424	424	0	0	0	0	0	0	0	0	0	0
	point416	416										
Wheeler Ridge Rd-2	point755	755	0	0	0	0	0	0	0	0	0	0
	point383	383	0	0	0	0	0	0	0	0	0	0
	point393	393	0	0	0	0	0	0	0	0	0	0
	point394	394	0	0	0	0	0	0	0	0	0	0

	point386	386										
Laval Rd E-2	point756	756	0	0	0	0	0	0	0	0	0	0
	point359	359	0	0	0	0	0	0	0	0	0	0
	point360	360	0	0	0	0	0	0	0	0	0	0
	point342	342										
I-5 NB - Grapevine to Laval Rd	point791	791	114	70	30	70	396	70	0	0	0	0
	point11	11	114	70	30	70	396	70	0	0	0	0
	point12	12	114	70	30	70	396	70	0	0	0	0
	point720	720	114	70	30	70	396	70	0	0	0	0
	point719	719	114	70	30	70	396	70	0	0	0	0
	point721	721	114	70	30	70	396	70	0	0	0	0
	point722	722	114	70	30	70	396	70	0	0	0	0
	point723	723	114	70	30	70	396	70	0	0	0	0
	point724	724	114	70	30	70	396	70	0	0	0	0
	point13	13	114	70	30	70	396	70	0	0	0	0
	point14	14	114	70	30	70	396	70	0	0	0	0
	point15	15	114	70	30	70	396	70	0	0	0	0
	point344	344										
I-5 SB-S of Project	point792	792	114	65	30	65	396	65	0	0	0	0
	point45	45	114	65	30	65	396	65	0	0	0	0
	point46	46	114	65	30	65	396	65	0	0	0	0
	point47	47	114	65	30	65	396	65	0	0	0	0
	point48	48	114	65	30	65	396	65	0	0	0	0
	point49	49	114	65	30	65	396	65	0	0	0	0
	point50	50	114	65	30	65	396	65	0	0	0	0
	point51	51	114	65	30	65	396	65	0	0	0	0
	point43	43	114	65	30	65	396	65	0	0	0	0
	point52	52	114	65	30	65	396	65	0	0	0	0
	point53	53	114	65	30	65	396	65	0	0	0	0
	point54	54										
I-5 NB-N. of Laval Rd	point796	796	0	0	0	0	0	0	0	0	0	0
	point345	345	0	0	0	0	0	0	0	0	0	0
	point346	346										
I-5 SB-Laval Rd to Grapevine	point797	797	114	70	30	70	396	70	0	0	0	0
	point349	349	114	70	30	70	396	70	0	0	0	0
	point341	341	114	70	30	70	396	70	0	0	0	0
	point17	17	114	70	30	70	396	70	0	0	0	0

		point18	18	114	70	30	70	396	70	0	0	0	0
		point725	725	114	70	30	70	396	70	0	0	0	0
		point726	726	114	70	30	70	396	70	0	0	0	0
		point729	729	114	70	30	70	396	70	0	0	0	0
		point830	830	114	70	30	70	396	70	0	0	0	0
		point727	727	114	70	30	70	396	70	0	0	0	0
		point728	728	114	70	30	70	396	70	0	0	0	0
		point19	19	114	70	30	70	396	70	0	0	0	0
		point42	42	114	70	30	70	396	70	0	0	0	0
		point44	44										
Grapevine Rd West		point617	617	0	0	0	0	0	0	0	0	0	0
		point616	616	0	0	0	0	0	0	0	0	0	0
		point615	615	0	0	0	0	0	0	0	0	0	0
		point614	614	0	0	0	0	0	0	0	0	0	0
		point612	612	0	0	0	0	0	0	0	0	0	0
		point812	812	0	0	0	0	0	0	0	0	0	0
		point707	707										
Grapevine Road East		point146	146	0	0	0	0	0	0	0	0	0	0
		point816	816	0	0	0	0	0	0	0	0	0	0
		point623	623	0	0	0	0	0	0	0	0	0	0
		point619	619	0	0	0	0	0	0	0	0	0	0
		point620	620	0	0	0	0	0	0	0	0	0	0
		point621	621	0	0	0	0	0	0	0	0	0	0
		point613	613										
Edmonston Pumping Plant Rd		point156	156	16	50	4	50	76	50	0	0	0	0
		point157	157	16	50	4	50	76	50	0	0	0	0
		point167	167	16	50	4	50	76	50	0	0	0	0
		point798	798	16	50	4	50	76	50	0	0	0	0
		point799	799	16	50	4	50	76	50	0	0	0	0
		point801	801	16	50	4	50	76	50	0	0	0	0
		point802	802	16	50	4	50	76	50	0	0	0	0
		point803	803	16	50	4	50	76	50	0	0	0	0
		point804	804	16	50	4	50	76	50	0	0	0	0
		point805	805	16	50	4	50	76	50	0	0	0	0
		point806	806	16	50	4	50	76	50	0	0	0	0
		point807	807	16	50	4	50	76	50	0	0	0	0
		point808	808	16	50	4	50	76	50	0	0	0	0

		point810	810	16	50	4	50	76	50	0	0	0	0
		point809	809										

Dudek						**2 October 2015**					
M Greene						**TNM 2.5**					
INPUT: RECEIVERS											
PROJECT/CONTRACT:	**P/N 7667**										
RUN:	**Grapevine Project - Cal Run ST4**										
Receiver											
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST4	1	1	37,151,204.0	12,690,199.0	1,530.00	5.00	66.50	66	10.0	8.0	Y

Dudek							**2 October 2015**					
M Greene							**TNM 2.5**					
							Calculated with TNM 2.5					
RESULTS: SOUND LEVELS												
PROJECT/CONTRACT:		**P/N 7667**										
RUN:		**Grapevine Project - Cal Run ST4**										
BARRIER DESIGN:		**INPUT HEIGHTS**						**Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.**				
ATMOSPHERICS:		**68 deg F, 50% RH**										

Receiver												
Name	**No.**	**#DUs**	**Existing**	**No Barrier**					**With Barrier**			
			LAeq1h	**LAeq1h**		**Increase over existing**		**Type**	**Calculated**	**Noise Reduction**		
				Calculated	**Crit'n**	**Calculated**	**Crit'n Sub'l Inc**	**Impact**	**LAeq1h**	**Calculated**	**Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST4	1	1	66.5	67.8	66	1.3	10	Snd Lvl	67.8	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	1	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek					**2 October 2015**						
M Greene					**TNM 2.5**						
INPUT: ROADWAYS							**Average pavement type shall be used unless**				
PROJECT/CONTRACT:	**P/N 7667**						**a State highway agency substantiates the use**				
RUN:	**Grapevine Project - Cal Run ST5**						**of a different type with the approval of FHWA**				
Roadway		**Points**									
Name	**Width**	**Name**	**No.**	**Coordinates (pavement)**			**Flow Control**			**Segment**	
				X	**Y**	**Z**	**Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Pvmt Type**	**On Struct?**
	ft			ft	ft	ft		mph	%		
Laval Rd E	90.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point358	358	37,148,312.0	12,708,412.0	1,120.00					
Roadway113	35.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
Roadway116	100.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
Roadway115	35.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	
		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	35.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
Roadway129	75.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
I5 NB Offamp	35.0	point609	609	37,150,884.0	12,691,390.0	1,500.00				Average	
		point605	605	37,150,932.0	12,691,551.0	1,510.00				Average	
		point606	606	37,151,040.0	12,691,584.0	1,515.00				Average	

		point607	607	37,151,168.0	12,691,523.0	1,520.00					
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average	
		point363	363	37,147,644.0	12,715,708.0	980.00				Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00					
I-5 NB - S of Project	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
		point835	835	37,151,192.0	12,690,314.0	1,546.90				Average	
		point10	10	37,150,956.0	12,690,697.0	1,525.57					
I-5 SB - N of Laval Rd	60.0	point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
		point348	348	37,146,312.0	12,708,896.0	1,170.00					
I5 SB Onramp	35.0	point610	610	37,150,288.0	12,691,462.0	1,520.00				Average	
		point587	587	37,150,376.0	12,691,601.0	1,510.00				Average	
		point589	589	37,150,472.0	12,691,584.0	1,500.00				Average	
		point590	590	37,150,564.0	12,691,479.0	1,490.00					
Dennis McCarthy Dr	45.0	point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	90.0	point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00					
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00					
Laval Rd E-2	12.0	point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	
		point342	342	37,147,568.0	12,709,945.0	1,120.00					

I-5 NB - Grapevine to Laval Rd	60.0	point791	791	37,150,956.0	12,690,697.0	1,525.57				Average	
		point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
		point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
		point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
		point719	719	37,149,448.0	12,696,794.0	1,374.66				Average	
		point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
		point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
		point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
		point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
		point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
		point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	
		point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	
		point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 SB-S of Project	60.0	point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50					
I-5 NB-N. of Laval Rd	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17				Average	
		point830	830	37,149,384.0	12,696,561.0	1,374.49				Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	
		point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	

		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	
		point44	44	37,150,824.0	12,690,687.0	1,525.60					
Grapevine Rd West	50.0	point617	617	37,150,412.0	12,692,013.0	1,480.00				Average	
		point616	616	37,150,412.0	12,691,912.0	1,490.00				Average	
		point615	615	37,150,244.0	12,691,571.0	1,520.00				Average	
		point614	614	37,150,204.0	12,691,402.0	1,530.00				Average	
		point612	612	37,150,476.0	12,690,329.0	1,538.00				Average	
		point812	812	37,150,524.0	12,690,307.0	1,537.50				Average	
		point707	707	37,150,732.0	12,690,361.0	1,535.00					
Grapevine Road East	50.0	point146	146	37,151,216.0	12,690,473.0	1,550.00				Average	
		point816	816	37,151,432.0	12,690,534.0	1,545.00				Average	
		point623	623	37,151,500.0	12,690,625.0	1,535.00				Average	
		point619	619	37,151,220.0	12,691,565.0	1,520.00				Average	
		point620	620	37,150,988.0	12,691,709.0	1,510.00				Average	
		point621	621	37,150,780.0	12,691,877.0	1,500.00				Average	
		point613	613	37,150,696.0	12,692,047.0	1,490.00					
Edmonston Pumping Plant Rd	35.0	point156	156	37,151,376.0	12,691,167.0	1,525.00				Average	
		point157	157	37,151,832.0	12,691,306.0	1,500.00				Average	
		point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
		point798	798	37,153,608.0	12,690,806.0	1,480.00				Average	
		point799	799	37,154,252.0	12,690,716.0	1,450.00				Average	
		point801	801	37,155,832.0	12,690,652.0	1,420.00				Average	
		point802	802	37,157,604.0	12,690,592.0	1,400.00				Average	
		point803	803	37,159,760.0	12,690,254.0	1,375.00				Average	
		point804	804	37,161,912.0	12,689,916.0	1,350.00				Average	
		point805	805	37,161,992.0	12,689,907.0	1,350.00				Average	
		point806	806	37,163,484.0	12,689,688.0	1,300.00				Average	
		point807	807	37,165,736.0	12,689,344.0	1,250.00				Average	
		point808	808	37,168,656.0	12,689,314.0	1,200.00				Average	
		point810	810	37,169,252.0	12,689,409.0	1,200.00				Average	
		point809	809	37,169,832.0	12,689,734.0	1,200.00					

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cal Run ST5**

Roadway Name	Points Name	No.	Segment Autos V veh/hr	Autos S mph	MTrucks V veh/hr	MTrucks S mph	HTrucks V veh/hr	HTrucks S mph	Buses V veh/hr	Buses S mph	Motorcycles V veh/hr	Motorcycles S mph
Laval Rd E	point340	340	0	0	0	0	0	0	0	0	0	0
	point354	354	0	0	0	0	0	0	0	0	0	0
	point355	355	0	0	0	0	0	0	0	0	0	0
	point356	356	0	0	0	0	0	0	0	0	0	0
	point357	357	0	0	0	0	0	0	0	0	0	0
	point358	358										
Roadway113	point375	375	0	0	0	0	0	0	0	0	0	0
	point376	376										
Roadway116	point387	387	0	0	0	0	0	0	0	0	0	0
	point388	388	0	0	0	0	0	0	0	0	0	0
	point389	389	0	0	0	0	0	0	0	0	0	0
	point390	390										
Roadway115	point398	398	0	0	0	0	0	0	0	0	0	0
	point378	378	0	0	0	0	0	0	0	0	0	0
	point379	379	0	0	0	0	0	0	0	0	0	0
	point380	380										
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0
	point400	400										
Roadway129	point422	422	0	0	0	0	0	0	0	0	0	0
	point403	403	0	0	0	0	0	0	0	0	0	0
	point404	404	0	0	0	0	0	0	0	0	0	0
	point405	405	0	0	0	0	0	0	0	0	0	0
	point406	406										
I5 NB Offamp	point609	609	0	0	0	0	0	0	0	0	0	0

	point605	605	0	0	0	0	0	0	0	0	0	0
	point606	606	0	0	0	0	0	0	0	0	0	0
	point607	607										
Wheeler Ridge Rd	point364	364	0	0	0	0	0	0	0	0	0	0
	point363	363	0	0	0	0	0	0	0	0	0	0
	point361	361	0	0	0	0	0	0	0	0	0	0
	point374	374	0	0	0	0	0	0	0	0	0	0
	point382	382										
I-5 NB - S of Project	point1	1	114	70	30	70	396	70	0	0	0	0
	point3	3	114	70	30	70	396	70	0	0	0	0
	point4	4	114	70	30	70	396	70	0	0	0	0
	point5	5	114	70	30	70	396	70	0	0	0	0
	point6	6	114	70	30	70	396	70	0	0	0	0
	point7	7	114	70	30	70	396	70	0	0	0	0
	point8	8	114	70	30	70	396	70	0	0	0	0
	point9	9	114	70	30	70	396	70	0	0	0	0
	point835	835	114	70	30	70	396	70	0	0	0	0
	point10	10										
I-5 SB - N of Laval Rd	point351	351	0	0	0	0	0	0	0	0	0	0
	point348	348										
I5 SB Onramp	point610	610	0	0	0	0	0	0	0	0	0	0
	point587	587	0	0	0	0	0	0	0	0	0	0
	point589	589	0	0	0	0	0	0	0	0	0	0
	point590	590										
Dennis McCarthy Dr	point426	426	0	0	0	0	0	0	0	0	0	0
	point418	418	0	0	0	0	0	0	0	0	0	0
	point419	419	0	0	0	0	0	0	0	0	0	0
	point420	420	0	0	0	0	0	0	0	0	0	0
	point399	399	0	0	0	0	0	0	0	0	0	0
	point401	401										
Laval Rd	point743	743	0	0	0	0	0	0	0	0	0	0
	point424	424	0	0	0	0	0	0	0	0	0	0
	point416	416										
Wheeler Ridge Rd-2	point755	755	0	0	0	0	0	0	0	0	0	0
	point383	383	0	0	0	0	0	0	0	0	0	0
	point393	393	0	0	0	0	0	0	0	0	0	0
	point394	394	0	0	0	0	0	0	0	0	0	0

	point386	386										
Laval Rd E-2	point756	756	0	0	0	0	0	0	0	0	0	0
	point359	359	0	0	0	0	0	0	0	0	0	0
	point360	360	0	0	0	0	0	0	0	0	0	0
	point342	342										
I-5 NB - Grapevine to Laval Rd	point791	791	1197	70	33	70	510	70	0	0	0	0
	point11	11	1197	70	33	70	510	70	0	0	0	0
	point12	12	1197	70	33	70	510	70	0	0	0	0
	point720	720	1197	70	33	70	510	70	0	0	0	0
	point719	719	1197	70	33	70	510	70	0	0	0	0
	point721	721	1197	70	33	70	510	70	0	0	0	0
	point722	722	1197	70	33	70	510	70	0	0	0	0
	point723	723	1197	70	33	70	510	70	0	0	0	0
	point724	724	1197	70	33	70	510	70	0	0	0	0
	point13	13	1197	70	33	70	510	70	0	0	0	0
	point14	14	1197	70	33	70	510	70	0	0	0	0
	point15	15	1197	70	33	70	510	70	0	0	0	0
	point344	344										
I-5 SB-S of Project	point792	792	114	65	30	65	396	65	0	0	0	0
	point45	45	114	65	30	65	396	65	0	0	0	0
	point46	46	114	65	30	65	396	65	0	0	0	0
	point47	47	114	65	30	65	396	65	0	0	0	0
	point48	48	114	65	30	65	396	65	0	0	0	0
	point49	49	114	65	30	65	396	65	0	0	0	0
	point50	50	114	65	30	65	396	65	0	0	0	0
	point51	51	114	65	30	65	396	65	0	0	0	0
	point43	43	114	65	30	65	396	65	0	0	0	0
	point52	52	114	65	30	65	396	65	0	0	0	0
	point53	53	114	65	30	65	396	65	0	0	0	0
	point54	54										
I-5 NB-N. of Laval Rd	point796	796	0	0	0	0	0	0	0	0	0	0
	point345	345	0	0	0	0	0	0	0	0	0	0
	point346	346										
I-5 SB-Laval Rd to Grapevine	point797	797	1197	70	33	70	510	70	0	0	0	0
	point349	349	1197	70	33	70	510	70	0	0	0	0
	point341	341	1197	70	33	70	510	70	0	0	0	0
	point17	17	1197	70	33	70	510	70	0	0	0	0

	point18	18	1197	70	33	70	510	70	0	0	0	0
	point725	725	1197	70	33	70	510	70	0	0	0	0
	point726	726	1197	70	33	70	510	70	0	0	0	0
	point729	729	1197	70	33	70	510	70	0	0	0	0
	point830	830	1197	70	33	70	510	70	0	0	0	0
	point727	727	1197	70	33	70	510	70	0	0	0	0
	point728	728	1197	70	33	70	510	70	0	0	0	0
	point19	19	1197	70	33	70	510	70	0	0	0	0
	point42	42	1197	70	33	70	510	70	0	0	0	0
	point44	44										
Grapevine Rd West	point617	617	0	0	0	0	0	0	0	0	0	0
	point616	616	0	0	0	0	0	0	0	0	0	0
	point615	615	0	0	0	0	0	0	0	0	0	0
	point614	614	0	0	0	0	0	0	0	0	0	0
	point612	612	0	0	0	0	0	0	0	0	0	0
	point812	812	0	0	0	0	0	0	0	0	0	0
	point707	707										
Grapevine Road East	point146	146	0	0	0	0	0	0	0	0	0	0
	point816	816	0	0	0	0	0	0	0	0	0	0
	point623	623	0	0	0	0	0	0	0	0	0	0
	point619	619	0	0	0	0	0	0	0	0	0	0
	point620	620	0	0	0	0	0	0	0	0	0	0
	point621	621	0	0	0	0	0	0	0	0	0	0
	point613	613										
Edmonston Pumping Plant Rd	point156	156	16	50	4	50	76	50	0	0	0	0
	point157	157	16	50	4	50	76	50	0	0	0	0
	point167	167	16	50	4	50	76	50	0	0	0	0
	point798	798	16	50	4	50	76	50	0	0	0	0
	point799	799	16	50	4	50	76	50	0	0	0	0
	point801	801	16	50	4	50	76	50	0	0	0	0
	point802	802	16	50	4	50	76	50	0	0	0	0
	point803	803	16	50	4	50	76	50	0	0	0	0
	point804	804	16	50	4	50	76	50	0	0	0	0
	point805	805	16	50	4	50	76	50	0	0	0	0
	point806	806	16	50	4	50	76	50	0	0	0	0
	point807	807	16	50	4	50	76	50	0	0	0	0
	point808	808	16	50	4	50	76	50	0	0	0	0

		point810	810	16	50	4	50	76	50	0	0	0	0
		point809	809										

Dudek						**2 October 2015**					
M Greene						**TNM 2.5**					
INPUT: RECEIVERS											
PROJECT/CONTRACT:	**P/N 7667**										
RUN:	**Grapevine Project - Cal Run ST5**										
Receiver											
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST5	1	1	37,147,984.0	12,702,002.0	1,248.00	5.00	80.60	66	10.0	8.0	Y

Dudek							**2 October 2015**						
M Greene							**TNM 2.5**						
							Calculated with TNM 2.5						
RESULTS: SOUND LEVELS													
PROJECT/CONTRACT:		**P/N 7667**											
RUN:		**Grapevine Project - Cal Run ST5**											
BARRIER DESIGN:		**INPUT HEIGHTS**						**Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.**					
ATMOSPHERICS:		**68 deg F, 50% RH**											

Receiver												
Name	**No.**	**#DUs**	**Existing**	**No Barrier**					**With Barrier**			
			LAeq1h	**LAeq1h**		**Increase over existing**		**Type**	**Calculated**	**Noise Reduction**		
				Calculated	**Crit'n**	**Calculated**	**Crit'n Sub'l Inc**	**Impact**	**LAeq1h**	**Calculated**	**Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST5	1	1	80.6	79.1	66	-1.5	10	Snd Lvl	79.1	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	1	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek				**2 October 2015**							
M Greene				**TNM 2.5**							
INPUT: ROADWAYS							**Average pavement type shall be used unless**				
PROJECT/CONTRACT:	**P/N 7667**						**a State highway agency substantiates the use**				
RUN:	**Grapevine Project - Cal Run ST6**						**of a different type with the approval of FHWA**				
Roadway		**Points**									
Name	**Width**	**Name**	**No.**	**Coordinates (pavement)**			**Flow Control**			**Segment**	
				X	**Y**	**Z**	**Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Pvmt Type**	**On Struct?**
	ft			ft	ft	ft		mph	%		
Laval Rd E	90.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point358	358	37,148,312.0	12,708,412.0	1,120.00					
Roadway113	35.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
Roadway116	100.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
Roadway115	35.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	
		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	35.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
Roadway129	75.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
I5 NB Offamp	35.0	point609	609	37,150,884.0	12,691,390.0	1,500.00				Average	
		point605	605	37,150,932.0	12,691,551.0	1,510.00				Average	
		point606	606	37,151,040.0	12,691,584.0	1,515.00				Average	

		point607	607	37,151,168.0	12,691,523.0	1,520.00					
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average	
		point363	363	37,147,644.0	12,715,708.0	980.00				Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00					
I-5 NB - S of Project	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
		point835	835	37,151,192.0	12,690,314.0	1,546.90				Average	
		point10	10	37,150,956.0	12,690,697.0	1,525.57					
I-5 SB - N of Laval Rd	60.0	point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
		point348	348	37,146,312.0	12,708,896.0	1,170.00					
I5 SB Onramp	35.0	point610	610	37,150,288.0	12,691,462.0	1,520.00				Average	
		point587	587	37,150,376.0	12,691,601.0	1,510.00				Average	
		point589	589	37,150,472.0	12,691,584.0	1,500.00				Average	
		point590	590	37,150,564.0	12,691,479.0	1,490.00					
Dennis McCarthy Dr	45.0	point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	90.0	point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00					
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00					
Laval Rd E-2	12.0	point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	
		point342	342	37,147,568.0	12,709,945.0	1,120.00					

I-5 NB - Grapevine to Laval Rd	60.0	point791	791	37,150,956.0	12,690,697.0	1,525.57				Average	
		point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
		point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
		point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
		point719	719	37,149,448.0	12,696,794.0	1,374.66				Average	
		point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
		point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
		point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
		point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
		point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
		point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	
		point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	
		point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 SB-S of Project	60.0	point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50					
I-5 NB-N. of Laval Rd	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17				Average	
		point830	830	37,149,384.0	12,696,561.0	1,374.49				Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	
		point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	

		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	
		point44	44	37,150,824.0	12,690,687.0	1,525.60					
Grapevine Rd West	50.0	point617	617	37,150,412.0	12,692,013.0	1,480.00				Average	
		point616	616	37,150,412.0	12,691,912.0	1,490.00				Average	
		point615	615	37,150,244.0	12,691,571.0	1,520.00				Average	
		point614	614	37,150,204.0	12,691,402.0	1,530.00				Average	
		point612	612	37,150,476.0	12,690,329.0	1,538.00				Average	
		point812	812	37,150,524.0	12,690,307.0	1,537.50				Average	
		point707	707	37,150,732.0	12,690,361.0	1,535.00					
Grapevine Road East	50.0	point146	146	37,151,216.0	12,690,473.0	1,550.00				Average	
		point816	816	37,151,432.0	12,690,534.0	1,545.00				Average	
		point623	623	37,151,500.0	12,690,625.0	1,535.00				Average	
		point619	619	37,151,220.0	12,691,565.0	1,520.00				Average	
		point620	620	37,150,988.0	12,691,709.0	1,510.00				Average	
		point621	621	37,150,780.0	12,691,877.0	1,500.00				Average	
		point613	613	37,150,696.0	12,692,047.0	1,490.00					
Edmonston Pumping Plant Rd	35.0	point156	156	37,151,376.0	12,691,167.0	1,525.00				Average	
		point157	157	37,151,832.0	12,691,306.0	1,500.00				Average	
		point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
		point798	798	37,153,608.0	12,690,806.0	1,480.00				Average	
		point799	799	37,154,252.0	12,690,716.0	1,450.00				Average	
		point801	801	37,155,832.0	12,690,652.0	1,420.00				Average	
		point802	802	37,157,604.0	12,690,592.0	1,400.00				Average	
		point803	803	37,159,760.0	12,690,254.0	1,375.00				Average	
		point804	804	37,161,912.0	12,689,916.0	1,350.00				Average	
		point805	805	37,161,992.0	12,689,907.0	1,350.00				Average	
		point806	806	37,163,484.0	12,689,688.0	1,300.00				Average	
		point807	807	37,165,736.0	12,689,344.0	1,250.00				Average	
		point808	808	37,168,656.0	12,689,314.0	1,200.00				Average	
		point810	810	37,169,252.0	12,689,409.0	1,200.00				Average	
		point809	809	37,169,832.0	12,689,734.0	1,200.00					

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cal Run ST6**

Roadway Name	Points Name	No.	Segment Autos V veh/hr	Autos S mph	MTrucks V veh/hr	MTrucks S mph	HTrucks V veh/hr	HTrucks S mph	Buses V veh/hr	Buses S mph	Motorcycles V veh/hr	Motorcycles S mph
Laval Rd E	point340	340	0	0	0	0	0	0	0	0	0	0
	point354	354	0	0	0	0	0	0	0	0	0	0
	point355	355	0	0	0	0	0	0	0	0	0	0
	point356	356	0	0	0	0	0	0	0	0	0	0
	point357	357	0	0	0	0	0	0	0	0	0	0
	point358	358										
Roadway113	point375	375	0	0	0	0	0	0	0	0	0	0
	point376	376										
Roadway116	point387	387	0	0	0	0	0	0	0	0	0	0
	point388	388	0	0	0	0	0	0	0	0	0	0
	point389	389	0	0	0	0	0	0	0	0	0	0
	point390	390										
Roadway115	point398	398	0	0	0	0	0	0	0	0	0	0
	point378	378	0	0	0	0	0	0	0	0	0	0
	point379	379	0	0	0	0	0	0	0	0	0	0
	point380	380										
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0
	point400	400										
Roadway129	point422	422	0	0	0	0	0	0	0	0	0	0
	point403	403	0	0	0	0	0	0	0	0	0	0
	point404	404	0	0	0	0	0	0	0	0	0	0
	point405	405	0	0	0	0	0	0	0	0	0	0
	point406	406										
I5 NB Offamp	point609	609	0	0	0	0	0	0	0	0	0	0

	point605	605	0	0	0	0	0	0	0	0	0	0
	point606	606	0	0	0	0	0	0	0	0	0	0
	point607	607										
Wheeler Ridge Rd	point364	364	0	0	0	0	0	0	0	0	0	0
	point363	363	0	0	0	0	0	0	0	0	0	0
	point361	361	0	0	0	0	0	0	0	0	0	0
	point374	374	0	0	0	0	0	0	0	0	0	0
	point382	382										
I-5 NB - S of Project	point1	1	114	70	30	70	396	70	0	0	0	0
	point3	3	114	70	30	70	396	70	0	0	0	0
	point4	4	114	70	30	70	396	70	0	0	0	0
	point5	5	114	70	30	70	396	70	0	0	0	0
	point6	6	114	70	30	70	396	70	0	0	0	0
	point7	7	114	70	30	70	396	70	0	0	0	0
	point8	8	114	70	30	70	396	70	0	0	0	0
	point9	9	114	70	30	70	396	70	0	0	0	0
	point835	835	114	70	30	70	396	70	0	0	0	0
	point10	10										
I-5 SB - N of Laval Rd	point351	351	0	0	0	0	0	0	0	0	0	0
	point348	348										
I5 SB Onramp	point610	610	0	0	0	0	0	0	0	0	0	0
	point587	587	0	0	0	0	0	0	0	0	0	0
	point589	589	0	0	0	0	0	0	0	0	0	0
	point590	590										
Dennis McCarthy Dr	point426	426	0	0	0	0	0	0	0	0	0	0
	point418	418	0	0	0	0	0	0	0	0	0	0
	point419	419	0	0	0	0	0	0	0	0	0	0
	point420	420	0	0	0	0	0	0	0	0	0	0
	point399	399	0	0	0	0	0	0	0	0	0	0
	point401	401										
Laval Rd	point743	743	0	0	0	0	0	0	0	0	0	0
	point424	424	0	0	0	0	0	0	0	0	0	0
	point416	416										
Wheeler Ridge Rd-2	point755	755	0	0	0	0	0	0	0	0	0	0
	point383	383	0	0	0	0	0	0	0	0	0	0
	point393	393	0	0	0	0	0	0	0	0	0	0
	point394	394	0	0	0	0	0	0	0	0	0	0

	point386	386										
Laval Rd E-2	point756	756	0	0	0	0	0	0	0	0	0	0
	point359	359	0	0	0	0	0	0	0	0	0	0
	point360	360	0	0	0	0	0	0	0	0	0	0
	point342	342										
I-5 NB - Grapevine to Laval Rd	point791	791	1242	70	24	70	522	70	0	0	0	0
	point11	11	1242	70	24	70	522	70	0	0	0	0
	point12	12	1242	70	24	70	522	70	0	0	0	0
	point720	720	1242	70	24	70	522	70	0	0	0	0
	point719	719	1242	70	24	70	522	70	0	0	0	0
	point721	721	1242	70	24	70	522	70	0	0	0	0
	point722	722	1242	70	24	70	522	70	0	0	0	0
	point723	723	1242	70	24	70	522	70	0	0	0	0
	point724	724	1242	70	24	70	522	70	0	0	0	0
	point13	13	1242	70	24	70	522	70	0	0	0	0
	point14	14	1242	70	24	70	522	70	0	0	0	0
	point15	15	1242	70	24	70	522	70	0	0	0	0
	point344	344										
I-5 SB-S of Project	point792	792	114	65	30	65	396	65	0	0	0	0
	point45	45	114	65	30	65	396	65	0	0	0	0
	point46	46	114	65	30	65	396	65	0	0	0	0
	point47	47	114	65	30	65	396	65	0	0	0	0
	point48	48	114	65	30	65	396	65	0	0	0	0
	point49	49	114	65	30	65	396	65	0	0	0	0
	point50	50	114	65	30	65	396	65	0	0	0	0
	point51	51	114	65	30	65	396	65	0	0	0	0
	point43	43	114	65	30	65	396	65	0	0	0	0
	point52	52	114	65	30	65	396	65	0	0	0	0
	point53	53	114	65	30	65	396	65	0	0	0	0
	point54	54										
I-5 NB-N. of Laval Rd	point796	796	0	0	0	0	0	0	0	0	0	0
	point345	345	0	0	0	0	0	0	0	0	0	0
	point346	346										
I-5 SB-Laval Rd to Grapevine	point797	797	1242	70	24	70	522	70	0	0	0	0
	point349	349	1242	70	24	70	522	70	0	0	0	0
	point341	341	1242	70	24	70	522	70	0	0	0	0
	point17	17	1242	70	24	70	522	70	0	0	0	0

	point18	18	1242	70	24	70	522	70	0	0	0	0
	point725	725	1242	70	24	70	522	70	0	0	0	0
	point726	726	1242	70	24	70	522	70	0	0	0	0
	point729	729	1242	70	24	70	522	70	0	0	0	0
	point830	830	1242	70	24	70	522	70	0	0	0	0
	point727	727	1242	70	24	70	522	70	0	0	0	0
	point728	728	1242	70	24	70	522	70	0	0	0	0
	point19	19	1242	70	24	70	522	70	0	0	0	0
	point42	42	1242	70	24	70	522	70	0	0	0	0
	point44	44										
Grapevine Rd West	point617	617	0	0	0	0	0	0	0	0	0	0
	point616	616	0	0	0	0	0	0	0	0	0	0
	point615	615	0	0	0	0	0	0	0	0	0	0
	point614	614	0	0	0	0	0	0	0	0	0	0
	point612	612	0	0	0	0	0	0	0	0	0	0
	point812	812	0	0	0	0	0	0	0	0	0	0
	point707	707										
Grapevine Road East	point146	146	0	0	0	0	0	0	0	0	0	0
	point816	816	0	0	0	0	0	0	0	0	0	0
	point623	623	0	0	0	0	0	0	0	0	0	0
	point619	619	0	0	0	0	0	0	0	0	0	0
	point620	620	0	0	0	0	0	0	0	0	0	0
	point621	621	0	0	0	0	0	0	0	0	0	0
	point613	613										
Edmonston Pumping Plant Rd	point156	156	16	50	4	50	76	50	0	0	0	0
	point157	157	16	50	4	50	76	50	0	0	0	0
	point167	167	16	50	4	50	76	50	0	0	0	0
	point798	798	16	50	4	50	76	50	0	0	0	0
	point799	799	16	50	4	50	76	50	0	0	0	0
	point801	801	16	50	4	50	76	50	0	0	0	0
	point802	802	16	50	4	50	76	50	0	0	0	0
	point803	803	16	50	4	50	76	50	0	0	0	0
	point804	804	16	50	4	50	76	50	0	0	0	0
	point805	805	16	50	4	50	76	50	0	0	0	0
	point806	806	16	50	4	50	76	50	0	0	0	0
	point807	807	16	50	4	50	76	50	0	0	0	0
	point808	808	16	50	4	50	76	50	0	0	0	0

		point810	810	16	50	4	50	76	50	0	0	0	0
		point809	809										

Dudek						**2 October 2015**					
M Greene						**TNM 2.5**					
INPUT: RECEIVERS											
PROJECT/CONTRACT:	**P/N 7667**										
RUN:	**Grapevine Project - Cal Run ST6**										
Receiver											
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST6	1	1	37,148,540.0	12,700,774.0	1,300.00	5.00	81.80	66	10.0	8.0	Y

Dudek 2 October 2015
M Greene TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: P/N 7667
RUN: Grapevine Project - Cal Run ST6
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST6	1	1	81.8	80.1	66	-1.7	10	Snd Lvl	80.1	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	1	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek
M Greene

2 October 2015
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: P/N 7667
RUN: Grapevine Project - Cal Run ST7

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Laval Rd E	24.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point852	852	37,149,264.0	12,707,360.0	1,117.50				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point358	358	37,148,312.0	12,708,412.0	1,120.00					
Roadway113	35.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
Roadway116	100.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
Roadway115	35.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	
		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	35.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
Roadway129	75.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
I5 NB Offamp	35.0	point609	609	37,150,884.0	12,691,390.0	1,500.00				Average	
		point605	605	37,150,932.0	12,691,551.0	1,510.00				Average	

		point606	606	37,151,040.0	12,691,584.0	1,515.00				Average	
		point607	607	37,151,168.0	12,691,523.0	1,520.00					
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average	
		point363	363	37,147,644.0	12,715,708.0	980.00				Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00					
I-5 NB - S of Project	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
		point835	835	37,151,192.0	12,690,314.0	1,546.90				Average	
		point10	10	37,150,956.0	12,690,697.0	1,525.57					
I-5 SB - N of Laval Rd	60.0	point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
		point348	348	37,146,312.0	12,708,896.0	1,170.00					
I5 SB Onramp	35.0	point610	610	37,150,288.0	12,691,462.0	1,520.00				Average	
		point587	587	37,150,376.0	12,691,601.0	1,510.00				Average	
		point589	589	37,150,472.0	12,691,584.0	1,500.00				Average	
		point590	590	37,150,564.0	12,691,479.0	1,490.00					
Dennis McCarthy Dr	45.0	point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	90.0	point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00					
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00					
Laval Rd E-2	12.0	point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	

			point342	342	37,147,568.0	12,709,945.0	1,120.00					
I-5 NB - Grapevine to Laval Rd	60.0		point791	791	37,150,956.0	12,690,697.0	1,525.57				Average	
			point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
			point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
			point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
			point719	719	37,149,448.0	12,696,794.0	1,374.66				Average	
			point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
			point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
			point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
			point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
			point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
			point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	
			point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	
			point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 SB-S of Project	60.0		point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
			point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
			point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
			point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
			point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
			point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
			point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
			point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
			point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
			point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
			point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
			point54	54	37,151,984.0	12,684,316.0	1,886.50					
I-5 NB-N. of Laval Rd	60.0		point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
			point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
			point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0		point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
			point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
			point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
			point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
			point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
			point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
			point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
			point729	729	37,149,264.0	12,697,040.0	1,363.17				Average	
			point830	830	37,149,384.0	12,696,561.0	1,374.49				Average	
			point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
			point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	

			point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	
			point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	
			point44	44	37,150,824.0	12,690,687.0	1,525.60					
Grapevine Rd West	50.0		point617	617	37,150,412.0	12,692,013.0	1,480.00				Average	
			point616	616	37,150,412.0	12,691,912.0	1,490.00				Average	
			point615	615	37,150,244.0	12,691,571.0	1,520.00				Average	
			point614	614	37,150,204.0	12,691,402.0	1,530.00				Average	
			point612	612	37,150,476.0	12,690,329.0	1,538.00				Average	
			point812	812	37,150,524.0	12,690,307.0	1,537.50				Average	
			point707	707	37,150,732.0	12,690,361.0	1,535.00					
Grapevine Road East	50.0		point146	146	37,151,216.0	12,690,473.0	1,550.00				Average	
			point816	816	37,151,432.0	12,690,534.0	1,545.00				Average	
			point623	623	37,151,500.0	12,690,625.0	1,535.00				Average	
			point619	619	37,151,220.0	12,691,565.0	1,520.00				Average	
			point620	620	37,150,988.0	12,691,709.0	1,510.00				Average	
			point621	621	37,150,780.0	12,691,877.0	1,500.00				Average	
			point613	613	37,150,696.0	12,692,047.0	1,490.00					
Edmonston Pumping Plant Rd	35.0		point156	156	37,151,376.0	12,691,167.0	1,525.00				Average	
			point157	157	37,151,832.0	12,691,306.0	1,500.00				Average	
			point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
			point798	798	37,153,608.0	12,690,806.0	1,480.00				Average	
			point799	799	37,154,252.0	12,690,716.0	1,450.00				Average	
			point801	801	37,155,832.0	12,690,652.0	1,420.00				Average	
			point802	802	37,157,604.0	12,690,592.0	1,400.00				Average	
			point803	803	37,159,760.0	12,690,254.0	1,375.00				Average	
			point804	804	37,161,912.0	12,689,916.0	1,350.00				Average	
			point805	805	37,161,992.0	12,689,907.0	1,350.00				Average	
			point806	806	37,163,484.0	12,689,688.0	1,300.00				Average	
			point807	807	37,165,736.0	12,689,344.0	1,250.00				Average	
			point808	808	37,168,656.0	12,689,314.0	1,200.00				Average	
			point810	810	37,169,252.0	12,689,409.0	1,200.00				Average	
			point809	809	37,169,832.0	12,689,734.0	1,200.00					

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cal Run ST7**

Roadway	Points		Segment									
Name	Name	No.	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Laval Rd E	point340	340	60	45	0	0	0	0	0	0	0	0
	point852	852	60	45	0	0	0	0	0	0	0	0
	point354	354	60	45	0	0	0	0	0	0	0	0
	point355	355	60	45	0	0	0	0	0	0	0	0
	point356	356	60	45	0	0	0	0	0	0	0	0
	point357	357	60	45	0	0	0	0	0	0	0	0
	point358	358										
Roadway113	point375	375	0	0	0	0	0	0	0	0	0	0
	point376	376										
Roadway116	point387	387	0	0	0	0	0	0	0	0	0	0
	point388	388	0	0	0	0	0	0	0	0	0	0
	point389	389	0	0	0	0	0	0	0	0	0	0
	point390	390										
Roadway115	point398	398	0	0	0	0	0	0	0	0	0	0
	point378	378	0	0	0	0	0	0	0	0	0	0
	point379	379	0	0	0	0	0	0	0	0	0	0
	point380	380										
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0
	point400	400										
Roadway129	point422	422	0	0	0	0	0	0	0	0	0	0
	point403	403	0	0	0	0	0	0	0	0	0	0
	point404	404	0	0	0	0	0	0	0	0	0	0
	point405	405	0	0	0	0	0	0	0	0	0	0
	point406	406										

I5 NB Offamp		point609	609	0	0	0	0	0	0	0	0	0	0
		point605	605	0	0	0	0	0	0	0	0	0	0
		point606	606	0	0	0	0	0	0	0	0	0	0
		point607	607										
Wheeler Ridge Rd		point364	364	0	0	0	0	0	0	0	0	0	0
		point363	363	0	0	0	0	0	0	0	0	0	0
		point361	361	0	0	0	0	0	0	0	0	0	0
		point374	374	0	0	0	0	0	0	0	0	0	0
		point382	382										
I-5 NB - S of Project		point1	1	114	70	30	70	396	70	0	0	0	0
		point3	3	114	70	30	70	396	70	0	0	0	0
		point4	4	114	70	30	70	396	70	0	0	0	0
		point5	5	114	70	30	70	396	70	0	0	0	0
		point6	6	114	70	30	70	396	70	0	0	0	0
		point7	7	114	70	30	70	396	70	0	0	0	0
		point8	8	114	70	30	70	396	70	0	0	0	0
		point9	9	114	70	30	70	396	70	0	0	0	0
		point835	835	114	70	30	70	396	70	0	0	0	0
		point10	10										
I-5 SB - N of Laval Rd		point351	351	0	0	0	0	0	0	0	0	0	0
		point348	348										
I5 SB Onramp		point610	610	0	0	0	0	0	0	0	0	0	0
		point587	587	0	0	0	0	0	0	0	0	0	0
		point589	589	0	0	0	0	0	0	0	0	0	0
		point590	590										
Dennis McCarthy Dr		point426	426	0	0	0	0	0	0	0	0	0	0
		point418	418	0	0	0	0	0	0	0	0	0	0
		point419	419	0	0	0	0	0	0	0	0	0	0
		point420	420	0	0	0	0	0	0	0	0	0	0
		point399	399	0	0	0	0	0	0	0	0	0	0
		point401	401										
Laval Rd		point743	743	0	0	0	0	0	0	0	0	0	0
		point424	424	0	0	0	0	0	0	0	0	0	0
		point416	416										
Wheeler Ridge Rd-2		point755	755	0	0	0	0	0	0	0	0	0	0
		point383	383	0	0	0	0	0	0	0	0	0	0
		point393	393	0	0	0	0	0	0	0	0	0	0

	point394	394	0	0	0	0	0	0	0	0	0	0
	point386	386										
Laval Rd E-2	point756	756	0	0	0	0	0	0	0	0	0	0
	point359	359	0	0	0	0	0	0	0	0	0	0
	point360	360	0	0	0	0	0	0	0	0	0	0
	point342	342										
I-5 NB - Grapevine to Laval Rd	point791	791	1242	70	24	70	522	70	0	0	0	0
	point11	11	1242	70	24	70	522	70	0	0	0	0
	point12	12	1242	70	24	70	522	70	0	0	0	0
	point720	720	1242	70	24	70	522	70	0	0	0	0
	point719	719	1242	70	24	70	522	70	0	0	0	0
	point721	721	1242	70	24	70	522	70	0	0	0	0
	point722	722	1242	70	24	70	522	70	0	0	0	0
	point723	723	1242	70	24	70	522	70	0	0	0	0
	point724	724	1242	70	24	70	522	70	0	0	0	0
	point13	13	1242	70	24	70	522	70	0	0	0	0
	point14	14	1242	70	24	70	522	70	0	0	0	0
	point15	15	1242	70	24	70	522	70	0	0	0	0
	point344	344										
I-5 SB-S of Project	point792	792	114	65	30	65	396	65	0	0	0	0
	point45	45	114	65	30	65	396	65	0	0	0	0
	point46	46	114	65	30	65	396	65	0	0	0	0
	point47	47	114	65	30	65	396	65	0	0	0	0
	point48	48	114	65	30	65	396	65	0	0	0	0
	point49	49	114	65	30	65	396	65	0	0	0	0
	point50	50	114	65	30	65	396	65	0	0	0	0
	point51	51	114	65	30	65	396	65	0	0	0	0
	point43	43	114	65	30	65	396	65	0	0	0	0
	point52	52	114	65	30	65	396	65	0	0	0	0
	point53	53	114	65	30	65	396	65	0	0	0	0
	point54	54										
I-5 NB-N. of Laval Rd	point796	796	0	0	0	0	0	0	0	0	0	0
	point345	345	0	0	0	0	0	0	0	0	0	0
	point346	346										
I-5 SB-Laval Rd to Grapevine	point797	797	1242	70	24	70	522	70	0	0	0	0
	point349	349	1242	70	24	70	522	70	0	0	0	0
	point341	341	1242	70	24	70	522	70	0	0	0	0

		point17	17	1242	70	24	70	522	70	0	0	0	0
		point18	18	1242	70	24	70	522	70	0	0	0	0
		point725	725	1242	70	24	70	522	70	0	0	0	0
		point726	726	1242	70	24	70	522	70	0	0	0	0
		point729	729	1242	70	24	70	522	70	0	0	0	0
		point830	830	1242	70	24	70	522	70	0	0	0	0
		point727	727	1242	70	24	70	522	70	0	0	0	0
		point728	728	1242	70	24	70	522	70	0	0	0	0
		point19	19	1242	70	24	70	522	70	0	0	0	0
		point42	42	1242	70	24	70	522	70	0	0	0	0
		point44	44										
Grapevine Rd West		point617	617	0	0	0	0	0	0	0	0	0	0
		point616	616	0	0	0	0	0	0	0	0	0	0
		point615	615	0	0	0	0	0	0	0	0	0	0
		point614	614	0	0	0	0	0	0	0	0	0	0
		point612	612	0	0	0	0	0	0	0	0	0	0
		point812	812	0	0	0	0	0	0	0	0	0	0
		point707	707										
Grapevine Road East		point146	146	0	0	0	0	0	0	0	0	0	0
		point816	816	0	0	0	0	0	0	0	0	0	0
		point623	623	0	0	0	0	0	0	0	0	0	0
		point619	619	0	0	0	0	0	0	0	0	0	0
		point620	620	0	0	0	0	0	0	0	0	0	0
		point621	621	0	0	0	0	0	0	0	0	0	0
		point613	613										
Edmonston Pumping Plant Rd		point156	156	16	50	4	50	76	50	0	0	0	0
		point157	157	16	50	4	50	76	50	0	0	0	0
		point167	167	16	50	4	50	76	50	0	0	0	0
		point798	798	16	50	4	50	76	50	0	0	0	0
		point799	799	16	50	4	50	76	50	0	0	0	0
		point801	801	16	50	4	50	76	50	0	0	0	0
		point802	802	16	50	4	50	76	50	0	0	0	0
		point803	803	16	50	4	50	76	50	0	0	0	0
		point804	804	16	50	4	50	76	50	0	0	0	0
		point805	805	16	50	4	50	76	50	0	0	0	0
		point806	806	16	50	4	50	76	50	0	0	0	0
		point807	807	16	50	4	50	76	50	0	0	0	0

		point808	808	16	50	4	50	76	50	0	0	0	0
		point810	810	16	50	4	50	76	50	0	0	0	0
		point809	809										

Dudek						**2 October 2015**					
M Greene						**TNM 2.5**					
INPUT: RECEIVERS											
PROJECT/CONTRACT:	**P/N 7667**										
RUN:	**Grapevine Project - Cal Run ST7**										
Receiver											
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST7	7	1	37,148,840.0	12,707,403.0	1,120.00	5.00	62.70	66	10.0	8.0	Y

Dudek **2 October 2015**
M Greene **TNM 2.5**
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT:	**P/N 7667**
RUN:	**Grapevine Project - Cal Run ST7**
BARRIER DESIGN:	**INPUT HEIGHTS**
ATMOSPHERICS:	**68 deg F, 50% RH**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver												
Name	**No.**	**#DUs**	**Existing**	**No Barrier**					**With Barrier**			
			LAeq1h	**LAeq1h**		**Increase over existing**		**Type**	**Calculated**	**Noise Reduction**		
				Calculated	**Crit'n**	**Calculated**	**Crit'n Sub'l Inc**	**Impact**	**LAeq1h**	**Calculated**	**Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST7	7	1	62.7	60.6	66	-2.1	10	----	60.6	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	1	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cal Run ST9**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Laval Rd E	24.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point852	852	37,149,264.0	12,707,360.0	1,117.50				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point358	358	37,148,312.0	12,708,412.0	1,120.00					
Roadway113	35.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
Roadway116	100.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
Roadway115	35.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	
		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	35.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
Roadway129	75.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
I5 NB Offamp	35.0	point609	609	37,150,884.0	12,691,390.0	1,500.00				Average	
		point605	605	37,150,932.0	12,691,551.0	1,510.00				Average	

		point606	606	37,151,040.0	12,691,584.0	1,515.00				Average	
		point607	607	37,151,168.0	12,691,523.0	1,520.00					
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average	
		point363	363	37,147,644.0	12,715,708.0	980.00				Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00					
I-5 NB - S of Project	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
		point835	835	37,151,192.0	12,690,314.0	1,546.90				Average	
		point10	10	37,150,956.0	12,690,697.0	1,525.57					
I-5 SB - N of Laval Rd	60.0	point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
		point348	348	37,146,312.0	12,708,896.0	1,170.00					
I5 SB Onramp	35.0	point610	610	37,150,288.0	12,691,462.0	1,520.00				Average	
		point587	587	37,150,376.0	12,691,601.0	1,510.00				Average	
		point589	589	37,150,472.0	12,691,584.0	1,500.00				Average	
		point590	590	37,150,564.0	12,691,479.0	1,490.00					
Dennis McCarthy Dr	45.0	point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	90.0	point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00					
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00					
Laval Rd E-2	12.0	point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	

		point342	342	37,147,568.0	12,709,945.0	1,120.00					
I-5 NB - Grapevine to Laval Rd	60.0	point791	791	37,150,956.0	12,690,697.0	1,525.57				Average	
		point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
		point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
		point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
		point719	719	37,149,448.0	12,696,794.0	1,374.66				Average	
		point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
		point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
		point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
		point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
		point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
		point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	
		point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	
		point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 SB-S of Project	60.0	point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50					
I-5 NB-N. of Laval Rd	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17				Average	
		point830	830	37,149,384.0	12,696,561.0	1,374.49				Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	

		point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	
		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	
		point44	44	37,150,824.0	12,690,687.0	1,525.60					
Grapevine Rd West	50.0	point617	617	37,150,412.0	12,692,013.0	1,480.00				Average	
		point616	616	37,150,412.0	12,691,912.0	1,490.00				Average	
		point615	615	37,150,244.0	12,691,571.0	1,520.00				Average	
		point614	614	37,150,204.0	12,691,402.0	1,530.00				Average	
		point612	612	37,150,476.0	12,690,329.0	1,538.00				Average	
		point812	812	37,150,524.0	12,690,307.0	1,537.50				Average	
		point707	707	37,150,732.0	12,690,361.0	1,535.00					
Grapevine Road East	50.0	point146	146	37,151,216.0	12,690,473.0	1,550.00				Average	
		point816	816	37,151,432.0	12,690,534.0	1,545.00				Average	
		point623	623	37,151,500.0	12,690,625.0	1,535.00				Average	
		point619	619	37,151,220.0	12,691,565.0	1,520.00				Average	
		point620	620	37,150,988.0	12,691,709.0	1,510.00				Average	
		point621	621	37,150,780.0	12,691,877.0	1,500.00				Average	
		point613	613	37,150,696.0	12,692,047.0	1,490.00					
Edmonston Pumping Plant Rd	35.0	point156	156	37,151,376.0	12,691,167.0	1,525.00				Average	
		point157	157	37,151,832.0	12,691,306.0	1,500.00				Average	
		point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
		point798	798	37,153,608.0	12,690,806.0	1,480.00				Average	
		point799	799	37,154,252.0	12,690,716.0	1,450.00				Average	
		point801	801	37,155,832.0	12,690,652.0	1,420.00				Average	
		point802	802	37,157,604.0	12,690,592.0	1,400.00				Average	
		point803	803	37,159,760.0	12,690,254.0	1,375.00				Average	
		point804	804	37,161,912.0	12,689,916.0	1,350.00				Average	
		point805	805	37,161,992.0	12,689,907.0	1,350.00				Average	
		point806	806	37,163,484.0	12,689,688.0	1,300.00				Average	
		point807	807	37,165,736.0	12,689,344.0	1,250.00				Average	
		point808	808	37,168,656.0	12,689,314.0	1,200.00				Average	
		point810	810	37,169,252.0	12,689,409.0	1,200.00				Average	
		point809	809	37,169,832.0	12,689,734.0	1,200.00					

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cal Run ST9**

Roadway Name	Points Name	No.	Segment Autos V veh/hr	Autos S mph	MTrucks V veh/hr	MTrucks S mph	HTrucks V veh/hr	HTrucks S mph	Buses V veh/hr	Buses S mph	Motorcycles V veh/hr	Motorcycles S mph
Laval Rd E	point340	340	54	35	0	0	6	35	0	0	0	0
	point852	852	54	35	0	0	6	35	0	0	0	0
	point354	354	54	35	0	0	6	35	0	0	0	0
	point355	355	54	35	0	0	6	35	0	0	0	0
	point356	356	54	35	0	0	6	35	0	0	0	0
	point357	357	54	35	0	0	6	35	0	0	0	0
	point358	358										
Roadway113	point375	375	0	0	0	0	0	0	0	0	0	0
	point376	376										
Roadway116	point387	387	0	0	0	0	0	0	0	0	0	0
	point388	388	0	0	0	0	0	0	0	0	0	0
	point389	389	0	0	0	0	0	0	0	0	0	0
	point390	390										
Roadway115	point398	398	0	0	0	0	0	0	0	0	0	0
	point378	378	0	0	0	0	0	0	0	0	0	0
	point379	379	0	0	0	0	0	0	0	0	0	0
	point380	380										
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0
	point400	400										
Roadway129	point422	422	0	0	0	0	0	0	0	0	0	0
	point403	403	0	0	0	0	0	0	0	0	0	0
	point404	404	0	0	0	0	0	0	0	0	0	0
	point405	405	0	0	0	0	0	0	0	0	0	0
	point406	406										

I5 NB Offamp	point609	609	0	0	0	0	0	0	0	0	0	0
	point605	605	0	0	0	0	0	0	0	0	0	0
	point606	606	0	0	0	0	0	0	0	0	0	0
	point607	607										
Wheeler Ridge Rd	point364	364	0	0	0	0	0	0	0	0	0	0
	point363	363	0	0	0	0	0	0	0	0	0	0
	point361	361	0	0	0	0	0	0	0	0	0	0
	point374	374	0	0	0	0	0	0	0	0	0	0
	point382	382										
I-5 NB - S of Project	point1	1	114	70	30	70	396	70	0	0	0	0
	point3	3	114	70	30	70	396	70	0	0	0	0
	point4	4	114	70	30	70	396	70	0	0	0	0
	point5	5	114	70	30	70	396	70	0	0	0	0
	point6	6	114	70	30	70	396	70	0	0	0	0
	point7	7	114	70	30	70	396	70	0	0	0	0
	point8	8	114	70	30	70	396	70	0	0	0	0
	point9	9	114	70	30	70	396	70	0	0	0	0
	point835	835	114	70	30	70	396	70	0	0	0	0
	point10	10										
I-5 SB - N of Laval Rd	point351	351	0	0	0	0	0	0	0	0	0	0
	point348	348										
I5 SB Onramp	point610	610	0	0	0	0	0	0	0	0	0	0
	point587	587	0	0	0	0	0	0	0	0	0	0
	point589	589	0	0	0	0	0	0	0	0	0	0
	point590	590										
Dennis McCarthy Dr	point426	426	0	0	0	0	0	0	0	0	0	0
	point418	418	0	0	0	0	0	0	0	0	0	0
	point419	419	0	0	0	0	0	0	0	0	0	0
	point420	420	0	0	0	0	0	0	0	0	0	0
	point399	399	0	0	0	0	0	0	0	0	0	0
	point401	401										
Laval Rd	point743	743	0	0	0	0	0	0	0	0	0	0
	point424	424	0	0	0	0	0	0	0	0	0	0
	point416	416										
Wheeler Ridge Rd-2	point755	755	0	0	0	0	0	0	0	0	0	0
	point383	383	0	0	0	0	0	0	0	0	0	0
	point393	393	0	0	0	0	0	0	0	0	0	0

		point394	394	0	0	0	0	0	0	0	0	0	0
		point386	386										
Laval Rd E-2		point756	756	0	0	0	0	0	0	0	0	0	0
		point359	359	0	0	0	0	0	0	0	0	0	0
		point360	360	0	0	0	0	0	0	0	0	0	0
		point342	342										
I-5 NB - Grapevine to Laval Rd		point791	791	1242	70	24	70	522	70	0	0	0	0
		point11	11	1242	70	24	70	522	70	0	0	0	0
		point12	12	1242	70	24	70	522	70	0	0	0	0
		point720	720	1242	70	24	70	522	70	0	0	0	0
		point719	719	1242	70	24	70	522	70	0	0	0	0
		point721	721	1242	70	24	70	522	70	0	0	0	0
		point722	722	1242	70	24	70	522	70	0	0	0	0
		point723	723	1242	70	24	70	522	70	0	0	0	0
		point724	724	1242	70	24	70	522	70	0	0	0	0
		point13	13	1242	70	24	70	522	70	0	0	0	0
		point14	14	1242	70	24	70	522	70	0	0	0	0
		point15	15	1242	70	24	70	522	70	0	0	0	0
		point344	344										
I-5 SB-S of Project		point792	792	114	65	30	65	396	65	0	0	0	0
		point45	45	114	65	30	65	396	65	0	0	0	0
		point46	46	114	65	30	65	396	65	0	0	0	0
		point47	47	114	65	30	65	396	65	0	0	0	0
		point48	48	114	65	30	65	396	65	0	0	0	0
		point49	49	114	65	30	65	396	65	0	0	0	0
		point50	50	114	65	30	65	396	65	0	0	0	0
		point51	51	114	65	30	65	396	65	0	0	0	0
		point43	43	114	65	30	65	396	65	0	0	0	0
		point52	52	114	65	30	65	396	65	0	0	0	0
		point53	53	114	65	30	65	396	65	0	0	0	0
		point54	54										
I-5 NB-N. of Laval Rd		point796	796	0	0	0	0	0	0	0	0	0	0
		point345	345	0	0	0	0	0	0	0	0	0	0
		point346	346										
I-5 SB-Laval Rd to Grapevine		point797	797	1242	70	24	70	522	70	0	0	0	0
		point349	349	1242	70	24	70	522	70	0	0	0	0
		point341	341	1242	70	24	70	522	70	0	0	0	0

		point17	17	1242	70	24	70	522	70	0	0	0	0
		point18	18	1242	70	24	70	522	70	0	0	0	0
		point725	725	1242	70	24	70	522	70	0	0	0	0
		point726	726	1242	70	24	70	522	70	0	0	0	0
		point729	729	1242	70	24	70	522	70	0	0	0	0
		point830	830	1242	70	24	70	522	70	0	0	0	0
		point727	727	1242	70	24	70	522	70	0	0	0	0
		point728	728	1242	70	24	70	522	70	0	0	0	0
		point19	19	1242	70	24	70	522	70	0	0	0	0
		point42	42	1242	70	24	70	522	70	0	0	0	0
		point44	44										
Grapevine Rd West		point617	617	0	0	0	0	0	0	0	0	0	0
		point616	616	0	0	0	0	0	0	0	0	0	0
		point615	615	0	0	0	0	0	0	0	0	0	0
		point614	614	0	0	0	0	0	0	0	0	0	0
		point612	612	0	0	0	0	0	0	0	0	0	0
		point812	812	0	0	0	0	0	0	0	0	0	0
		point707	707										
Grapevine Road East		point146	146	0	0	0	0	0	0	0	0	0	0
		point816	816	0	0	0	0	0	0	0	0	0	0
		point623	623	0	0	0	0	0	0	0	0	0	0
		point619	619	0	0	0	0	0	0	0	0	0	0
		point620	620	0	0	0	0	0	0	0	0	0	0
		point621	621	0	0	0	0	0	0	0	0	0	0
		point613	613										
Edmonston Pumping Plant Rd		point156	156	16	50	4	50	76	50	0	0	0	0
		point157	157	16	50	4	50	76	50	0	0	0	0
		point167	167	16	50	4	50	76	50	0	0	0	0
		point798	798	16	50	4	50	76	50	0	0	0	0
		point799	799	16	50	4	50	76	50	0	0	0	0
		point801	801	16	50	4	50	76	50	0	0	0	0
		point802	802	16	50	4	50	76	50	0	0	0	0
		point803	803	16	50	4	50	76	50	0	0	0	0
		point804	804	16	50	4	50	76	50	0	0	0	0
		point805	805	16	50	4	50	76	50	0	0	0	0
		point806	806	16	50	4	50	76	50	0	0	0	0
		point807	807	16	50	4	50	76	50	0	0	0	0

		point808	808	16	50	4	50	76	50	0	0	0	0	
		point810	810	16	50	4	50	76	50	0	0	0	0	
		point809	809											

Dudek						**2 October 2015**					
M Greene						**TNM 2.5**					
INPUT: RECEIVERS											
PROJECT/CONTRACT:	**P/N 7667**										
RUN:	**Grapevine Project - Cal Run ST9**										
Receiver											
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**LAeq1h**	**LAeq1h**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST9	7	1	37,149,440.0	12,707,330.0	1,116.00	5.00	62.70	66	10.0	8.0	Y

Dudek							**2 October 2015**					
M Greene							**TNM 2.5**					
							Calculated with TNM 2.5					
RESULTS: SOUND LEVELS												
PROJECT/CONTRACT:		**P/N 7667**										
RUN:		**Grapevine Project - Cal Run ST9**										
BARRIER DESIGN:		**INPUT HEIGHTS**						**Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.**				
ATMOSPHERICS:		**68 deg F, 50% RH**										

Receiver												
Name	**No.**	**#DUs**	**Existing**	**No Barrier**					**With Barrier**			
			LAeq1h	**LAeq1h**		**Increase over existing**		**Type**	**Calculated**	**Noise Reduction**		
				Calculated	**Crit'n**	**Calculated**	**Crit'n Sub'l Inc**	**Impact**	**LAeq1h**	**Calculated**	**Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST9	7	1	62.7	61.4	66	-1.3	10	----	61.4	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	1	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Existing**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points					Flow Control			Segment	
Name	Width	Name	No.	Coordinates (pavement) X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
I-5NB Laval Rd Offramp	35.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
Roadway116	100.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
I5 NB onramp - Laval Rd	35.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	
		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	35.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
Roadway129	75.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
I5 NB Offamp - Grapevine Rd E.	35.0	point609	609	37,150,884.0	12,691,390.0	1,500.00				Average	
		point605	605	37,150,932.0	12,691,551.0	1,510.00				Average	
		point606	606	37,151,040.0	12,691,584.0	1,515.00				Average	
		point607	607	37,151,168.0	12,691,523.0	1,520.00					
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average	
		point363	363	37,147,644.0	12,715,708.0	980.00				Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00					

I-5 NB - Fort Tejon to Grapevine	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
		point10	10	37,150,956.0	12,690,697.0	1,525.57					
I-5 SB - SR99 to Laval Rd	60.0	point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
		point348	348	37,146,312.0	12,708,896.0	1,170.00					
I5 SB Onramp	35.0	point610	610	37,150,288.0	12,691,462.0	1,520.00				Average	
		point587	587	37,150,376.0	12,691,601.0	1,510.00				Average	
		point589	589	37,150,472.0	12,691,584.0	1,500.00				Average	
		point590	590	37,150,564.0	12,691,479.0	1,490.00					
I-5 SB Laval Rd Offramp/DnnsMcCrthy	45.0	point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	90.0	point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00					
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00					
I-5 NB - Grapevine to Laval Rd	60.0	point791	791	37,150,956.0	12,690,697.0	1,525.57				Average	
		point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
		point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
		point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
		point719	719	37,149,448.0	12,696,794.0	1,374.66				Average	
		point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
		point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
		point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
		point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
		point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
		point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	

		point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	
		point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 SB - Grapevine to Fort Tejon	60.0	point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50					
I-5 NB - Laval Rd to SR99	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17				Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	
		point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	
		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	
		point44	44	37,150,824.0	12,690,687.0	1,525.60					
I5 SB offramp - Grapevine Rd West	50.0	point617	617	37,150,412.0	12,692,013.0	1,480.00				Average	
		point616	616	37,150,412.0	12,691,912.0	1,490.00				Average	
		point615	615	37,150,244.0	12,691,571.0	1,520.00				Average	
		point614	614	37,150,204.0	12,691,402.0	1,530.00					
Grapevine Road East	50.0	point146	146	37,151,216.0	12,690,473.0	1,550.00				Average	
		point816	816	37,151,432.0	12,690,534.0	1,545.00				Average	
		point623	623	37,151,500.0	12,690,625.0	1,535.00				Average	
		point619	619	37,151,220.0	12,691,565.0	1,520.00					
Edmonston Pumping Plant Rd	35.0	point156	156	37,151,376.0	12,691,167.0	1,525.00				Average	
		point157	157	37,151,832.0	12,691,306.0	1,500.00				Average	

			point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
			point798	798	37,153,608.0	12,690,806.0	1,480.00				Average	
			point799	799	37,154,252.0	12,690,716.0	1,450.00				Average	
			point801	801	37,155,832.0	12,690,652.0	1,420.00				Average	
			point802	802	37,157,604.0	12,690,592.0	1,400.00				Average	
			point803	803	37,159,760.0	12,690,254.0	1,375.00				Average	
			point804	804	37,161,912.0	12,689,916.0	1,350.00				Average	
			point805	805	37,161,992.0	12,689,907.0	1,350.00				Average	
			point806	806	37,163,484.0	12,689,688.0	1,300.00				Average	
			point807	807	37,165,736.0	12,689,344.0	1,250.00				Average	
			point808	808	37,168,656.0	12,689,314.0	1,200.00				Average	
			point810	810	37,169,252.0	12,689,409.0	1,200.00				Average	
			point809	809	37,169,832.0	12,689,734.0	1,200.00					
Grapevine Rd E. -I-5 NB Onramp	50.0		point833	833	37,151,220.0	12,691,565.0	1,520.00				Average	
			point620	620	37,150,988.0	12,691,709.0	1,510.00				Average	
			point621	621	37,150,780.0	12,691,877.0	1,500.00				Average	
			point613	613	37,150,696.0	12,692,047.0	1,490.00					
Grapevine Rd West-2	50.0		point834	834	37,150,204.0	12,691,402.0	1,530.00				Average	
			point612	612	37,150,476.0	12,690,329.0	1,538.00				Average	
			point812	812	37,150,524.0	12,690,307.0	1,537.50				Average	
			point707	707	37,150,732.0	12,690,361.0	1,535.00					
De Sol Dr / Laval Rd-Laval Rd E	95.0		point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
			point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
			point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
			point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
			point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
			point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
			point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
			point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	
			point342	342	37,147,568.0	12,709,945.0	1,120.00					

Dudek 2 October 201
M Greene TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Percentages
PROJECT/CONTRACT: P/N 7667
RUN: Grapevine Project - Existing

Roadway Name	Points Name	No.	Segment Total Volume veh/hr	Autos P %	Autos S mph	MTrucks P %	MTrucks S mph	HTrucks P %	HTrucks S mph	Buses P %	Buses S mph	Motorcycles P %	Motorcycles S mph
I-5NB Laval Rd Offramp	point375	375	258	76	50	6	50	18	50	0	0	0	0
	point376	376											
Roadway116	point387	387	0	0	0	0	0	0	0	0	0	0	0
	point388	388	0	0	0	0	0	0	0	0	0	0	0
	point389	389	0	0	0	0	0	0	0	0	0	0	0
	point390	390											
I5 NB onramp - Laval Rd	point398	398	326	76	50	6	50	18	50	0	0	0	0
	point378	378	326	76	50	6	50	18	50	0	0	0	0
	point379	379	326	76	50	6	50	18	50	0	0	0	0
	point380	380											
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0	0
	point400	400											
Roadway129	point422	422	0	0	0	0	0	0	0	0	0	0	0
	point403	403	0	0	0	0	0	0	0	0	0	0	0
	point404	404	0	0	0	0	0	0	0	0	0	0	0
	point405	405	0	0	0	0	0	0	0	0	0	0	0
	point406	406											
I5 NB Offamp - Grapevine Rd E.	point609	609	41	76	50	6	50	18	50	0	0	0	0
	point605	605	41	76	50	6	50	18	50	0	0	0	0
	point606	606	41	76	50	6	50	18	50	0	0	0	0
	point607	607											
Wheeler Ridge Rd	point364	364	880	76	45	6	45	18	45	0	0	0	0
	point363	363	880	76	45	6	45	18	45	0	0	0	0
	point361	361	880	76	45	6	45	18	45	0	0	0	0

	point374	374	880	76	45	6	45	18	45	0	0	0	0
	point382	382											
I-5 NB - Fort Tejon to Grapevine	point1	1	2035	76	65	6	65	18	65	0	0	0	0
	point3	3	2035	76	65	6	65	18	65	0	0	0	0
	point4	4	2035	76	65	6	65	18	65	0	0	0	0
	point5	5	2035	76	65	6	65	18	65	0	0	0	0
	point6	6	2035	76	65	6	65	18	65	0	0	0	0
	point7	7	2035	76	65	6	65	18	65	0	0	0	0
	point8	8	2035	76	65	6	65	18	65	0	0	0	0
	point9	9	2035	76	65	6	65	18	65	0	0	0	0
	point10	10											
I-5 SB - SR99 to Laval Rd	point351	351	1884	76	70	6	70	18	70	0	0	0	0
	point348	348											
I5 SB Onramp	point610	610	52	76	50	6	50	18	50	0	0	0	0
	point587	587	52	76	50	6	50	18	50	0	0	0	0
	point589	589	52	76	50	6	50	18	50	0	0	0	0
	point590	590											
I-5 SB Laval Rd Offramp/DnnsMcCrthy	point426	426	328	76	50	6	50	18	50	0	0	0	0
	point418	418	328	76	50	6	50	18	50	0	0	0	0
	point419	419	328	76	50	6	50	18	50	0	0	0	0
	point420	420	328	76	50	6	50	18	50	0	0	0	0
	point399	399	328	76	50	6	50	18	50	0	0	0	0
	point401	401											
Laval Rd	point743	743	214	76	30	6	30	18	30	0	0	0	0
	point424	424	214	76	30	6	30	18	30	0	0	0	0
	point416	416											
Wheeler Ridge Rd-2	point755	755	1015	76	45	6	45	18	45	0	0	0	0
	point383	383	1015	76	45	6	45	18	45	0	0	0	0
	point393	393	1015	76	45	6	45	18	45	0	0	0	0
	point394	394	1015	76	45	6	45	18	45	0	0	0	0
	point386	386											
I-5 NB - Grapevine to Laval Rd	point791	791	2051	76	70	6	70	18	70	0	0	0	0
	point11	11	2051	76	70	6	70	18	70	0	0	0	0
	point12	12	2051	76	70	6	70	18	70	0	0	0	0
	point720	720	2051	76	70	6	70	18	70	0	0	0	0
	point719	719	2051	76	70	6	70	18	70	0	0	0	0
	point721	721	2051	76	70	6	70	18	70	0	0	0	0

	point722	722	2051	76	70	6	70	18	70	0	0	0	0
	point723	723	2051	76	70	6	70	18	70	0	0	0	0
	point724	724	2051	76	70	6	70	18	70	0	0	0	0
	point13	13	2051	76	70	6	70	18	70	0	0	0	0
	point14	14	2051	76	70	6	70	18	70	0	0	0	0
	point15	15	2051	76	70	6	70	18	70	0	0	0	0
	point344	344											
I-5 SB - Grapevine to Fort Tejon	point792	792	1782	76	65	6	65	18	65	0	0	0	0
	point45	45	1782	76	65	6	65	18	0	0	0	0	0
	point46	46	1782	76	65	6	65	18	65	0	0	0	0
	point47	47	1782	76	65	6	65	18	65	0	0	0	0
	point48	48	1782	76	65	6	65	18	65	0	0	0	0
	point49	49	1782	76	65	6	65	18	65	0	0	0	0
	point50	50	1782	76	65	6	65	18	65	0	0	0	0
	point51	51	1782	76	65	6	65	18	65	0	0	0	0
	point43	43	1782	76	65	6	65	18	65	0	0	0	0
	point52	52	1782	76	65	6	65	18	65	0	0	0	0
	point53	53	1782	76	65	6	65	18	65	0	0	0	0
	point54	54											
I-5 NB - Laval Rd to SR99	point796	796	2158	76	70	6	70	18	70	0	0	0	0
	point345	345	2158	76	70	6	70	18	70	0	0	0	0
	point346	346											
I-5 SB-Laval Rd to Grapevine	point797	797	1780	76	70	6	70	18	70	0	0	0	0
	point349	349	1780	76	70	6	70	18	70	0	0	0	0
	point341	341	1780	76	70	6	70	18	70	0	0	0	0
	point17	17	1780	76	70	6	70	18	70	0	0	0	0
	point18	18	1780	76	70	6	70	18	70	0	0	0	0
	point725	725	1780	76	70	6	70	18	70	0	0	0	0
	point726	726	1780	76	70	6	70	18	70	0	0	0	0
	point729	729	1780	76	70	6	70	18	70	0	0	0	0
	point727	727	1780	76	70	6	70	18	70	0	0	0	0
	point728	728	1780	76	70	6	70	18	70	0	0	0	0
	point19	19	1780	76	70	6	70	18	70	0	0	0	0
	point42	42	1780	76	70	6	70	18	70	0	0	0	0
	point44	44											
I5 SB offramp - Grapevine Rd West	point617	617	50	76	50	6	50	18	50	0	0	0	0
	point616	616	50	76	50	6	50	18	50	0	0	0	0

	point615	615	50	76	50	6	50	18	50	0	0	0	0
	point614	614											
Grapevine Road East	point146	146	174	76	30	6	30	18	30	0	0	0	0
	point816	816	174	76	30	6	30	18	30	0	0	0	0
	point623	623	174	76	30	6	30	18	30	0	0	0	0
	point619	619											
Edmonston Pumping Plant Rd	point156	156	0	0	0	0	0	0	0	0	0	0	0
	point157	157	0	0	0	0	0	0	0	0	0	0	0
	point167	167	0	0	0	0	0	0	0	0	0	0	0
	point798	798	0	0	0	0	0	0	0	0	0	0	0
	point799	799	0	0	0	0	0	0	0	0	0	0	0
	point801	801	0	0	0	0	0	0	0	0	0	0	0
	point802	802	0	0	0	0	0	0	0	0	0	0	0
	point803	803	0	0	0	0	0	0	0	0	0	0	0
	point804	804	0	0	0	0	0	0	0	0	0	0	0
	point805	805	0	0	0	0	0	0	0	0	0	0	0
	point806	806	0	0	0	0	0	0	0	0	0	0	0
	point807	807	0	0	0	0	0	0	0	0	0	0	0
	point808	808	0	0	0	0	0	0	0	0	0	0	0
	point810	810	0	0	0	0	0	0	0	0	0	0	0
	point809	809											
Grapevine Rd E. -I-5 NB Onramp	point833	833	57	76	50	6	50	18	50	0	0	0	0
	point620	620	57	76	50	6	50	18	50	0	0	0	0
	point621	621	57	76	50	6	50	18	50	0	0	0	0
	point613	613											
Grapevine Rd West-2	point834	834	174	76	30	6	30	18	30	0	0	0	0
	point612	612	174	76	30	6	30	18	30	0	0	0	0
	point812	812	174	76	30	6	30	18	30	0	0	0	0
	point707	707											
De Sol Dr / Laval Rd-Laval Rd E	point340	340	438	76	45	6	45	18	45	0	0	0	0
	point354	354	438	76	45	6	45	18	45	0	0	0	0
	point355	355	438	76	45	6	45	18	45	0	0	0	0
	point356	356	438	76	45	6	45	18	45	0	0	0	0
	point357	357	438	76	45	6	45	18	0	0	0	0	0
	point756	756	438	76	45	6	45	18	45	0	0	0	0
	point359	359	438	76	45	6	45	18	45	0	0	0	0
	point360	360	438	76	45	6	45	18	45	0	0	0	0

		point342	342												

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: RECEIVERS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Existing**

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Farmhouse S. of Project	1	1	37,151,464.0	12,688,662.0	1,620.00	5.00	0.00	66	10.0	8.0	Y
Ramada Limited	3	1	37,150,324.0	12,690,333.0	1,535.00	5.00	0.00	66	10.0	8.0	Y
Best Western	5	1	37,145,996.0	12,708,367.0	1,175.00	5.00	0.00	66	10.0	8.0	Y
Microtel Inn & Suites	7	1	37,148,404.0	12,709,171.0	1,120.00	5.00	0.00	66	10.0	8.0	Y

Dudek			**2 October 2015**					
M Greene			**TNM 2.5**					
			Calculated with TNM 2.5					
RESULTS: SOUND LEVELS								
PROJECT/CONTRACT:	**P/N 7667**							
RUN:	**Grapevine Project - Existing**							
BARRIER DESIGN:	**INPUT HEIGHTS**			**Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.**				
ATMOSPHERICS:	**68 deg F, 50% RH**							

Receiver Name	**No.**	**#DUs**	**Existing LAeq1h**	**No Barrier LAeq1h Calculated**	**Crit'n**	**Increase over existing Calculated**	**Crit'n Sub'l Inc**	**Type Impact**	**With Barrier Calculated LAeq1h**	**Noise Reduction Calculated**	**Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Farmhouse S. of Project	1	1	0.0	61.9	66	61.9	10	----	61.9	0.0	8	-8.0
Ramada Limited	3	1	0.0	63.2	66	63.2	10	----	63.2	0.0	8	-8.0
Best Western	5	1	0.0	69.0	66	69.0	10	Snd Lvl	69.0	0.0	8	-8.0
Microtel Inn & Suites	7	1	0.0	62.4	66	62.4	10	----	62.4	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction Min**	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	4	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Existing w Proj**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Street B I-5 to St C	75.0	point55	55	37,149,896.0	12,694,183.0	1,430.00				Average	
		point937	937	37,149,396.0	12,694,059.0	1,495.00				Average	
		point938	938	37,149,144.0	12,693,997.0	1,527.50				Average	
		point57	57	37,148,896.0	12,693,935.0	1,560.00					
Street D N of St B	75.0	point66	66	37,151,060.0	12,694,684.0	1,420.00				Average	
		point930	930	37,151,056.0	12,695,314.0	1,405.00				Average	
		point778	778	37,151,052.0	12,695,944.0	1,390.00					
Street L St A to St B	50.0	point73	73	37,156,016.0	12,694,811.0	1,390.00				Average	
		point828	828	37,155,528.0	12,695,704.0	1,340.00				Average	
		point74	74	37,155,036.0	12,696,598.0	1,290.00					
Street A I-5 to St C	75.0	point81	81	37,149,124.0	12,697,077.0	1,360.00				Average	
		point79	79	37,148,000.0	12,696,798.0	1,370.00					
Street A I-5 to St D	75.0	point82	82	37,149,444.0	12,697,174.0	1,370.00				Average	
		point76	76	37,150,328.0	12,697,405.0	1,360.00				Average	
		point77	77	37,150,820.0	12,697,412.0	1,360.00					
Street A St D to St I	75.0	point84	84	37,151,204.0	12,697,391.0	1,360.00				Average	
		point945	945	37,152,072.0	12,697,391.0	1,330.00				Average	
		point85	85	37,152,936.0	12,697,391.0	1,300.00					
Street D S of St B	75.0	point114	114	37,151,104.0	12,694,432.0	1,420.00				Average	
		point840	840	37,151,308.0	12,693,661.0	1,440.00				Average	
		point781	781	37,151,512.0	12,692,890.0	1,460.00					
Street B I-5 to St A	75.0	point116	116	37,150,156.0	12,694,246.0	1,430.00				Average	
		point118	118	37,150,996.0	12,694,445.0	1,420.00					
Street B St D to St I	75.0	point127	127	37,151,224.0	12,694,535.0	1,420.00				Average	
		point120	120	37,151,944.0	12,694,702.0	1,410.00					
Edmonston Pumping Plant Rd-4	75.0	point195	195	37,161,992.0	12,689,907.0	1,350.00				Average	
		point189	189	37,163,484.0	12,689,688.0	1,300.00				Average	

		point190	190	37,165,736.0	12,689,344.0	1,250.00				Average	
		point191	191	37,168,656.0	12,689,314.0	1,200.00				Average	
		point192	192	37,169,252.0	12,689,409.0	1,200.00				Average	
		point193	193	37,169,832.0	12,689,734.0	1,200.00					
Street M East	50.0	point197	197	37,163,368.0	12,689,727.0	1,300.00				Average	
		point199	199	37,163,584.0	12,691,754.0	1,300.00				Average	
		point200	200	37,162,624.0	12,692,327.0	1,310.00				Average	
		point201	201	37,161,880.0	12,692,333.0	1,310.00					
Street K	50.0	point208	208	37,155,764.0	12,692,346.0	1,350.00				Average	
		point203	203	37,155,568.0	12,692,606.0	1,340.00				Average	
		point204	204	37,155,100.0	12,694,604.0	1,400.00					
Street J St A to St B	75.0	point213	213	37,154,296.0	12,694,767.0	1,405.00				Average	
		point863	863	37,154,288.0	12,695,319.0	1,357.50				Average	
		point215	215	37,154,280.0	12,695,871.0	1,310.00					
Roadway70	50.0	point221	221	37,154,276.0	12,696,899.0	1,290.00				Average	
		point219	219	37,154,308.0	12,697,081.0	1,300.00				Average	
		point214	214	37,154,884.0	12,698,052.0	1,310.00				Average	
		point222	222	37,155,116.0	12,698,403.0	1,320.00				Average	
		point224	224	37,155,672.0	12,698,763.0	1,320.00				Average	
		point225	225	37,156,416.0	12,698,756.0	1,320.00				Average	
		point226	226	37,157,116.0	12,698,398.0	1,320.00				Average	
		point227	227	37,157,772.0	12,698,020.0	1,330.00				Average	
		point228	228	37,158,780.0	12,697,299.0	1,330.00				Average	
		point229	229	37,159,384.0	12,696,485.0	1,340.00				Average	
		point230	230	37,159,772.0	12,695,818.0	1,350.00				Average	
		point231	231	37,160,072.0	12,695,370.0	1,360.00				Average	
		point232	232	37,159,692.0	12,695,164.0	1,370.00				Average	
		point223	223	37,158,432.0	12,694,481.0	1,390.00					
Roadway72	50.0	point233	233	37,155,700.0	12,696,841.0	1,290.00				Average	
		point235	235	37,155,704.0	12,698,724.0	1,320.00					
Street B - St C to St E	50.0	point244	244	37,148,488.0	12,693,761.0	1,560.00				Average	
		point237	237	37,147,080.0	12,692,235.0	1,560.00				Average	
		point238	238	37,145,208.0	12,690,108.0	1,560.00					
Street G	50.0	point269	269	37,147,756.0	12,697,321.0	1,360.00				Average	
		point263	263	37,147,220.0	12,697,531.0	1,410.00				Average	
		point741	741	37,146,680.0	12,697,736.0	1,480.00				Average	
		point742	742	37,146,140.0	12,697,942.0	1,485.00				Average	
		point264	264	37,145,600.0	12,698,147.0	1,490.00					
Street E St C to St B	50.0	point248	248	37,149,172.0	12,690,430.0	1,560.00				Average	
		point881	881	37,148,560.0	12,690,945.0	1,560.00				Average	

		point250	250	37,147,952.0	12,691,460.0	1,560.00				Average	
		point251	251	37,147,092.0	12,692,213.0	1,560.00					
Street H East	50.0	point272	272	37,146,848.0	12,695,949.0	1,500.00				Average	
		point274	274	37,147,472.0	12,696,107.0	1,450.00				Average	
		point275	275	37,148,100.0	12,696,246.0	1,410.00					
Roadway8	50.0	point283	283	37,148,284.0	12,693,815.0	1,560.00				Average	
		point279	279	37,146,812.0	12,694,380.0	1,560.00					
Roadway188	50.0	point285	285	37,146,492.0	12,693,414.0	1,560.00				Average	
		point281	281	37,147,568.0	12,692,892.0	1,560.00					
Roadway 89	50.0	point297	297	37,146,324.0	12,689,588.0	1,560.00				Average	
		point291	291	37,147,908.0	12,691,420.0	1,560.00					
Roadway91	50.0	point298	298	37,159,512.0	12,692,385.0	1,320.00				Average	
		point300	300	37,159,512.0	12,693,176.0	1,390.00					
Roadway97	50.0	point324	324	37,150,120.0	12,697,241.0	1,365.00				Average	
		point326	326	37,150,168.0	12,696,134.0	1,380.00				Average	
		point327	327	37,150,960.0	12,696,128.0	1,370.00					
Roadway99	50.0	point335	335	37,151,096.0	12,696,169.0	1,370.00				Average	
		point329	329	37,152,604.0	12,696,172.0	1,360.00					
Roadway98	50.0	point337	337	37,151,128.0	12,698,772.0	1,330.00				Average	
		point331	331	37,153,440.0	12,698,774.0	1,300.00					
Roadway 92	50.0	point338	338	37,149,800.0	12,698,784.0	1,350.00				Average	
		point333	333	37,150,940.0	12,698,776.0	1,330.00					
Street I St A to St B	50.0	point309	309	37,152,240.0	12,694,757.0	1,410.00				Average	
		point873	873	37,152,456.0	12,695,474.0	1,400.00				Average	
		point302	302	37,152,676.0	12,696,191.0	1,390.00					
Laval Rd E	50.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point358	358	37,148,312.0	12,708,412.0	1,120.00					
I5 NB offramp at Laval Rd	50.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
I5 SB offramp at Laval	50.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
I5 NB onramp at Laval	50.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	

		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	50.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
I5 SB onramp at Laval	50.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
Street F Central	50.0	point428	428	37,146,812.0	12,696,032.0	1,500.00				Average	
		point430	430	37,146,520.0	12,697,245.0	1,490.00				Average	
		point431	431	37,146,664.0	12,697,668.0	1,480.00					
Roadway125	50.0	point441	441	37,157,144.0	12,696,814.0	1,290.00				Average	
		point436	436	37,158,412.0	12,697,512.0	1,330.00					
Street F	50.0	point444	444	37,146,712.0	12,697,821.0	1,480.00				Average	
		point433	433	37,147,312.0	12,699,423.0	1,380.00				Average	
		point434	434	37,147,592.0	12,699,490.0	1,360.00					
Roadway141	50.0	point445	445	37,157,076.0	12,696,843.0	1,290.00				Average	
		point447	447	37,157,084.0	12,698,366.0	1,320.00					
Street L St B to St M	50.0	point458	458	37,157,288.0	12,692,442.0	1,330.00				Average	
		point819	819	37,156,924.0	12,693,146.0	1,350.00				Average	
		point820	820	37,156,556.0	12,693,851.0	1,370.00				Average	
		point451	451	37,156,192.0	12,694,555.0	1,390.00					
Roadway144	50.0	point453	453	37,159,480.0	12,690,361.0	1,380.00				Average	
		point460	460	37,159,492.0	12,692,251.0	1,320.00					
I5 onramp loop at Grapevine	50.0	point546	546	37,149,792.0	12,697,111.0	1,365.00				Average	
		point539	539	37,149,800.0	12,696,905.0	1,372.00				Average	
		point540	540	37,149,676.0	12,696,805.0	1,375.00				Average	
		point541	541	37,149,588.0	12,696,811.0	1,375.00					
I5 NB onramp slip at Grapevine	50.0	point572	572	37,149,776.0	12,697,299.0	1,365.00				Average	
		point564	564	37,149,692.0	12,697,604.0	1,360.00				Average	
		point565	565	37,149,652.0	12,697,751.0	1,355.00				Average	
		point566	566	37,149,540.0	12,697,890.0	1,350.00				Average	
		point567	567	37,149,400.0	12,698,053.0	1,345.00				Average	
		point568	568	37,149,252.0	12,698,201.0	1,345.00				Average	
		point569	569	37,149,128.0	12,698,373.0	1,340.00					
I5 SB loop onramp at Grapevine	50.0	point575	575	37,148,772.0	12,697,326.0	1,360.00				Average	
		point577	577	37,148,796.0	12,697,431.0	1,360.00				Average	
		point578	578	37,148,868.0	12,697,492.0	1,355.00				Average	
		point579	579	37,148,964.0	12,697,503.0	1,355.00				Average	

		point580	580	37,149,064.0	12,697,442.0	1,355.00					
I5 SB onramp slip at Grapevine	50.0	point586	586	37,148,776.0	12,696,932.0	1,365.00				Average	
		point582	582	37,148,864.0	12,696,588.0	1,370.00				Average	
		point583	583	37,148,948.0	12,696,443.0	1,375.00				Average	
		point584	584	37,149,032.0	12,696,349.0	1,380.00				Average	
		point559	559	37,149,176.0	12,696,234.0	1,385.00				Average	
		point561	561	37,149,284.0	12,696,151.0	1,390.00				Average	
		point562	562	37,149,440.0	12,695,973.0	1,395.00					
I5 SB offramp at Grapevine	50.0	point598	598	37,148,844.0	12,698,353.0	1,340.00				Average	
		point592	592	37,148,800.0	12,697,975.0	1,345.00				Average	
		point593	593	37,148,724.0	12,697,758.0	1,350.00				Average	
		point594	594	37,148,672.0	12,697,514.0	1,355.00				Average	
		point595	595	37,148,680.0	12,697,330.0	1,360.00				Average	
		point596	596	37,148,724.0	12,697,036.0	1,365.00					
Street R Del Oro Dr to St T	50.0	point624	624	37,150,820.0	12,704,506.0	1,200.00				Average	
		point626	626	37,152,532.0	12,704,507.0	1,190.00				Average	
		point627	627	37,155,008.0	12,704,513.0	1,170.00				Average	
		point628	628	37,157,168.0	12,704,524.0	1,150.00					
Roadway185	50.0	point636	636	37,154,976.0	12,704,560.0	1,170.00				Average	
		point630	630	37,154,976.0	12,706,123.0	1,150.00					
Street T North	50.0	point638	638	37,152,536.0	12,704,550.0	1,190.00				Average	
		point632	632	37,152,536.0	12,706,162.0	1,170.00					
Roadway191	50.0	point640	640	37,154,984.0	12,701,055.0	1,250.00				Average	
		point642	642	37,154,976.0	12,702,935.0	1,210.00					
Street D Del Oro Dr to St S	75.0	point651	651	37,152,116.0	12,702,347.0	1,250.00				Average	
		point641	641	37,152,532.0	12,702,942.0	1,230.00					
Street S	50.0	point653	653	37,156,208.0	12,702,970.0	1,200.00				Average	
		point646	646	37,154,980.0	12,702,977.0	1,210.00				Average	
		point647	647	37,152,544.0	12,702,983.0	1,230.00					
Roadway194	50.0	point665	665	37,152,092.0	12,702,080.0	1,250.00				Average	
		point663	663	37,152,244.0	12,701,807.0	1,250.00				Average	
		point655	655	37,154,880.0	12,700,845.0	1,220.00					
Roadway200	50.0	point321	321	37,151,068.0	12,700,676.0	1,290.00				Average	
		point667	667	37,149,788.0	12,701,117.0	1,300.00				Average	
		point669	669	37,149,608.0	12,701,075.0	1,300.00				Average	
		point670	670	37,149,460.0	12,700,959.0	1,300.00				Average	
		point671	671	37,149,344.0	12,700,802.0	1,310.00				Average	
		point672	672	37,149,332.0	12,700,639.0	1,320.00				Average	
		point673	673	37,149,364.0	12,700,383.0	1,330.00				Average	
		point674	674	37,149,764.0	12,698,759.0	1,350.00				Average	

		point675	675	37,150,104.0	12,697,399.0	1,365.00					
Street H	50.0	point695	695	37,146,756.0	12,695,940.0	1,500.00				Average	
		point696	696	37,145,148.0	12,695,505.0	1,560.00					
Street Q	75.0	point140	140	37,151,924.0	12,691,321.0	1,500.00				Average	
		point142	142	37,151,980.0	12,690,999.0	1,510.00				Average	
		point143	143	37,151,924.0	12,690,788.0	1,520.00				Average	
		point144	144	37,151,780.0	12,690,650.0	1,530.00				Average	
		point145	145	37,151,652.0	12,690,596.0	1,540.00				Average	
		point146	146	37,151,216.0	12,690,473.0	1,550.00					
Street C S of St B	75.0	point136	136	37,148,712.0	12,693,732.0	1,560.00				Average	
		point833	833	37,148,896.0	12,692,984.0	1,560.00				Average	
		point784	784	37,149,080.0	12,692,235.0	1,560.00					
Edmnstn Pumpg Plnt Rd St D to St J	75.0	point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
		point159	159	37,153,608.0	12,690,806.0	1,480.00					
Roadway57	50.0	point183	183	37,161,744.0	12,692,347.0	1,310.00				Average	
		point177	177	37,161,356.0	12,693,207.0	1,380.00				Average	
		point178	178	37,161,032.0	12,694,020.0	1,350.00				Average	
		point179	179	37,160,672.0	12,694,408.0	1,360.00				Average	
		point180	180	37,160,364.0	12,694,591.0	1,370.00				Average	
		point181	181	37,160,028.0	12,694,633.0	1,370.00				Average	
		point184	184	37,159,676.0	12,694,584.0	1,380.00				Average	
		point186	186	37,159,320.0	12,694,381.0	1,390.00				Average	
		point187	187	37,158,684.0	12,693,904.0	1,395.00					
Roadway55	50.0	point699	699	37,161,912.0	12,689,916.0	1,350.00				Average	
		point170	170	37,161,908.0	12,692,023.0	1,320.00				Average	
		point171	171	37,161,772.0	12,692,324.0	1,310.00					
I5 NB offramp at Grapevine	50.0	point573	573	37,149,716.0	12,696,036.0	1,400.00				Average	
		point560	560	37,149,772.0	12,696,316.0	1,390.00				Average	
		point534	534	37,149,896.0	12,696,597.0	1,380.00				Average	
		point536	536	37,149,868.0	12,696,942.0	1,370.00				Average	
		point537	537	37,149,808.0	12,697,186.0	1,365.00					
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average	
		point363	363	37,147,644.0	12,715,708.0	980.00				Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00					
Del Oro Dr St R to St T	100.0	point637	637	37,151,908.0	12,702,410.0	1,250.00				Average	
		point915	915	37,151,336.0	12,703,472.0	1,225.00				Average	
		point366	366	37,150,768.0	12,704,535.0	1,200.00					
Roadway95	50.0	point704	704	37,152,968.0	12,697,460.0	1,300.00				Average	

		point306	306	37,153,524.0	12,698,744.0	1,300.00				Average	
		point307	307	37,153,744.0	12,699,246.0	1,290.00				Average	
		point299	299	37,153,736.0	12,699,545.0	1,280.00				Average	
		point310	310	37,153,620.0	12,699,708.0	1,280.00				Average	
		point312	312	37,153,516.0	12,699,830.0	1,270.00				Average	
		point313	313	37,151,212.0	12,700,629.0	1,290.00					
Street A St L to St N	75.0	point152	152	37,155,080.0	12,696,800.0	1,290.00				Average	
		point164	164	37,155,692.0	12,696,793.0	1,290.00				Average	
		point952	952	37,156,396.0	12,696,796.0	1,290.00				Average	
		point165	165	37,157,100.0	12,696,800.0	1,290.00					
Street Q West	75.0	point707	707	37,150,732.0	12,690,361.0	1,535.00				Average	
		point148	148	37,150,260.0	12,690,234.0	1,540.00				Average	
		point149	149	37,150,072.0	12,690,213.0	1,550.00				Average	
		point141	141	37,149,892.0	12,690,204.0	1,560.00				Average	
		point150	150	37,149,628.0	12,690,212.0	1,560.00				Average	
		point151	151	37,149,292.0	12,690,351.0	1,560.00					
Street E	50.0	point709	709	37,147,004.0	12,692,270.0	1,560.00				Average	
		point253	253	37,146,232.0	12,692,976.0	1,560.00				Average	
		point254	254	37,145,344.0	12,693,747.0	1,560.00				Average	
		point255	255	37,145,136.0	12,694,097.0	1,550.00				Average	
		point256	256	37,145,076.0	12,694,375.0	1,540.00				Average	
		point257	257	37,145,072.0	12,695,368.0	1,520.00				Average	
		point249	249	37,145,088.0	12,697,058.0	1,510.00				Average	
		point258	258	37,145,428.0	12,697,976.0	1,500.00				Average	
		point260	260	37,146,120.0	12,699,868.0	1,370.00				Average	
		point261	261	37,146,460.0	12,700,769.0	1,315.00					
Roadway89	50.0	point711	711	37,147,976.0	12,691,492.0	1,560.00				Average	
		point293	293	37,148,256.0	12,691,783.0	1,560.00				Average	
		point294	294	37,148,124.0	12,692,384.0	1,560.00				Average	
		point295	295	37,147,656.0	12,692,831.0	1,560.00					
Roadway88	50.0	point698	698	37,145,724.0	12,690,807.0	1,560.00				Average	
		point287	287	37,144,948.0	12,691,543.0	1,560.00				Average	
		point289	289	37,146,172.0	12,692,916.0	1,560.00					
Street B East	50.0	point133	133	37,156,272.0	12,694,676.0	1,390.00				Average	
		point129	129	37,156,504.0	12,694,689.0	1,390.00					
I-5 SB - N of Laval Rd	60.0	point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
		point864	864	37,145,472.0	12,712,280.0	1,165.00				Average	
		point865	865	37,145,752.0	12,711,152.0	1,166.67				Average	
		point866	866	37,146,032.0	12,710,024.0	1,168.33				Average	
		point348	348	37,146,312.0	12,708,896.0	1,170.00					

Roadway195	50.0	point716	716	37,154,972.0	12,703,002.0	1,210.00				Average	
		point644	644	37,154,980.0	12,704,445.0	1,170.00					
Street D N of St A	75.0	point91	91	37,151,044.0	12,697,561.0	1,360.00				Average	
		point734	734	37,151,048.0	12,698,972.0	1,325.00				Average	
		point860	860	37,151,048.0	12,699,442.0	1,313.33				Average	
		point861	861	37,151,048.0	12,699,912.0	1,301.67				Average	
		point61	61	37,151,048.0	12,700,382.0	1,290.00					
Street J N of Edmnstn PumpPlnt Rd	75.0	point210	210	37,153,660.0	12,691,070.0	1,480.00				Average	
		point877	877	37,153,816.0	12,691,826.0	1,462.50				Average	
		point789	789	37,153,976.0	12,692,582.0	1,445.00					
Street M	50.0	point172	172	37,161,720.0	12,692,324.0	1,310.00				Average	
		point700	700	37,155,816.0	12,692,332.0	1,350.00					
Dennis McCarthy Dr	50.0	point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	50.0	point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00					
Street T St R to St S	50.0	point747	747	37,152,544.0	12,702,983.0	1,230.00				Average	
		point922	922	37,152,540.0	12,703,728.0	1,210.00				Average	
		point648	648	37,152,536.0	12,704,474.0	1,190.00					
Roadway54-2	50.0	point749	749	37,155,816.0	12,692,332.0	1,350.00				Average	
		point175	175	37,155,832.0	12,690,680.0	1,420.00					
Street B St L to St N	50.0	point750	750	37,156,504.0	12,694,689.0	1,390.00				Average	
		point960	960	37,157,168.0	12,695,050.0	1,385.00				Average	
		point124	124	37,157,832.0	12,695,411.0	1,380.00					
Street N	50.0	point449	449	37,157,100.0	12,696,755.0	1,290.00				Average	
		point751	751	37,157,836.0	12,695,412.0	1,380.00				Average	
		point125	125	37,158,280.0	12,694,630.0	1,390.00				Average	
		point714	714	37,158,864.0	12,693,536.0	1,400.00				Average	
		point713	713	37,158,988.0	12,693,352.0	1,400.00				Average	
		point134	134	37,159,220.0	12,693,242.0	1,390.00				Average	
		point135	135	37,161,348.0	12,693,221.0	1,380.00					
Street F South	50.0	point271	271	37,146,260.0	12,693,006.0	1,560.00				Average	
		point266	266	37,146,332.0	12,693,095.0	1,560.00				Average	
		point267	267	37,146,444.0	12,693,392.0	1,560.00				Average	
		point259	259	37,147,064.0	12,695,092.0	1,560.00				Average	

		point689	689	37,146,844.0	12,695,864.0	1,560.00					
Street C S of St A	75.0	point753	753	37,148,000.0	12,696,798.0	1,370.00				Average	
		point738	738	37,148,160.0	12,696,092.0	1,417.50				Average	
		point830	830	37,148,240.0	12,695,739.0	1,441.25				Average	
		point739	739	37,148,316.0	12,695,386.0	1,465.00				Average	
		point787	787	37,148,392.0	12,695,032.0	1,488.75					
Street B South	50.0	point754	754	37,145,208.0	12,690,108.0	1,560.00				Average	
		point239	239	37,145,668.0	12,689,776.0	1,560.00				Average	
		point240	240	37,146,372.0	12,689,498.0	1,560.00				Average	
		point241	241	37,146,852.0	12,689,433.0	1,560.00				Average	
		point242	242	37,147,476.0	12,689,479.0	1,560.00				Average	
		point245	245	37,148,084.0	12,689,588.0	1,560.00				Average	
		point246	246	37,148,564.0	12,689,832.0	1,560.00				Average	
		point247	247	37,148,920.0	12,690,085.0	1,560.00				Average	
		point234	234	37,149,220.0	12,690,308.0	1,560.00					
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00					
Laval Rd E-2	50.0	point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	
		point342	342	37,147,568.0	12,709,945.0	1,120.00					
Del Oro Dr-North	100.0	point759	759	37,150,768.0	12,704,535.0	1,200.00				Average	
		point367	367	37,149,904.0	12,706,125.0	1,150.00				Average	
		point368	368	37,149,640.0	12,706,611.0	1,130.00				Average	
		point369	369	37,149,592.0	12,707,300.0	1,115.00				Average	
		point370	370	37,149,612.0	12,708,979.0	1,080.00				Average	
		point362	362	37,149,612.0	12,711,400.0	1,040.00					
Street D S of Del Oro Dr	75.0	point760	760	37,151,048.0	12,700,382.0	1,290.00				Average	
		point878	878	37,151,352.0	12,701,170.0	1,267.50				Average	
		point62	62	37,151,660.0	12,701,957.0	1,245.00				Average	
		point63	63	37,151,796.0	12,702,088.0	1,250.00					
Street A St I St J	75.0	point761	761	37,152,936.0	12,697,391.0	1,300.00				Average	
		point959	959	37,153,600.0	12,697,106.0	1,295.00				Average	
		point86	86	37,154,264.0	12,696,822.0	1,290.00					
Street A St J to St L	75.0	point762	762	37,154,264.0	12,696,822.0	1,290.00				Average	
		point87	87	37,154,808.0	12,696,823.0	1,290.00					
Street I-2	50.0	point764	764	37,152,676.0	12,696,191.0	1,390.00				Average	

		point763	763	37,152,680.0	12,696,791.0	1,350.00				Average	
		point875	875	37,152,716.0	12,696,882.0	1,341.67				Average	
		point876	876	37,152,756.0	12,696,973.0	1,333.33				Average	
		point874	874	37,152,792.0	12,697,064.0	1,325.00				Average	
		point304	304	37,152,900.0	12,697,336.0	1,300.00					
Street J S of St A	75.0	point765	765	37,154,280.0	12,695,871.0	1,310.00				Average	
		point216	216	37,154,296.0	12,696,123.0	1,300.00				Average	
		point217	217	37,154,280.0	12,696,758.0	1,290.00					
Street B-2	50.0	point766	766	37,151,944.0	12,694,702.0	1,410.00				Average	
		point776	776	37,152,256.0	12,694,700.0	1,409.00					
Street B St J to St L	75.0	point768	768	37,155,092.0	12,694,679.0	1,400.00				Average	
		point130	130	37,155,484.0	12,694,678.0	1,395.00				Average	
		point131	131	37,155,964.0	12,694,656.0	1,390.00					
Street B-2 St J to St L	75.0	point775	775	37,154,252.0	12,694,685.0	1,402.67				Average	
		point121	121	37,155,092.0	12,694,679.0	1,400.00					
Street B St I to St J	75.0	point777	777	37,152,256.0	12,694,700.0	1,409.00				Average	
		point769	769	37,152,572.0	12,694,697.0	1,408.00				Average	
		point895	895	37,153,308.0	12,694,692.0	1,405.67				Average	
		point773	773	37,154,044.0	12,694,687.0	1,403.33				Average	
		point774	774	37,154,252.0	12,694,685.0	1,402.67					
Edmnstn Pumping Plnt Rd- St J to St K	75.0	point779	779	37,153,608.0	12,690,806.0	1,480.00				Average	
		point160	160	37,154,252.0	12,690,716.0	1,450.00				Average	
		point894	894	37,155,040.0	12,690,684.0	1,435.00				Average	
		point161	161	37,155,832.0	12,690,652.0	1,420.00					
Edmonstn Pumping Plant Rd E of St K	75.0	point780	780	37,155,832.0	12,690,652.0	1,420.00				Average	
		point162	162	37,157,604.0	12,690,592.0	1,400.00				Average	
		point737	737	37,159,760.0	12,690,254.0	1,375.00				Average	
		point163	163	37,161,912.0	12,689,916.0	1,350.00					
Street D N of Edmnstn Pmp Plnt Rd	75.0	point783	783	37,151,512.0	12,692,890.0	1,460.00				Average	
		point841	841	37,151,716.0	12,692,119.0	1,480.00				Average	
		point111	111	37,151,920.0	12,691,348.0	1,500.00					
Street C N of St E	75.0	point786	786	37,149,080.0	12,692,235.0	1,560.00				Average	
		point879	879	37,149,264.0	12,691,486.0	1,560.00				Average	
		point137	137	37,149,444.0	12,690,738.0	1,560.00				Average	
		point138	138	37,149,424.0	12,690,593.0	1,560.00				Average	
		point139	139	37,149,320.0	12,690,385.0	1,560.00					
Street C N of St B	75.0	point788	788	37,148,392.0	12,695,032.0	1,488.75				Average	
		point740	740	37,148,472.0	12,694,679.0	1,512.50				Average	
		point71	71	37,148,632.0	12,693,973.0	1,560.00					
Street J S of St B	75.0	point790	790	37,153,976.0	12,692,582.0	1,445.00				Average	

		point211	211	37,154,296.0	12,694,093.0	1,410.00				Average	
		point212	212	37,154,292.0	12,694,634.0	1,405.00					
Street C St G to Tejon Ind Dr	75.0	point690	690	37,148,000.0	12,696,798.0	1,370.00				Average	
		point691	691	37,147,860.0	12,697,313.0	1,360.00				Average	
		point692	692	37,147,976.0	12,698,532.0	1,360.00				Average	
		point829	829	37,147,824.0	12,699,048.0	1,360.00				Average	
		point693	693	37,147,668.0	12,699,564.0	1,360.00				Average	
		point694	694	37,147,424.0	12,700,259.0	1,350.00				Average	
		point102	102	37,147,412.0	12,700,267.0	1,340.00				Average	
		point104	104	37,147,228.0	12,700,470.0	1,330.00				Average	
		point105	105	37,146,940.0	12,700,631.0	1,320.00				Average	
		point793	793	37,146,336.0	12,700,866.0	1,316.67					
Tejon Industrial Dr-2	75.0	point795	795	37,146,336.0	12,700,866.0	1,316.67				Average	
		point794	794	37,145,728.0	12,701,102.0	1,313.33				Average	
		point745	745	37,145,124.0	12,701,337.0	1,310.00				Average	
		point107	107	37,144,752.0	12,701,478.0	1,300.00				Average	
		point112	112	37,144,376.0	12,701,749.0	1,280.00				Average	
		point109	109	37,144,088.0	12,702,152.0	1,270.00				Average	
		point429	429	37,144,124.0	12,703,527.0	1,260.00				Average	
		point411	411	37,144,260.0	12,703,950.0	1,250.00				Average	
		point413	413	37,144,528.0	12,707,155.0	1,150.00					
I-5 NB-N. of Laval Rd	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17					
I-5 NB - Grapevine to Laval Rd	60.0	point798	798	37,149,448.0	12,696,794.0	1,374.66				Average	
		point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
		point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
		point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
		point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
		point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
		point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	
		point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	

		point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 NB - S of Project	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
		point791	791	37,150,956.0	12,690,697.0	1,525.57				Average	
		point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
		point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
		point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
		point719	719	37,149,448.0	12,696,794.0	1,374.66					
I-5 SB-S of Project	60.0	point799	799	37,149,264.0	12,697,040.0	1,363.17				Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	
		point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	
		point842	842	37,150,568.0	12,691,750.0	1,489.48				Average	
		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	
		point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50					
Roadway305	50.0	point843	843	37,144,692.0	12,711,333.0	1,166.00				Average	
		point844	844	37,144,648.0	12,711,318.0	1,166.00				Average	
		point845	845	37,144,600.0	12,711,305.0	1,166.00				Average	
		point846	846	37,144,552.0	12,711,290.0	1,166.00				Average	
		point847	847	37,144,504.0	12,711,276.0	1,166.00				Average	
		point848	848	37,144,456.0	12,711,262.0	1,166.00				Average	
		point849	849	37,144,404.0	12,711,248.0	1,166.00				Average	
		point850	850	37,144,356.0	12,711,234.0	1,166.00				Average	

		point851	851	37,144,308.0	12,711,219.0	1,166.00				Average	
		point852	852	37,144,260.0	12,711,205.0	1,166.00				Average	
		point853	853	37,144,212.0	12,711,191.0	1,166.00					
Street D S of St A	75.0	point929	929	37,151,052.0	12,695,944.0	1,390.00				Average	
		point862	862	37,151,048.0	12,696,574.0	1,375.00				Average	
		point59	59	37,151,044.0	12,697,205.0	1,360.00					
Roadway329	50.0	point983	983	37,144,068.0	12,711,216.0	1,490.00				Average	
		point984	984	37,144,020.0	12,711,201.0	1,490.00				Average	
		point985	985	37,143,972.0	12,711,187.0	1,490.00				Average	
		point986	986	37,143,924.0	12,711,173.0	1,490.00				Average	
		point987	987	37,143,872.0	12,711,159.0	1,490.00				Average	
		point988	988	37,143,824.0	12,711,145.0	1,490.00				Average	
		point989	989	37,143,776.0	12,711,130.0	1,490.00				Average	
		point990	990	37,143,728.0	12,711,116.0	1,490.00				Average	
		point991	991	37,143,680.0	12,711,102.0	1,490.00					

Dudek
M Greene

2 October 201
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Percentages

PROJECT/CONTRACT: P/N 7667

RUN: Grapevine Project - Existing w Proj

Roadway Name	Points Name	No.	Segment Total Volume	Autos P	Autos S	MTrucks P	MTrucks S	HTrucks P	HTrucks S	Buses P	Buses S	Motorcycles P	Motorcycles S
			veh/hr	%	mph	%	mph	%	mph	%	mph	%	mph
Street B I-5 to St C	point55	55	790	76	30	6	30	18	30	0	0	0	0
	point937	937	790	76	30	6	30	18	30	0	0	0	0
	point938	938	790	76	30	6	30	18	30	0	0	0	0
	point57	57											
Street D N of St B	point66	66	920	76	30	6	30	18	30	0	0	0	0
	point930	930	920	76	30	6	30	18	30	0	0	0	0
	point778	778											
Street L St A to St B	point73	73	900	96	30	3	30	1	30	0	0	0	0
	point828	828	900	96	30	3	30	1	30	0	0	0	0
	point74	74											
Street A I-5 to St C	point81	81	0	0	0	0	0	0	0	0	0	0	0
	point79	79											
Street A I-5 to St D	point82	82	0	0	0	0	0	0	0	0	0	0	0
	point76	76	0	0	0	0	0	0	0	0	0	0	0
	point77	77											
Street A St D to St I	point84	84	3550	76	30	6	30	18	30	0	0	0	0
	point945	945	3550	76	30	6	30	18	30	0	0	0	0
	point85	85											
Street D S of St B	point114	114	450	76	30	6	30	18	30	0	0	0	0
	point840	840	450	76	30	6	30	18	30	0	0	0	0
	point781	781											
Street B I-5 to St A	point116	116	790	76	30	6	30	18	30	0	0	0	0
	point118	118											
Street B St D to St I	point127	127	900	76	30	6	30	18	30	0	0	0	0
	point120	120											

Edmonston Pumping Plant Rd-4	point195	195	0	0	0	0	0	0	0	0	0	0	0
	point189	189	0	0	0	0	0	0	0	0	0	0	0
	point190	190	0	0	0	0	0	0	0	0	0	0	0
	point191	191	0	0	0	0	0	0	0	0	0	0	0
	point192	192	0	0	0	0	0	0	0	0	0	0	0
	point193	193											
Street M East	point197	197	0	0	0	0	0	0	0	0	0	0	0
	point199	199	0	0	0	0	0	0	0	0	0	0	0
	point200	200	0	0	0	0	0	0	0	0	0	0	0
	point201	201											
Street K	point208	208	0	0	0	0	0	0	0	0	0	0	0
	point203	203	0	0	0	0	0	0	0	0	0	0	0
	point204	204											
Street J St A to St B	point213	213	800	76	25	6	25	18	25	0	0	0	0
	point863	863	800	76	25	6	25	18	25	0	0	0	0
	point215	215											
Roadway70	point221	221	0	0	0	0	0	0	0	0	0	0	0
	point219	219	0	0	0	0	0	0	0	0	0	0	0
	point214	214	0	0	0	0	0	0	0	0	0	0	0
	point222	222	0	0	0	0	0	0	0	0	0	0	0
	point224	224	0	0	0	0	0	0	0	0	0	0	0
	point225	225	0	0	0	0	0	0	0	0	0	0	0
	point226	226	0	0	0	0	0	0	0	0	0	0	0
	point227	227	0	0	0	0	0	0	0	0	0	0	0
	point228	228	0	0	0	0	0	0	0	0	0	0	0
	point229	229	0	0	0	0	0	0	0	0	0	0	0
	point230	230	0	0	0	0	0	0	0	0	0	0	0
	point231	231	0	0	0	0	0	0	0	0	0	0	0
	point232	232	0	0	0	0	0	0	0	0	0	0	0
	point223	223											
Roadway72	point233	233	0	0	0	0	0	0	0	0	0	0	0
	point235	235											
Street B - St C to St E	point244	244	980	96	25	3	25	1	25	0	0	0	0
	point237	237	980	96	25	3	25	1	25	0	0	0	0
	point238	238											
Street G	point269	269	0	0	0	0	0	0	0	0	0	0	0
	point263	263	0	0	0	0	0	0	0	0	0	0	0

	point741	741	0	0	0	0	0	0	0	0	0	0	0
	point742	742	0	0	0	0	0	0	0	0	0	0	0
	point264	264											
Street E St C to St B	point248	248	410	96	25	3	25	1	25	0	0	0	0
	point881	881	410	96	25	3	25	1	25	0	0	0	0
	point250	250	410	96	25	3	25	1	25	0	0	0	0
	point251	251											
Street H East	point272	272	0	0	0	0	0	0	0	0	0	0	0
	point274	274	0	0	0	0	0	0	0	0	0	0	0
	point275	275											
Roadway8	point283	283	0	0	0	0	0	0	0	0	0	0	0
	point279	279											
Roadway188	point285	285	0	0	0	0	0	0	0	0	0	0	0
	point281	281											
Roadway 89	point297	297	0	0	0	0	0	0	0	0	0	0	0
	point291	291											
Roadway91	point298	298	0	0	0	0	0	0	0	0	0	0	0
	point300	300											
Roadway97	point324	324	0	0	0	0	0	0	0	0	0	0	0
	point326	326	0	0	0	0	0	0	0	0	0	0	0
	point327	327											
Roadway99	point335	335	0	0	0	0	0	0	0	0	0	0	0
	point329	329											
Roadway98	point337	337	0	0	0	0	0	0	0	0	0	0	0
	point331	331											
Roadway 92	point338	338	0	0	0	0	0	0	0	0	0	0	0
	point333	333											
Street I St A to St B	point309	309	80	96	25	3	25	1	25	0	0	0	0
	point873	873	80	96	25	3	25	1	25	0	0	0	0
	point302	302											
Laval Rd E	point340	340	1450	76	45	6	45	18	45	0	0	0	0
	point354	354	1450	76	45	6	45	18	45	0	0	0	0
	point355	355	1450	76	45	6	45	18	45	0	0	0	0
	point356	356	1450	76	45	6	45	18	45	0	0	0	0
	point357	357	1450	76	45	6	45	18	45	0	0	0	0
	point358	358											
I5 NB offramp at Laval Rd	point375	375	340	76	50	6	50	18	50	0	0	0	0

	point376	376											
I5 SB offramp at Laval	point387	387	490	76	50	6	50	18	50	0	0	0	0
	point388	388	490	76	50	6	50	18	50	0	0	0	0
	point389	389	490	76	50	6	50	18	50	0	0	0	0
	point390	390											
I5 NB onramp at Laval	point398	398	910	76	50	6	50	18	50	0	0	0	0
	point378	378	910	76	50	6	50	18	50	0	0	0	0
	point379	379	910	76	50	6	50	18	50	0	0	0	0
	point380	380											
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0	0
	point400	400											
I5 SB onramp at Laval	point422	422	520	76	50	6	50	18	50	0	0	0	0
	point403	403	520	76	50	6	50	18	50	0	0	0	0
	point404	404	520	76	50	6	50	18	50	0	0	0	0
	point405	405	520	76	50	6	50	18	50	0	0	0	0
	point406	406											
Street F Central	point428	428	0	0	0	0	0	0	0	0	0	0	0
	point430	430	0	0	0	0	0	0	0	0	0	0	0
	point431	431											
Roadway125	point441	441	0	0	0	0	0	0	0	0	0	0	0
	point436	436											
Street F	point444	444	0	0	0	0	0	0	0	0	0	0	0
	point433	433	0	0	0	0	0	0	0	0	0	0	0
	point434	434											
Roadway141	point445	445	0	0	0	0	0	0	0	0	0	0	0
	point447	447											
Street L St B to St M	point458	458	1140	96	25	3	25	1	25	0	0	0	0
	point819	819	1140	96	25	3	25	1	25	0	0	0	0
	point820	820	1140	96	25	3	25	1	25	0	0	0	0
	point451	451											
Roadway144	point453	453	0	0	0	0	0	0	0	0	0	0	0
	point460	460											
I5 onramp loop at Grapevine	point546	546	550	96	50	3	50	1	50	0	0	0	0
	point539	539	550	96	50	3	50	1	50	0	0	0	0
	point540	540	550	96	50	3	50	1	50	0	0	0	0
	point541	541											

I5 NB onramp slip at Grapevine	point572	572	770	76	50	6	50	18	50	0	0	0	0
	point564	564	770	76	50	6	50	18	50	0	0	0	0
	point565	565	770	76	50	6	50	18	50	0	0	0	0
	point566	566	770	76	50	6	50	18	50	0	0	0	0
	point567	567	770	76	50	6	50	18	50	0	0	0	0
	point568	568	770	76	50	6	50	18	50	0	0	0	0
	point569	569											
I5 SB loop onramp at Grapevine	point575	575	720	76	50	6	50	18	50	0	0	0	0
	point577	577	720	76	50	6	50	18	50	0	0	0	0
	point578	578	720	76	50	6	50	18	50	0	0	0	0
	point579	579	720	76	50	6	50	18	50	0	0	0	0
	point580	580											
I5 SB onramp slip at Grapevine	point586	586	430	76	50	6	50	18	50	0	0	0	0
	point582	582	430	76	50	6	50	18	50	0	0	0	0
	point583	583	430	76	50	6	50	18	50	0	0	0	0
	point584	584	430	76	50	6	50	18	50	0	0	0	0
	point559	559	430	76	50	6	50	18	50	0	0	0	0
	point561	561	430	76	50	6	50	18	50	0	0	0	0
	point562	562											
I5 SB offramp at Grapevine	point598	598	1670	76	50	6	50	18	50	0	0	0	0
	point592	592	1670	76	50	6	50	18	50	0	0	0	0
	point593	593	1670	76	50	6	50	18	50	0	0	0	0
	point594	594	1670	76	50	6	50	18	50	0	0	0	0
	point595	595	1670	76	50	6	50	18	50	0	0	0	0
	point596	596											
Street R Del Oro Dr to St T	point624	624	970	76	25	6	25	18	25	0	0	0	0
	point626	626	970	76	25	6	25	18	25	0	0	0	0
	point627	627	970	76	25	6	25	18	25	0	0	0	0
	point628	628											
Roadway185	point636	636	0	0	0	0	0	0	0	0	0	0	0
	point630	630											
Street T North	point638	638	0	0	0	0	0	0	0	0	0	0	0
	point632	632											
Roadway191	point640	640	0	0	0	0	0	0	0	0	0	0	0
	point642	642											
Street D Del Oro Dr to St S	point651	651	550	76	25	6	25	18	25	0	0	0	0
	point641	641											

Street S	point653	653	0	0	0	0	0	0	0	0	0	0	0
	point646	646	0	0	0	0	0	0	0	0	0	0	0
	point647	647											
Roadway194	point665	665	0	0	0	0	0	0	0	0	0	0	0
	point663	663	0	0	0	0	0	0	0	0	0	0	0
	point655	655											
Roadway200	point321	321	0	0	0	0	0	0	0	0	0	0	0
	point667	667	0	0	0	0	0	0	0	0	0	0	0
	point669	669	0	0	0	0	0	0	0	0	0	0	0
	point670	670	0	0	0	0	0	0	0	0	0	0	0
	point671	671	0	0	0	0	0	0	0	0	0	0	0
	point672	672	0	0	0	0	0	0	0	0	0	0	0
	point673	673	0	0	0	0	0	0	0	0	0	0	0
	point674	674	0	0	0	0	0	0	0	0	0	0	0
	point675	675											
Street H	point695	695	0	0	0	0	0	0	0	0	0	0	0
	point696	696											
Street Q	point140	140	140	76	30	6	30	18	30	0	0	0	0
	point142	142	140	76	30	6	30	18	30	0	0	0	0
	point143	143	140	76	30	6	30	18	30	0	0	0	0
	point144	144	140	76	30	6	30	18	30	0	0	0	0
	point145	145	140	76	30	6	30	18	30	0	0	0	0
	point146	146											
Street C S of St B	point136	136	860	76	30	6	30	18	30	0	0	0	0
	point833	833	860	76	30	6	30	18	30	0	0	0	0
	point784	784											
Edmnstn Pumpg Plnt Rd St D to St J	point167	167	230	76	30	6	30	18	30	0	0	0	0
	point159	159											
Roadway57	point183	183	0	0	0	0	0	0	0	0	0	0	0
	point177	177	0	0	0	0	0	0	0	0	0	0	0
	point178	178	0	0	0	0	0	0	0	0	0	0	0
	point179	179	0	0	0	0	0	0	0	0	0	0	0
	point180	180	0	0	0	0	0	0	0	0	0	0	0
	point181	181	0	0	0	0	0	0	0	0	0	0	0
	point184	184	0	0	0	0	0	0	0	0	0	0	0
	point186	186	0	0	0	0	0	0	0	0	0	0	0
	point187	187											

Roadway55	point699	699	0	0	0	0	0	0	0	0	0	0	0
	point170	170	0	0	0	0	0	0	0	0	0	0	0
	point171	171											
I5 NB offramp at Grapevine	point573	573	1130	76	50	6	50	18	50	0	0	0	0
	point560	560	1130	76	50	6	50	18	50	0	0	0	0
	point534	534	1130	76	50	6	50	18	50	0	0	0	0
	point536	536	1130	76	50	6	50	18	50	0	0	0	0
	point537	537											
Wheeler Ridge Rd	point364	364	880	76	45	6	45	18	45	0	0	0	0
	point363	363	880	76	45	6	45	18	45	0	0	0	0
	point361	361	880	76	45	6	45	18	45	0	0	0	0
	point374	374	880	76	45	6	45	18	45	0	0	0	0
	point382	382											
Del Oro Dr St R to St T	point637	637	2690	76	30	6	30	18	30	0	0	0	0
	point915	915	2690	76	30	6	30	18	30	0	0	0	0
	point366	366											
Roadway95	point704	704	0	0	0	0	0	0	0	0	0	0	0
	point306	306	0	0	0	0	0	0	0	0	0	0	0
	point307	307	0	0	0	0	0	0	0	0	0	0	0
	point299	299	0	0	0	0	0	0	0	0	0	0	0
	point310	310	0	0	0	0	0	0	0	0	0	0	0
	point312	312	0	0	0	0	0	0	0	0	0	0	0
	point313	313											
Street A St L to St N	point152	152	1050	76	25	6	25	18	25	0	0	0	0
	point164	164	1050	76	25	6	25	18	25	0	0	0	0
	point952	952	1050	76	25	6	25	18	25	0	0	0	0
	point165	165											
Street Q West	point707	707	140	76	30	6	30	18	30	0	0	0	0
	point148	148	140	76	30	6	30	18	30	0	0	0	0
	point149	149	140	76	30	6	30	18	30	0	0	0	0
	point141	141	140	76	30	6	30	18	30	0	0	0	0
	point150	150	140	76	30	6	30	18	30	0	0	0	0
	point151	151											
Street E	point709	709	0	0	0	0	0	0	0	0	0	0	0
	point253	253	0	0	0	0	0	0	0	0	0	0	0
	point254	254	0	0	0	0	0	0	0	0	0	0	0
	point255	255	0	0	0	0	0	0	0	0	0	0	0

	point256	256	0	0	0	0	0	0	0	0	0	0	0
	point257	257	0	0	0	0	0	0	0	0	0	0	0
	point249	249	0	0	0	0	0	0	0	0	0	0	0
	point258	258	0	0	0	0	0	0	0	0	0	0	0
	point260	260	0	0	0	0	0	0	0	0	0	0	0
	point261	261											
Roadway89	point711	711	0	0	0	0	0	0	0	0	0	0	0
	point293	293	0	0	0	0	0	0	0	0	0	0	0
	point294	294	0	0	0	0	0	0	0	0	0	0	0
	point295	295											
Roadway88	point698	698	0	0	0	0	0	0	0	0	0	0	0
	point287	287	0	0	0	0	0	0	0	0	0	0	0
	point289	289											
Street B East	point133	133	0	0	0	0	0	0	0	0	0	0	0
	point129	129											
I-5 SB - N of Laval Rd	point351	351	3870	76	70	6	70	18	70	0	0	0	0
	point864	864	3870	76	70	6	70	18	70	0	0	0	0
	point865	865	3870	76	70	6	70	18	70	0	0	0	0
	point866	866	3870	76	70	6	70	18	70	0	0	0	0
	point348	348											
Roadway195	point716	716	0	0	0	0	0	0	0	0	0	0	0
	point644	644											
Street D N of St A	point91	91	2995	76	30	6	30	18	30	0	0	0	0
	point734	734	2995	76	30	6	30	18	30	0	0	0	0
	point860	860	2995	76	30	6	30	18	30	0	0	0	0
	point861	861	2995	76	30	6	30	18	30	0	0	0	0
	point61	61											
Street J N of Edmnstn PumpPlnt Rd	point210	210	230	76	25	6	25	18	25	0	0	0	0
	point877	877	230	76	25	6	25	18	25	0	0	0	0
	point789	789											
Street M	point172	172	0	0	0	0	0	0	0	0	0	0	0
	point700	700											
Dennis McCarthy Dr	point426	426	660	76	25	6	25	18	25	0	0	0	0
	point418	418	660	76	25	6	25	18	25	0	0	0	0
	point419	419	660	76	25	6	25	18	25	0	0	0	0
	point420	420	660	76	25	6	25	18	25	0	0	0	0
	point399	399	660	76	25	6	25	18	25	0	0	0	0

	point401	401											
Laval Rd	point743	743	0	76	30	6	30	18	30	0	0	0	0
	point424	424	0	76	30	6	30	18	30	0	0	0	0
	point416	416											
Street T St R to St S	point747	747	430	76	25	6	25	18	25	0	0	0	0
	point922	922	430	76	25	6	25	18	25	0	0	0	0
	point648	648											
Roadway54-2	point749	749	0	0	0	0	0	0	0	0	0	0	0
	point175	175											
Street B St L to St N	point750	750	250	96	25	3	25	1	25	0	0	0	0
	point960	960	250	96	25	3	25	1	25	0	0	0	0
	point124	124											
Street N	point449	449	0	0	0	0	0	0	0	0	0	0	0
	point751	751	0	0	0	0	0	0	0	0	0	0	0
	point125	125	0	0	0	0	0	0	0	0	0	0	0
	point714	714	0	0	0	0	0	0	0	0	0	0	0
	point713	713	0	0	0	0	0	0	0	0	0	0	0
	point134	134	0	0	0	0	0	0	0	0	0	0	0
	point135	135											
Street F South	point271	271	0	0	0	0	0	0	0	0	0	0	0
	point266	266	0	0	0	0	0	0	0	0	0	0	0
	point267	267	0	0	0	0	0	0	0	0	0	0	0
	point259	259	0	0	0	0	0	0	0	0	0	0	0
	point689	689											
Street C S of St A	point753	753	2550	76	30	6	30	18	30	0	0	0	0
	point738	738	2550	76	30	6	30	18	30	0	0	0	0
	point830	830	2550	76	30	6	30	18	30	0	0	0	0
	point739	739	2550	76	30	6	30	18	30	0	0	0	0
	point787	787											
Street B South	point754	754	0	0	0	0	0	0	0	0	0	0	0
	point239	239	0	0	0	0	0	0	0	0	0	0	0
	point240	240	0	0	0	0	0	0	0	0	0	0	0
	point241	241	0	0	0	0	0	0	0	0	0	0	0
	point242	242	0	0	0	0	0	0	0	0	0	0	0
	point245	245	0	0	0	0	0	0	0	0	0	0	0
	point246	246	0	0	0	0	0	0	0	0	0	0	0
	point247	247	0	0	0	0	0	0	0	0	0	0	0

	point234	234											
Wheeler Ridge Rd-2	point755	755	1440	76	45	6	45	18	45	0	0	0	0
	point383	383	1440	76	45	6	45	18	45	0	0	0	0
	point393	393	1440	76	45	6	45	18	45	0	0	0	0
	point394	394	1440	76	45	6	45	18	45	0	0	0	0
	point386	386											
Laval Rd E-2	point756	756	1840	76	45	6	45	18	45	0	0	0	0
	point359	359	1840	76	45	6	45	18	45	0	0	0	0
	point360	360	1840	76	45	6	45	18	45	0	0	0	0
	point342	342											
Del Oro Dr-North	point759	759	2610	76	30	6	30	18	30	0	0	0	0
	point367	367	2610	76	30	6	30	18	30	0	0	0	0
	point368	368	2610	76	30	6	30	18	30	0	0	0	0
	point369	369	2610	76	30	6	30	18	30	0	0	0	0
	point370	370	2610	76	30	6	30	18	30	0	0	0	0
	point362	362											
Street D S of Del Oro Dr	point760	760	2995	76	30	6	30	18	30	0	0	0	0
	point878	878	2995	76	30	6	30	18	30	0	0	0	0
	point62	62	2995	76	30	6	30	18	30	0	0	0	0
	point63	63											
Street A St I St J	point761	761	2910	76	30	6	30	18	30	0	0	0	0
	point959	959	2910	76	30	6	30	18	30	0	0	0	0
	point86	86											
Street A St J to St L	point762	762	1850	76	30	6	30	18	30	0	0	0	0
	point87	87											
Street I-2	point764	764	80	96	25	3	25	1	25	0	0	0	0
	point763	763	80	96	25	3	25	1	25	0	0	0	0
	point875	875	80	96	25	3	25	1	25	0	0	0	0
	point876	876	80	96	25	3	25	1	25	0	0	0	0
	point874	874	80	96	25	3	25	1	25	0	0	0	0
	point304	304											
Street J S of St A	point765	765	0	0	0	0	0	0	0	0	0	0	0
	point216	216	0	0	0	0	0	0	0	0	0	0	0
	point217	217											
Street B-2	point766	766	0	0	0	0	0	0	0	0	0	0	0
	point776	776											
Street B St J to St L	point768	768	490	76	30	6	30	18	30	0	0	0	0

	point130	130	490	76	30	6	30	18	30	0	0	0	0	
	point131	131												
Street B-2 St J to St L	point775	775	495	76	30	6	30	18	30	0	0	0	0	
	point121	121												
Street B St I to St J	point777	777	720	76	30	6	30	18	30	0	0	0	0	
	point769	769	720	76	30	6	30	18	30	0	0	0	0	
	point895	895	720	76	30	6	30	18	30	0	0	0	0	
	point773	773	720	76	30	6	30	18	30	0	0	0	0	
	point774	774												
Edmnstn Pumping Plnt Rd- St J to St K	point779	779	198	76	30	6	30	18	30	0	0	0	0	
	point160	160	198	76	30	6	30	18	30	0	0	0	0	
	point894	894	198	76	30	6	30	18	30	0	0	0	0	
	point161	161												
Edmonstn Pumping Plant Rd E of St K	point780	780	198	76	30	6	30	18	30	0	0	0	0	
	point162	162	198	76	30	6	30	18	30	0	0	0	0	
	point737	737	198	76	30	6	30	18	30	0	0	0	0	
	point163	163												
Street D N of Edmnstn Pmp Plnt Rd	point783	783	220	76	30	6	30	18	30	0	0	0	0	
	point841	841	220	76	30	6	30	18	30	0	0	0	0	
	point111	111												
Street C N of St E	point786	786	430	76	30	6	30	18	30	0	0	0	0	
	point879	879	430	76	30	6	30	18	30	0	0	0	0	
	point137	137	430	76	30	6	30	18	30	0	0	0	0	
	point138	138	430	76	30	6	30	18	30	0	0	0	0	
	point139	139												
Street C N of St B	point788	788	1440	76	30	6	30	18	30	0	0	0	0	
	point740	740	1440	76	30	6	30	18	30	0	0	0	0	
	point71	71												
Street J S of St B	point790	790	660	76	25	6	25	18	25	0	0	0	0	
	point211	211	660	76	25	6	25	18	25	0	0	0	0	
	point212	212												
Street C St G to Tejon Ind Dr	point690	690	1340	76	30	6	30	18	30	0	0	0	0	
	point691	691	1340	76	30	6	30	18	30	0	0	0	0	
	point692	692	1340	76	30	6	30	18	30	0	0	0	0	
	point829	829	1340	76	30	6	30	18	30	0	0	0	0	
	point693	693	1340	76	30	6	30	18	30	0	0	0	0	
	point694	694	1340	76	30	6	30	18	30	0	0	0	0	

	point102	102	1340	76	30	6	30	18	30	0	0	0	0
	point104	104	1340	76	30	6	30	18	30	0	0	0	0
	point105	105	1340	76	30	6	30	18	30	0	0	0	0
	point793	793											
Tejon Industrial Dr-2	point795	795	1430	76	30	6	30	18	30	0	0	0	0
	point794	794	1430	76	30	6	30	18	30	0	0	0	0
	point745	745	1430	76	30	6	30	18	30	0	0	0	0
	point107	107	1430	76	30	6	30	18	30	0	0	0	0
	point112	112	1430	76	30	6	30	18	30	0	0	0	0
	point109	109	1430	76	30	6	30	18	30	0	0	0	0
	point429	429	1430	76	30	6	30	18	30	0	0	0	0
	point411	411	1430	76	30	6	30	18	30	0	0	0	0
	point413	413											
I-5 NB-N. of Laval Rd	point796	796	3710	76	70	6	70	18	70	0	0	0	0
	point345	345	3710	76	70	6	70	18	70	0	0	0	0
	point346	346											
I-5 SB-Laval Rd to Grapevine	point797	797	3240	76	70	6	70	18	70	0	0	0	0
	point349	349	3240	76	70	6	70	18	70	0	0	0	0
	point341	341	3240	76	70	6	70	18	70	0	0	0	0
	point17	17	3240	76	70	6	70	18	70	0	0	0	0
	point18	18	3240	76	70	6	70	18	70	0	0	0	0
	point725	725	3240	76	70	6	70	18	70	0	0	0	0
	point726	726	3240	76	70	6	70	18	70	0	0	0	0
	point729	729											
I-5 NB - Grapevine to Laval Rd	point798	798	3220	76	70	6	70	18	70	0	0	0	0
	point721	721	3220	76	70	6	70	18	70	0	0	0	0
	point722	722	3220	76	70	6	70	18	70	0	0	0	0
	point723	723	3220	76	70	6	70	18	70	0	0	0	0
	point724	724	3220	76	70	6	70	18	70	0	0	0	0
	point13	13	3220	76	70	6	70	18	70	0	0	0	0
	point14	14	3220	76	70	6	70	18	70	0	0	0	0
	point15	15	3220	76	70	6	70	18	70	0	0	0	0
	point344	344											
I-5 NB - S of Project	point1	1	3030	76	70	6	70	18	70	0	0	0	0
	point3	3	3030	76	70	6	70	18	70	0	0	0	0
	point4	4	3030	76	70	6	70	18	70	0	0	0	0
	point5	5	3030	76	70	6	70	18	70	0	0	0	0

	point6	6	3030	76	70	6	70	18	70	0	0	0	0
	point7	7	3030	76	70	6	70	18	70	0	0	0	0
	point8	8	3030	76	70	6	70	18	70	0	0	0	0
	point9	9	3030	76	70	6	70	18	70	0	0	0	0
	point791	791	3030	76	70	6	70	18	70	0	0	0	0
	point11	11	3030	76	70	6	70	18	70	0	0	0	0
	point12	12	3030	76	70	6	70	18	70	0	0	0	0
	point720	720	3030	76	70	6	70	18	70	0	0	0	0
	point719	719											
I-5 SB-S of Project	point799	799	2720	76	70	6	70	18	70	0	0	0	0
	point727	727	2720	76	70	6	70	18	70	0	0	0	0
	point728	728	2720	76	70	6	70	18	70	0	0	0	0
	point19	19	2720	76	70	6	70	18	70	0	0	0	0
	point842	842	2720	76	70	6	70	18	70	0	0	0	0
	point42	42	2720	76	70	6	70	18	70	0	0	0	0
	point792	792	2720	76	70	6	70	18	70	0	0	0	0
	point45	45	2720	76	70	6	70	18	70	0	0	0	0
	point46	46	2720	76	70	6	70	18	70	0	0	0	0
	point47	47	2720	76	70	6	70	18	70	0	0	0	0
	point48	48	2720	76	70	6	70	18	70	0	0	0	0
	point49	49	2720	76	70	6	70	18	70	0	0	0	0
	point50	50	2720	76	70	6	70	18	70	0	0	0	0
	point51	51	2720	76	70	6	70	18	70	0	0	0	0
	point43	43	2720	76	70	6	70	18	70	0	0	0	0
	point52	52	2720	76	70	6	70	18	70	0	0	0	0
	point53	53	2720	76	70	6	70	18	70	0	0	0	0
	point54	54											
Roadway305	point843	843	0	0	0	0	0	0	0	0	0	0	0
	point844	844	0	0	0	0	0	0	0	0	0	0	0
	point845	845	0	0	0	0	0	0	0	0	0	0	0
	point846	846	0	0	0	0	0	0	0	0	0	0	0
	point847	847	0	0	0	0	0	0	0	0	0	0	0
	point848	848	0	0	0	0	0	0	0	0	0	0	0
	point849	849	0	0	0	0	0	0	0	0	0	0	0
	point850	850	0	0	0	0	0	0	0	0	0	0	0
	point851	851	0	0	0	0	0	0	0	0	0	0	0
	point852	852	0	0	0	0	0	0	0	0	0	0	0

		point853	853											
Street D S of St A		point929	929	1570	76	30	6	30	18	30	0	0	0	0
		point862	862	1570	76	30	6	30	18	30	0	0	0	0
		point59	59											
Roadway329		point983	983	0	0	0	0	0	0	0	0	0	0	0
		point984	984	0	0	0	0	0	0	0	0	0	0	0
		point985	985	0	0	0	0	0	0	0	0	0	0	0
		point986	986	0	0	0	0	0	0	0	0	0	0	0
		point987	987	0	0	0	0	0	0	0	0	0	0	0
		point988	988	0	0	0	0	0	0	0	0	0	0	0
		point989	989	0	0	0	0	0	0	0	0	0	0	0
		point990	990	0	0	0	0	0	0	0	0	0	0	0
		point991	991											

Dudek 2 October 2015
M Greene TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: P/N 7667
RUN: Grapevine Project - Existing w Proj

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
I-5 Grapevine - 100'	8	1	37,150,536.0	12,691,664.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 200'	10	1	37,150,440.0	12,691,635.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 300'	12	1	37,150,340.0	12,691,607.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 400'	17	1	37,150,244.0	12,691,578.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 500'	19	1	37,150,148.0	12,691,550.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 600'	20	1	37,150,056.0	12,691,522.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 700'	26	1	37,149,956.0	12,691,494.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 800'	28	1	37,149,860.0	12,691,465.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 900'	31	1	37,149,764.0	12,691,437.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 1000'	33	1	37,149,668.0	12,691,407.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 1100'	34	1	37,149,572.0	12,691,382.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 100'	37	1	37,148,476.0	12,700,950.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 200'	39	1	37,148,572.0	12,700,979.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 300'	41	1	37,148,672.0	12,701,007.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 400'	44	1	37,148,768.0	12,701,036.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 500'	45	1	37,148,860.0	12,701,064.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 600'	46	1	37,148,952.0	12,701,090.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 700'	47	1	37,149,148.0	12,701,147.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 800'	49	1	37,149,244.0	12,701,176.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 900'	50	1	37,149,340.0	12,701,204.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 1000'	51	1	37,149,436.0	12,701,234.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 1100'	52	1	37,149,540.0	12,701,261.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 N of Laval - 100'	53	1	37,145,680.0	12,711,297.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N of Laval - 200'	55	1	37,145,584.0	12,711,268.0	1,166.00	5.00	0.00	65	10.0	8.0	Y

I-5 N of Laval - 300'	56	1	37,145,484.0	12,711,240.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N of Laval - 400'	57	1	37,145,388.0	12,711,211.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N of Laval - 500'	58	1	37,145,292.0	12,711,183.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 600'	59	1	37,145,200.0	12,711,153.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 700'	62	1	37,145,104.0	12,711,125.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 800'	63	1	37,145,004.0	12,711,097.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 900'	64	1	37,144,912.0	12,711,070.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 1100'	65	1	37,144,816.0	12,711,041.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 1200'	67	1	37,144,628.0	12,710,984.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 50'	68	1	37,152,072.0	12,697,441.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 100'	69	1	37,152,072.0	12,697,491.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 150'	70	1	37,152,072.0	12,697,541.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 200'	71	1	37,152,072.0	12,697,591.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 250'	83	1	37,152,072.0	12,697,641.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 50'	84	1	37,154,572.0	12,696,877.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L -100'	85	1	37,154,572.0	12,696,927.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 150'	86	1	37,154,572.0	12,696,977.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 200'	86	1	37,154,572.0	12,697,027.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 250'	87	1	37,154,572.0	12,697,077.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 50'	88	1	37,156,396.0	12,696,851.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 100'	89	1	37,156,396.0	12,696,901.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 150'	90	1	37,156,396.0	12,696,951.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 200'	91	1	37,156,396.0	12,697,001.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 250'	93	1	37,156,396.0	12,697,051.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St I St J - 50'	94	1	37,153,624.0	12,697,147.0	1,295.00	5.00	0.00	65	10.0	8.0	Y
St A St I St J - 100'	95	1	37,153,652.0	12,697,188.0	1,295.00	5.00	0.00	65	10.0	8.0	Y
St A St I St J - 150'	96	1	37,153,684.0	12,697,229.0	1,295.00	5.00	0.00	65	10.0	8.0	Y
St A St I St J - 200'	97	1	37,153,712.0	12,697,270.0	1,295.00	5.00	0.00	65	10.0	8.0	Y
St A St I St J - 250'	99	1	37,153,740.0	12,697,311.0	1,295.00	5.00	0.00	65	10.0	8.0	Y
St B St D to St I - 50'	100	1	37,151,656.0	12,694,744.0	1,415.00	5.00	0.00	65	10.0	8.0	Y
St B St D to St I - 100'	101	1	37,151,656.0	12,694,794.0	1,415.00	5.00	0.00	65	10.0	8.0	Y
St B St D to St I - 150'	102	1	37,151,656.0	12,694,844.0	1,415.00	5.00	0.00	65	10.0	8.0	Y
St B St D to St I - 200'	103	1	37,151,656.0	12,694,894.0	1,415.00	5.00	0.00	65	10.0	8.0	Y
St B St L to St N - 50'	105	1	37,157,132.0	12,695,089.0	1,385.00	5.00	0.00	65	10.0	8.0	Y
St B St L to St N - 100'	106	1	37,157,104.0	12,695,130.0	1,385.00	5.00	0.00	65	10.0	8.0	Y
St B St L to St N - 150'	107	1	37,157,072.0	12,695,172.0	1,385.00	5.00	0.00	65	10.0	8.0	Y
St B St L to St N - 200'	108	1	37,157,044.0	12,695,213.0	1,385.00	5.00	0.00	65	10.0	8.0	Y

St B St L to St N - 250'	109	1	37,157,016.0	12,695,255.0	1,385.00	5.00	0.00	65	10.0	8.0	Y
St B I-5 to St C - 50'	112	1	37,149,180.0	12,693,954.0	1,528.00	5.00	0.00	65	10.0	8.0	Y
St B I-5 to St C - 100'	113	1	37,149,192.0	12,693,905.0	1,528.00	5.00	0.00	65	10.0	8.0	Y
St B I-5 to St C -150'	114	1	37,149,208.0	12,693,857.0	1,528.00	5.00	0.00	65	10.0	8.0	Y
St B I-5 to St C - 200'	115	1	37,149,220.0	12,693,808.0	1,528.00	5.00	0.00	65	10.0	8.0	Y
St B I-5 to St C - 250'	116	1	37,149,232.0	12,693,760.0	1,528.00	5.00	0.00	65	10.0	8.0	Y
St B St I to St J - 50'	119	1	37,153,304.0	12,694,746.0	1,406.00	5.00	0.00	65	10.0	8.0	Y
St B St I to St J - 100'	120	1	37,153,304.0	12,694,796.0	1,406.00	5.00	0.00	65	10.0	8.0	Y
St B St I to St J - 150'	121	1	37,153,304.0	12,694,846.0	1,406.00	5.00	0.00	65	10.0	8.0	Y
St B St I to St J - 200'	122	1	37,153,304.0	12,694,896.0	1,406.00	5.00	0.00	65	10.0	8.0	Y
St B St I to St J - 250'	123	1	37,153,304.0	12,694,946.0	1,406.00	5.00	0.00	65	10.0	8.0	Y
St B St J to St L - 50'	124	1	37,155,480.0	12,694,728.0	1,395.00	5.00	0.00	65	10.0	8.0	Y
St B St J to St L - 100'	125	1	37,155,480.0	12,694,778.0	1,395.00	5.00	0.00	65	10.0	8.0	Y
St B St J to St L - 150'	126	1	37,155,480.0	12,694,828.0	1,395.00	5.00	0.00	65	10.0	8.0	Y
St B St J to St L - 200'	127	1	37,155,480.0	12,694,878.0	1,395.00	5.00	0.00	65	10.0	8.0	Y
St B St J to St L - 250'	129	1	37,155,480.0	12,694,928.0	1,395.00	5.00	0.00	65	10.0	8.0	Y
St B-E St C to St E - 50'	130	1	37,146,424.0	12,691,413.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St B-E St C to St E - 100'	131	1	37,146,464.0	12,691,381.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St B-E St C to St E - 150'	116	1	37,146,500.0	12,691,348.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St B-E St C to St E - 200'	132	1	37,146,540.0	12,691,316.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St B-E St C to St E - 250'	135	1	37,146,576.0	12,691,283.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C St G to Tejon Ind Dr - 50'	138	1	37,147,780.0	12,699,015.0	1,360.00	5.00	0.00	65	10.0	8.0	Y
St C St G to Tejon Ind Dr - 100'	116	1	37,147,732.0	12,698,988.0	1,360.00	5.00	0.00	65	10.0	8.0	Y
St C St G to Tejon Ind Dr - 150'	139	1	37,147,692.0	12,698,962.0	1,360.00	5.00	0.00	65	10.0	8.0	Y
St C St G to Tejon Ind Dr - 200'	141	1	37,147,648.0	12,698,937.0	1,360.00	5.00	0.00	65	10.0	8.0	Y
St C St G to Tejon Ind Dr - 250'	143	1	37,147,604.0	12,698,912.0	1,360.00	5.00	0.00	65	10.0	8.0	Y
St C S of St A - 200'	144	1	37,148,068.0	12,695,617.0	1,442.00	5.00	0.00	65	10.0	8.0	Y
St C S of St A - 250'	116	1	37,148,028.0	12,695,594.0	1,442.00	5.00	0.00	65	10.0	8.0	Y
St C S of St A - 300'	145	1	37,147,988.0	12,695,567.0	1,442.00	5.00	0.00	65	10.0	8.0	Y
St C S of St A - 350'	147	1	37,147,944.0	12,695,538.0	1,442.00	5.00	0.00	65	10.0	8.0	Y
St C S of St A - 400'	149	1	37,147,904.0	12,695,512.0	1,442.00	5.00	0.00	65	10.0	8.0	Y
St C N of St B - 250'	147	1	37,148,244.0	12,694,564.0	1,513.00	5.00	0.00	65	10.0	8.0	Y
St C N of St B - 300'	153	1	37,148,200.0	12,694,545.0	1,513.00	5.00	0.00	65	10.0	8.0	Y
St C N of St B - 350'	155	1	37,148,152.0	12,694,516.0	1,513.00	5.00	0.00	65	10.0	8.0	Y
St C N of St B - 400'	156	1	37,148,112.0	12,694,489.0	1,513.00	5.00	0.00	65	10.0	8.0	Y
St C N of St B - 450'	145	1	37,148,068.0	12,694,462.0	1,513.00	5.00	0.00	65	10.0	8.0	Y
St C S of St B - 50'	157	1	37,148,844.0	12,692,986.0	1,560.00	5.00	0.00	65	10.0	8.0	Y

St C S of St B - 100'	159	1	37,148,796.0	12,692,959.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C S of St B - 150'	161	1	37,148,756.0	12,692,933.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C S of St B - 200'	162	1	37,148,712.0	12,692,908.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C S of St B - 250'	145	1	37,148,668.0	12,692,883.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C N of St E - 50'	163	1	37,149,216.0	12,691,475.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C N of St E - 100'	165	1	37,149,168.0	12,691,461.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C N of St E - 150'	167	1	37,149,120.0	12,691,446.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C N of St E - 200'	145	1	37,149,072.0	12,691,432.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C N of St E - 250'	168	1	37,149,024.0	12,691,418.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St D N of St A - 50'	170	1	37,151,088.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	Y
St D N of St A - 100'	172	1	37,151,140.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	Y
St D N of St A - 150'	173	1	37,151,188.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	Y
St D N of St A - 200'	174	1	37,151,240.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	Y
St D N of St A - 250'	175	1	37,151,288.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	Y
St D S of Del Oro Dr - 50'	176	1	37,151,400.0	12,701,153.0	1,268.00	5.00	0.00	65	10.0	8.0	Y
St D S of Del Oro Dr - 100'	178	1	37,151,448.0	12,701,137.0	1,268.00	5.00	0.00	65	10.0	8.0	Y
St D S of Del Oro Dr - 150'	179	1	37,151,496.0	12,701,122.0	1,268.00	5.00	0.00	65	10.0	8.0	Y
St D S of Del Oro Dr - 200'	180	1	37,151,544.0	12,701,106.0	1,268.00	5.00	0.00	65	10.0	8.0	Y
St D S of Del Oro Dr - 250'	181	1	37,151,588.0	12,701,089.0	1,268.00	5.00	0.00	65	10.0	8.0	Y
St D Oro Dr to St S - 50'	182	1	37,152,396.0	12,702,656.0	1,240.00	5.00	0.00	65	10.0	8.0	Y
St D Oro Dr to St S - 100'	187	1	37,152,444.0	12,702,640.0	1,240.00	5.00	0.00	65	10.0	8.0	Y
St D Oro Dr to St S - 150'	188	1	37,152,492.0	12,702,625.0	1,240.00	5.00	0.00	65	10.0	8.0	Y
St D Oro Dr to St S - 200'	189	1	37,152,540.0	12,702,609.0	1,240.00	5.00	0.00	65	10.0	8.0	Y
St D Oro Dr to St S - 250'	190	1	37,152,588.0	12,702,593.0	1,240.00	5.00	0.00	65	10.0	8.0	Y
St D S of St B - 50'	191	1	37,151,364.0	12,693,679.0	1,440.00	5.00	0.00	65	10.0	8.0	Y
St D S of St B - 100'	193	1	37,151,412.0	12,693,689.0	1,440.00	5.00	0.00	65	10.0	8.0	Y
St D S of St B - 150'	194	1	37,151,460.0	12,693,706.0	1,440.00	5.00	0.00	65	10.0	8.0	Y
St D S of St B - 200'	145	1	37,151,508.0	12,693,721.0	1,440.00	5.00	0.00	65	10.0	8.0	Y
St D S of St B - 250'	201	1	37,151,552.0	12,693,738.0	1,440.00	5.00	0.00	65	10.0	8.0	Y
St D N of EdstnPmpPlnt Rd - 50'	203	1	37,151,764.0	12,692,138.0	1,480.00	5.00	0.00	65	10.0	8.0	Y
St D N of EdstnPmpPlnt Rd - 100'	205	1	37,151,808.0	12,692,148.0	1,480.00	5.00	0.00	65	10.0	8.0	Y
St D N of EdstnPmpPlnt Rd - 150'	206	1	37,151,864.0	12,692,166.0	1,480.00	5.00	0.00	65	10.0	8.0	Y
St D N of EdstnPmpPlnt Rd - 200'	207	1	37,151,912.0	12,692,180.0	1,480.00	5.00	0.00	65	10.0	8.0	Y
St D N of EdstnPmpPlnt Rd - 250'	208	1	37,151,956.0	12,692,193.0	1,480.00	5.00	0.00	65	10.0	8.0	Y
St D S of St A - 50'	209	1	37,151,096.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	Y
St D S of St A - 100'	211	1	37,151,148.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	Y
St D S of St A - 150'	212	1	37,151,196.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	Y

St D S of St A - 200'	203	1	37,151,248.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	Y
St D S of St A - 250'	213	1	37,151,296.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	Y
St D N of St B - 50'	215	1	37,151,108.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	Y
St D N of St B - 100'	217	1	37,151,156.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	Y
St D N of St B - 150'	218	1	37,151,208.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	Y
St D N of St B - 200'	219	1	37,151,256.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	Y
St D N of St B - 250'	220	1	37,151,308.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	Y
St E St C to St B - 50'	221	1	37,148,596.0	12,690,984.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St E St C to St B - 100'	223	1	37,148,632.0	12,691,019.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St E St C to St B - 150'	224	1	37,148,668.0	12,691,053.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St E St C to St B - 200'	225	1	37,148,704.0	12,691,086.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St E St C to St B - 250'	226	1	37,148,740.0	12,691,123.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St I St A to St B - 50'	227	1	37,152,812.0	12,696,979.0	1,398.00	5.00	0.00	65	10.0	8.0	Y
St I St A to St B - 100'	229	1	37,152,860.0	12,696,963.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St I St A to St B - 150'	230	1	37,152,908.0	12,696,948.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St I St A to St B - 200'	231	1	37,152,956.0	12,696,932.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St I St A to St B - 250'	232	1	37,153,004.0	12,696,916.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St J St A to St B - 50'	233	1	37,154,336.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	Y
St J St A to St B - 100'	235	1	37,154,388.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	Y
St J St A to St B - 150'	236	1	37,154,436.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	Y
St J St A to St B - 200'	221	1	37,154,488.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	Y
St J St A to St B - 250'	237	1	37,154,536.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	Y
St J S of St B - 50'	239	1	37,154,340.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	Y
St J S of St B - 100'	241	1	37,154,392.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	Y
St J S of St B - 150'	242	1	37,154,440.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	Y
St J S of St B - 200'	243	1	37,154,492.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	Y
St J S of St B - 250'	244	1	37,154,540.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	Y
St J N of EdmstnPmpPlnt Rd - 50'	245	1	37,153,860.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	Y
St J N of EdmstnPmpPlnt Rd - 100'	247	1	37,153,912.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	Y
St J N of EdmstnPmpPlnt Rd - 150'	248	1	37,153,960.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	Y
St J N of EdmstnPmpPlnt Rd - 200'	249	1	37,154,012.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	Y
St J N of EdmstnPmpPlnt Rd - 250'	250	1	37,154,060.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	Y
St L St A to St B 50'	251	1	37,155,484.0	12,695,684.0	1,340.00	5.00	0.00	65	10.0	8.0	Y
St L St A to St B 100'	253	1	37,155,436.0	12,695,657.0	1,340.00	5.00	0.00	65	10.0	8.0	Y
St L St A to St B 150'	254	1	37,155,396.0	12,695,631.0	1,340.00	5.00	0.00	65	10.0	8.0	Y
St L St A to St B 200'	255	1	37,155,352.0	12,695,606.0	1,340.00	5.00	0.00	65	10.0	8.0	Y
St L St A to St B 250'	256	1	37,155,308.0	12,695,581.0	1,340.00	5.00	0.00	65	10.0	8.0	Y

St R Del Oro Dr to St T- 50'	257	1	37,153,756.0	12,704,563.0	1,180.00	5.00	0.00	65	10.0	8.0	Y
St R Del Oro Dr to St T- 100'	259	1	37,153,756.0	12,704,613.0	1,180.00	5.00	0.00	65	10.0	8.0	Y
St R Del Oro Dr to St T- 150'	260	1	37,153,756.0	12,704,663.0	1,180.00	5.00	0.00	65	10.0	8.0	Y
St R Del Oro Dr to St T- 200'	261	1	37,153,756.0	12,704,713.0	1,180.00	5.00	0.00	65	10.0	8.0	Y
St R Del Oro Dr to St T- 250'	262	1	37,153,756.0	12,704,763.0	1,180.00	5.00	0.00	65	10.0	8.0	Y
St L St B to St M - 50'	263	1	37,156,512.0	12,693,827.0	1,370.00	5.00	0.00	65	10.0	8.0	Y
St L St B to St M - 100'	265	1	37,156,468.0	12,693,802.0	1,370.00	5.00	0.00	65	10.0	8.0	Y
St L St B to St M - 150'	266	1	37,156,428.0	12,693,776.0	1,370.00	5.00	0.00	65	10.0	8.0	Y
St L St B to St M - 200'	267	1	37,156,384.0	12,693,751.0	1,370.00	5.00	0.00	65	10.0	8.0	Y
St L St B to St M - 250'	268	1	37,156,340.0	12,693,726.0	1,370.00	5.00	0.00	65	10.0	8.0	Y
St T St R to St S- 50'	269	1	37,152,592.0	12,703,721.0	1,210.00	5.00	0.00	65	10.0	8.0	Y
St T St R to St S- 100'	271	1	37,152,640.0	12,703,721.0	1,210.00	5.00	0.00	65	10.0	8.0	Y
St T St R to St S- 150'	273	1	37,152,692.0	12,703,721.0	1,210.00	5.00	0.00	65	10.0	8.0	Y
St T St R to St S- 200'	275	1	37,152,740.0	12,703,721.0	1,210.00	5.00	0.00	66	10.0	8.0	Y
St T St R to St S- 250'	276	1	37,152,792.0	12,703,721.0	1,210.00	5.00	0.00	66	10.0	8.0	Y
Edmn St D to St J - 50'	277	1	37,152,976.0	12,691,041.0	1,485.00	5.00	0.00	66	10.0	8.0	Y
Edmn St D to St J - 100'	281	1	37,152,992.0	12,691,088.0	1,485.00	5.00	0.00	66	10.0	8.0	Y
Edmn St D to St J - 150'	285	1	37,153,012.0	12,691,135.0	1,485.00	5.00	0.00	66	10.0	8.0	Y
Edmn St D to St J - 200'	286	1	37,153,028.0	12,691,182.0	1,485.00	5.00	0.00	66	10.0	8.0	Y
Edmn St D to St J - 250'	281	1	37,153,044.0	12,691,229.0	1,485.00	5.00	0.00	66	10.0	8.0	Y
Edmn St J to St K - 50'	287	1	37,155,072.0	12,690,730.0	1,435.00	5.00	0.00	66	10.0	8.0	Y
Edmn St J to St K - 100'	288	1	37,155,072.0	12,690,780.0	1,435.00	5.00	0.00	66	10.0	8.0	Y
Edmn St J to St K - 150'	290	1	37,155,072.0	12,690,830.0	1,435.00	5.00	0.00	66	10.0	8.0	Y
Edmn St J to St K - 200'	291	1	37,155,072.0	12,690,880.0	1,435.00	5.00	0.00	66	10.0	8.0	Y
Edmn St J to St K - 250'	293	1	37,155,072.0	12,690,930.0	1,435.00	5.00	0.00	66	10.0	8.0	Y
Edmn E of St K - 50'	281	1	37,157,608.0	12,690,642.0	1,400.00	5.00	0.00	66	10.0	8.0	Y
Edmn E of St K - 100'	294	1	37,157,608.0	12,690,692.0	1,400.00	5.00	0.00	66	10.0	8.0	Y
Edmn E of St K - 150'	295	1	37,157,608.0	12,690,742.0	1,400.00	5.00	0.00	66	10.0	8.0	Y
Edmn E of St K - 200'	296	1	37,157,608.0	12,690,792.0	1,400.00	5.00	0.00	66	10.0	8.0	Y
Edmn E of St K - 250'	298	1	37,157,608.0	12,690,842.0	1,400.00	5.00	0.00	66	10.0	8.0	Y
Del Oro Dr St R to St T - 50'	299	1	37,151,368.0	12,703,534.0	1,225.00	5.00	0.00	66	10.0	8.0	Y
Del Oro Dr St R to St T - 100'	300	1	37,151,412.0	12,703,555.0	1,225.00	5.00	0.00	66	10.0	8.0	Y
Del Oro Dr St R to St T - 150'	304	1	37,151,460.0	12,703,577.0	1,225.00	5.00	0.00	66	10.0	8.0	Y
Del Oro Dr St R to St T - 200'	305	1	37,151,504.0	12,703,598.0	1,225.00	5.00	0.00	66	10.0	8.0	Y
Del Oro Dr St R to St T - 250'	306	1	37,151,552.0	12,703,598.0	1,225.00	5.00	0.00	66	10.0	8.0	Y
Farmhouse S. of Project	314	1	37,151,464.0	12,688,662.0	1,620.00	5.00	0.00	66	10.0	8.0	Y
Ramada Limited	315	1	37,150,324.0	12,690,333.0	1,535.00	5.00	0.00	66	10.0	8.0	Y

Best Western	316	1	37,145,996.0	12,708,367.0	1,175.00	5.00	0.00	66	10.0	8.0	Y
Microtel Inn & Suites	317	1	37,148,404.0	12,709,171.0	1,120.00	5.00	0.00	66	10.0	8.0	Y

Dudek **2 October 2015**
M Greene **TNM 2.5**
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Existing w Proj**
BARRIER DESIGN: **INPUT HEIGHTS**
ATMOSPHERICS: **68 deg F, 50% RH**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
I-5 Grapevine - 100'	8	1	0.0	80.4	65	80.4	10	Snd Lvl	80.4	0.0	8	-8.0
I-5 Grapevine - 200'	10	1	0.0	74.6	65	74.6	10	Snd Lvl	74.6	0.0	8	-8.0
I-5 Grapevine - 300'	12	1	0.0	71.5	65	71.5	10	Snd Lvl	71.5	0.0	8	-8.0
I-5 Grapevine - 400'	17	1	0.0	68.2	65	68.2	10	Snd Lvl	68.2	0.0	8	-8.0
I-5 Grapevine - 500'	19	1	0.0	65.7	65	65.7	10	Snd Lvl	65.7	0.0	8	-8.0
I-5 Grapevine - 600'	20	1	0.0	63.9	65	63.9	10	----	63.9	0.0	8	-8.0
I-5 Grapevine - 700'	26	1	0.0	62.5	65	62.5	10	----	62.5	0.0	8	-8.0
I-5 Grapevine - 800'	28	1	0.0	61.2	65	61.2	10	----	61.2	0.0	8	-8.0
I-5 Grapevine - 900'	31	1	0.0	60.0	65	60.0	10	----	60.0	0.0	8	-8.0
I-5 Grapevine - 1000'	33	1	0.0	59.4	65	59.4	10	----	59.4	0.0	8	-8.0
I-5 Grapevine - 1100'	34	1	0.0	59.1	65	59.1	10	----	59.1	0.0	8	-8.0
I-5 Laval - 100'	37	1	0.0	83.7	65	83.7	10	Snd Lvl	83.7	0.0	8	-8.0
I-5 Laval - 200'	39	1	0.0	76.7	65	76.7	10	Snd Lvl	76.7	0.0	8	-8.0
I-5 Laval - 300'	41	1	0.0	73.4	65	73.4	10	Snd Lvl	73.4	0.0	8	-8.0
I-5 Laval - 400'	44	1	0.0	69.6	65	69.6	10	Snd Lvl	69.6	0.0	8	-8.0
I-5 Laval - 500'	45	1	0.0	67.0	65	67.0	10	Snd Lvl	67.0	0.0	8	-8.0
I-5 Laval - 600'	46	1	0.0	65.1	65	65.1	10	Snd Lvl	65.1	0.0	8	-8.0
I-5 Laval - 700'	47	1	0.0	61.8	65	61.8	10	----	61.8	0.0	8	-8.0
I-5 Laval - 800'	49	1	0.0	60.7	65	60.7	10	----	60.7	0.0	8	-8.0
I-5 Laval - 900'	50	1	0.0	59.7	65	59.7	10	----	59.7	0.0	8	-8.0
I-5 Laval - 1000'	51	1	0.0	58.6	65	58.6	10	----	58.6	0.0	8	-8.0
I-5 Laval - 1100'	52	1	0.0	57.8	65	57.8	10	----	57.8	0.0	8	-8.0
I-5 N of Laval - 100'	53	1	0.0	85.0	65	85.0	10	Snd Lvl	85.0	0.0	8	-8.0
I-5 N of Laval - 200'	55	1	0.0	78.6	65	78.6	10	Snd Lvl	78.6	0.0	8	-8.0
I-5 N of Laval - 300'	56	1	0.0	75.3	65	75.3	10	Snd Lvl	75.3	0.0	8	-8.0

I-5 N of Laval - 400'	57	1	0.0	71.5	65	71.5	10	Snd Lvl	71.5	0.0	8	-8.0
I-5 N of Laval - 500'	58	1	0.0	68.7	65	68.7	10	Snd Lvl	68.7	0.0	8	-8.0
I-5 N. of Laval - 600'	59	1	0.0	66.5	65	66.5	10	Snd Lvl	66.5	0.0	8	-8.0
I-5 N. of Laval - 700'	62	1	0.0	64.5	65	64.5	10	----	64.5	0.0	8	-8.0
I-5 N. of Laval - 800'	63	1	0.0	62.8	65	62.8	10	----	62.8	0.0	8	-8.0
I-5 N. of Laval - 900'	64	1	0.0	61.9	65	61.9	10	----	61.9	0.0	8	-8.0
I-5 N. of Laval - 1100'	65	1	0.0	61.2	65	61.2	10	----	61.2	0.0	8	-8.0
I-5 N. of Laval - 1200'	67	1	0.0	60.1	65	60.1	10	----	60.1	0.0	8	-8.0
St A St D to St I- 50'	68	1	0.0	74.1	65	74.1	10	Snd Lvl	74.1	0.0	8	-8.0
St A St D to St I- 100'	69	1	0.0	70.4	65	70.4	10	Snd Lvl	70.4	0.0	8	-8.0
St A St D to St I- 150'	70	1	0.0	68.4	65	68.4	10	Snd Lvl	68.4	0.0	8	-8.0
St A St D to St I- 200'	71	1	0.0	66.8	65	66.8	10	Snd Lvl	66.8	0.0	8	-8.0
St A St D to St I- 250'	83	1	0.0	65.5	65	65.5	10	Snd Lvl	65.5	0.0	8	-8.0
St A St J to St L - 50'	84	1	0.0	70.9	65	70.9	10	Snd Lvl	70.9	0.0	8	-8.0
St A St J to St L -100'	85	1	0.0	67.6	65	67.6	10	Snd Lvl	67.6	0.0	8	-8.0
St A St J to St L - 150'	86	1	0.0	65.6	65	65.6	10	Snd Lvl	65.6	0.0	8	-8.0
St A St J to St L - 200'	86	1	0.0	63.8	65	63.8	10	----	63.8	0.0	8	-8.0
St A St J to St L - 250'	87	1	0.0	62.3	65	62.3	10	----	62.3	0.0	8	-8.0
St A St L to St N - 50'	88	1	0.0	67.9	65	67.9	10	Snd Lvl	67.9	0.0	8	-8.0
St A St L to St N - 100'	89	1	0.0	64.7	65	64.7	10	----	64.7	0.0	8	-8.0
St A St L to St N - 150'	90	1	0.0	62.8	65	62.8	10	----	62.8	0.0	8	-8.0
St A St L to St N - 200'	91	1	0.0	61.3	65	61.3	10	----	61.3	0.0	8	-8.0
St A St L to St N - 250'	93	1	0.0	60.0	65	60.0	10	----	60.0	0.0	8	-8.0
St A St I St J - 50'	94	1	0.0	73.8	65	73.8	10	Snd Lvl	73.8	0.0	8	-8.0
St A St I St J - 100'	95	1	0.0	70.1	65	70.1	10	Snd Lvl	70.1	0.0	8	-8.0
St A St I St J - 150'	96	1	0.0	67.9	65	67.9	10	Snd Lvl	67.9	0.0	8	-8.0
St A St I St J - 200'	97	1	0.0	66.4	65	66.4	10	Snd Lvl	66.4	0.0	8	-8.0
St A St I St J - 250'	99	1	0.0	65.1	65	65.1	10	Snd Lvl	65.1	0.0	8	-8.0
St B St D to St I - 50'	100	1	0.0	65.1	65	65.1	10	Snd Lvl	65.1	0.0	8	-8.0
St B St D to St I - 100'	101	1	0.0	63.5	65	63.5	10	----	63.5	0.0	8	-8.0
St B St D to St I - 150'	102	1	0.0	62.3	65	62.3	10	----	62.3	0.0	8	-8.0
St B St D to St I - 200'	103	1	0.0	61.5	65	61.5	10	----	61.5	0.0	8	-8.0
St B St L to St N - 50'	105	1	0.0	56.4	65	56.4	10	----	56.4	0.0	8	-8.0
St B St L to St N - 100'	106	1	0.0	54.1	65	54.1	10	----	54.1	0.0	8	-8.0
St B St L to St N - 150'	107	1	0.0	53.0	65	53.0	10	----	53.0	0.0	8	-8.0
St B St L to St N - 200'	108	1	0.0	52.4	65	52.4	10	----	52.4	0.0	8	-8.0
St B St L to St N - 250'	109	1	0.0	51.7	65	51.7	10	----	51.7	0.0	8	-8.0
St B I-5 to St C - 50'	112	1	0.0	73.6	65	73.6	10	Snd Lvl	73.6	0.0	8	-8.0
St B I-5 to St C - 100'	113	1	0.0	70.3	65	70.3	10	Snd Lvl	70.3	0.0	8	-8.0
St B I-5 to St C -150'	114	1	0.0	68.7	65	68.7	10	Snd Lvl	68.7	0.0	8	-8.0
St B I-5 to St C - 200'	115	1	0.0	67.5	65	67.5	10	Snd Lvl	67.5	0.0	8	-8.0
St B I-5 to St C - 250'	116	1	0.0	66.7	65	66.7	10	Snd Lvl	66.7	0.0	8	-8.0

St B St I to St J - 50'	119	1	0.0	67.2	65	67.2	10	Snd Lvl	67.2	0.0	8	-8.0
St B St I to St J - 100'	120	1	0.0	64.0	65	64.0	10	----	64.0	0.0	8	-8.0
St B St I to St J - 150'	121	1	0.0	62.4	65	62.4	10	----	62.4	0.0	8	-8.0
St B St I to St J - 200'	122	1	0.0	60.9	65	60.9	10	----	60.9	0.0	8	-8.0
St B St I to St J - 250'	123	1	0.0	59.9	65	59.9	10	----	59.9	0.0	8	-8.0
St B St J to St L - 50'	124	1	0.0	65.8	65	65.8	10	Snd Lvl	65.8	0.0	8	-8.0
St B St J to St L - 100'	125	1	0.0	62.3	65	62.3	10	----	62.3	0.0	8	-8.0
St B St J to St L - 150'	126	1	0.0	60.5	65	60.5	10	----	60.5	0.0	8	-8.0
St B St J to St L - 200'	127	1	0.0	59.3	65	59.3	10	----	59.3	0.0	8	-8.0
St B St J to St L - 250'	129	1	0.0	58.3	65	58.3	10	----	58.3	0.0	8	-8.0
St B-E St C to St E - 50'	130	1	0.0	61.5	65	61.5	10	----	61.5	0.0	8	-8.0
St B-E St C to St E - 100'	131	1	0.0	58.4	65	58.4	10	----	58.4	0.0	8	-8.0
St B-E St C to St E - 150'	116	1	0.0	56.6	65	56.6	10	----	56.6	0.0	8	-8.0
St B-E St C to St E - 200'	132	1	0.0	55.2	65	55.2	10	----	55.2	0.0	8	-8.0
St B-E St C to St E - 250'	135	1	0.0	53.5	65	53.5	10	----	53.5	0.0	8	-8.0
St C St G to Tejon Ind Dr - 50'	138	1	0.0	70.6	65	70.6	10	Snd Lvl	70.6	0.0	8	-8.0
St C St G to Tejon Ind Dr - 100'	116	1	0.0	67.6	65	67.6	10	Snd Lvl	67.6	0.0	8	-8.0
St C St G to Tejon Ind Dr - 150'	139	1	0.0	66.1	65	66.1	10	Snd Lvl	66.1	0.0	8	-8.0
St C St G to Tejon Ind Dr - 200'	141	1	0.0	64.8	65	64.8	10	----	64.8	0.0	8	-8.0
St C St G to Tejon Ind Dr - 250'	143	1	0.0	63.8	65	63.8	10	----	63.8	0.0	8	-8.0
St C S of St A - 200'	144	1	0.0	68.8	65	68.8	10	Snd Lvl	68.8	0.0	8	-8.0
St C S of St A - 250'	116	1	0.0	67.5	65	67.5	10	Snd Lvl	67.5	0.0	8	-8.0
St C S of St A - 300'	145	1	0.0	66.4	65	66.4	10	Snd Lvl	66.4	0.0	8	-8.0
St C S of St A - 350'	147	1	0.0	65.3	65	65.3	10	Snd Lvl	65.3	0.0	8	-8.0
St C S of St A - 400'	149	1	0.0	64.1	65	64.1	10	----	64.1	0.0	8	-8.0
St C N of St B - 250'	147	1	0.0	65.4	65	65.4	10	Snd Lvl	65.4	0.0	8	-8.0
St C N of St B - 300'	153	1	0.0	64.5	65	64.5	10	----	64.5	0.0	8	-8.0
St C N of St B - 350'	155	1	0.0	63.3	65	63.3	10	----	63.3	0.0	8	-8.0
St C N of St B - 400'	156	1	0.0	62.2	65	62.2	10	----	62.2	0.0	8	-8.0
St C N of St B - 450'	145	1	0.0	61.2	65	61.2	10	----	61.2	0.0	8	-8.0
St C S of St B - 50'	157	1	0.0	68.8	65	68.8	10	Snd Lvl	68.8	0.0	8	-8.0
St C S of St B - 100'	159	1	0.0	65.5	65	65.5	10	Snd Lvl	65.5	0.0	8	-8.0
St C S of St B - 150'	161	1	0.0	63.9	65	63.9	10	----	63.9	0.0	8	-8.0
St C S of St B - 200'	162	1	0.0	62.7	65	62.7	10	----	62.7	0.0	8	-8.0
St C S of St B - 250'	145	1	0.0	61.7	65	61.7	10	----	61.7	0.0	8	-8.0
St C N of St E - 50'	163	1	0.0	66.3	65	66.3	10	Snd Lvl	66.3	0.0	8	-8.0
St C N of St E - 100'	165	1	0.0	63.8	65	63.8	10	----	63.8	0.0	8	-8.0
St C N of St E - 150'	167	1	0.0	62.2	65	62.2	10	----	62.2	0.0	8	-8.0
St C N of St E - 200'	145	1	0.0	61.2	65	61.2	10	----	61.2	0.0	8	-8.0
St C N of St E - 250'	168	1	0.0	60.3	65	60.3	10	----	60.3	0.0	8	-8.0
St D N of St A - 50'	170	1	0.0	74.8	65	74.8	10	Snd Lvl	74.8	0.0	8	-8.0
St D N of St A - 100'	172	1	0.0	70.3	65	70.3	10	Snd Lvl	70.3	0.0	8	-8.0

St D N of St A - 150'	173	1	0.0	68.1	65	68.1	10	Snd Lvl	68.1	0.0	8	-8.0
St D N of St A - 200'	174	1	0.0	66.4	65	66.4	10	Snd Lvl	66.4	0.0	8	-8.0
St D N of St A - 250'	175	1	0.0	65.1	65	65.1	10	Snd Lvl	65.1	0.0	8	-8.0
St D S of Del Oro Dr - 50'	176	1	0.0	73.4	65	73.4	10	Snd Lvl	73.4	0.0	8	-8.0
St D S of Del Oro Dr - 100'	178	1	0.0	69.7	65	69.7	10	Snd Lvl	69.7	0.0	8	-8.0
St D S of Del Oro Dr - 150'	179	1	0.0	67.6	65	67.6	10	Snd Lvl	67.6	0.0	8	-8.0
St D S of Del Oro Dr - 200'	180	1	0.0	66.1	65	66.1	10	Snd Lvl	66.1	0.0	8	-8.0
St D S of Del Oro Dr - 250'	181	1	0.0	64.8	65	64.8	10	----	64.8	0.0	8	-8.0
St D Oro Dr to St S - 50'	182	1	0.0	66.0	65	66.0	10	Snd Lvl	66.0	0.0	8	-8.0
St D Oro Dr to St S - 100'	187	1	0.0	63.1	65	63.1	10	----	63.1	0.0	8	-8.0
St D Oro Dr to St S - 150'	188	1	0.0	61.5	65	61.5	10	----	61.5	0.0	8	-8.0
St D Oro Dr to St S - 200'	189	1	0.0	60.2	65	60.2	10	----	60.2	0.0	8	-8.0
St D Oro Dr to St S - 250'	190	1	0.0	59.2	65	59.2	10	----	59.2	0.0	8	-8.0
St D S of St B - 50'	191	1	0.0	65.9	65	65.9	10	Snd Lvl	65.9	0.0	8	-8.0
St D S of St B - 100'	193	1	0.0	63.7	65	63.7	10	----	63.7	0.0	8	-8.0
St D S of St B - 150'	194	1	0.0	62.6	65	62.6	10	----	62.6	0.0	8	-8.0
St D S of St B - 200'	145	1	0.0	62.0	65	62.0	10	----	62.0	0.0	8	-8.0
St D S of St B - 250'	201	1	0.0	61.4	65	61.4	10	----	61.4	0.0	8	-8.0
St D N of EdstnPmpPlnt Rd - 50'	203	1	0.0	64.1	65	64.1	10	----	64.1	0.0	8	-8.0
St D N of EdstnPmpPlnt Rd - 100'	205	1	0.0	62.2	65	62.2	10	----	62.2	0.0	8	-8.0
St D N of EdstnPmpPlnt Rd - 150'	206	1	0.0	61.1	65	61.1	10	----	61.1	0.0	8	-8.0
St D N of EdstnPmpPlnt Rd - 200'	207	1	0.0	60.4	65	60.4	10	----	60.4	0.0	8	-8.0
St D N of EdstnPmpPlnt Rd - 250'	208	1	0.0	59.8	65	59.8	10	----	59.8	0.0	8	-8.0
St D S of St A - 50'	209	1	0.0	71.1	65	71.1	10	Snd Lvl	71.1	0.0	8	-8.0
St D S of St A - 100'	211	1	0.0	67.4	65	67.4	10	Snd Lvl	67.4	0.0	8	-8.0
St D S of St A - 150'	212	1	0.0	65.7	65	65.7	10	Snd Lvl	65.7	0.0	8	-8.0
St D S of St A - 200'	203	1	0.0	64.4	65	64.4	10	----	64.4	0.0	8	-8.0
St D S of St A - 250'	213	1	0.0	63.4	65	63.4	10	----	63.4	0.0	8	-8.0
St D N of St B - 50'	215	1	0.0	68.6	65	68.6	10	Snd Lvl	68.6	0.0	8	-8.0
St D N of St B - 100'	217	1	0.0	65.7	65	65.7	10	Snd Lvl	65.7	0.0	8	-8.0
St D N of St B - 150'	218	1	0.0	64.2	65	64.2	10	----	64.2	0.0	8	-8.0
St D N of St B - 200'	219	1	0.0	63.2	65	63.2	10	----	63.2	0.0	8	-8.0
St D N of St B - 250'	220	1	0.0	62.1	65	62.1	10	----	62.1	0.0	8	-8.0
St E St C to St B - 50'	221	1	0.0	59.2	65	59.2	10	----	59.2	0.0	8	-8.0
St E St C to St B - 100'	223	1	0.0	57.5	65	57.5	10	----	57.5	0.0	8	-8.0
St E St C to St B - 150'	224	1	0.0	57.1	65	57.1	10	----	57.1	0.0	8	-8.0
St E St C to St B - 200'	225	1	0.0	56.9	65	56.9	10	----	56.9	0.0	8	-8.0
St E St C to St B - 250'	226	1	0.0	56.7	65	56.7	10	----	56.7	0.0	8	-8.0
St I St A to St B - 50'	227	1	0.0	64.2	65	64.2	10	----	64.2	0.0	8	-8.0
St I St A to St B - 100'	229	1	0.0	62.2	65	62.2	10	----	62.2	0.0	8	-8.0
St I St A to St B - 150'	230	1	0.0	62.1	65	62.1	10	----	62.1	0.0	8	-8.0
St I St A to St B - 200'	231	1	0.0	62.0	65	62.0	10	----	62.0	0.0	8	-8.0

St I St A to St B - 250'	232	1	0.0	61.9	65	61.9	10	----	61.9	0.0	8	-8.0
St J St A to St B - 50'	233	1	0.0	67.3	65	67.3	10	Snd Lvl	67.3	0.0	8	-8.0
St J St A to St B - 100'	235	1	0.0	63.3	65	63.3	10	----	63.3	0.0	8	-8.0
St J St A to St B - 150'	236	1	0.0	61.5	65	61.5	10	----	61.5	0.0	8	-8.0
St J St A to St B - 200'	221	1	0.0	60.0	65	60.0	10	----	60.0	0.0	8	-8.0
St J St A to St B - 250'	237	1	0.0	58.9	65	58.9	10	----	58.9	0.0	8	-8.0
St J S of St B - 50'	239	1	0.0	66.9	65	66.9	10	Snd Lvl	66.9	0.0	8	-8.0
St J S of St B - 100'	241	1	0.0	63.1	65	63.1	10	----	63.1	0.0	8	-8.0
St J S of St B - 150'	242	1	0.0	61.2	65	61.2	10	----	61.2	0.0	8	-8.0
St J S of St B - 200'	243	1	0.0	59.9	65	59.9	10	----	59.9	0.0	8	-8.0
St J S of St B - 250'	244	1	0.0	58.9	65	58.9	10	----	58.9	0.0	8	-8.0
St J N of EdmstnPmpPlnt Rd - 50'	245	1	0.0	62.6	65	62.6	10	----	62.6	0.0	8	-8.0
St J N of EdmstnPmpPlnt Rd - 100'	247	1	0.0	59.6	65	59.6	10	----	59.6	0.0	8	-8.0
St J N of EdmstnPmpPlnt Rd - 150'	248	1	0.0	58.3	65	58.3	10	----	58.3	0.0	8	-8.0
St J N of EdmstnPmpPlnt Rd - 200'	249	1	0.0	57.2	65	57.2	10	----	57.2	0.0	8	-8.0
St J N of EdmstnPmpPlnt Rd - 250'	250	1	0.0	56.7	65	56.7	10	----	56.7	0.0	8	-8.0
St L St A to St B 50'	251	1	0.0	62.7	65	62.7	10	----	62.7	0.0	8	-8.0
St L St A to St B 100'	253	1	0.0	59.2	65	59.2	10	----	59.2	0.0	8	-8.0
St L St A to St B 150'	254	1	0.0	57.6	65	57.6	10	----	57.6	0.0	8	-8.0
St L St A to St B 200'	255	1	0.0	56.3	65	56.3	10	----	56.3	0.0	8	-8.0
St L St A to St B 250'	256	1	0.0	55.1	65	55.1	10	----	55.1	0.0	8	-8.0
St R Del Oro Dr to St T- 50'	257	1	0.0	67.7	65	67.7	10	Snd Lvl	67.7	0.0	8	-8.0
St R Del Oro Dr to St T- 100'	259	1	0.0	64.6	65	64.6	10	----	64.6	0.0	8	-8.0
St R Del Oro Dr to St T- 150'	260	1	0.0	62.7	65	62.7	10	----	62.7	0.0	8	-8.0
St R Del Oro Dr to St T- 200'	261	1	0.0	61.3	65	61.3	10	----	61.3	0.0	8	-8.0
St R Del Oro Dr to St T- 250'	262	1	0.0	59.4	65	59.4	10	----	59.4	0.0	8	-8.0
St L St B to St M - 50'	263	1	0.0	62.1	65	62.1	10	----	62.1	0.0	8	-8.0
St L St B to St M - 100'	265	1	0.0	58.8	65	58.8	10	----	58.8	0.0	8	-8.0
St L St B to St M - 150'	266	1	0.0	56.9	65	56.9	10	----	56.9	0.0	8	-8.0
St L St B to St M - 200'	267	1	0.0	55.6	65	55.6	10	----	55.6	0.0	8	-8.0
St L St B to St M - 250'	268	1	0.0	53.7	65	53.7	10	----	53.7	0.0	8	-8.0
St T St R to St S- 50'	269	1	0.0	64.6	65	64.6	10	----	64.6	0.0	8	-8.0
St T St R to St S- 100'	271	1	0.0	61.9	65	61.9	10	----	61.9	0.0	8	-8.0
St T St R to St S- 150'	273	1	0.0	60.2	65	60.2	10	----	60.2	0.0	8	-8.0
St T St R to St S- 200'	275	1	0.0	59.1	66	59.1	10	----	59.1	0.0	8	-8.0
St T St R to St S- 250'	276	1	0.0	57.9	66	57.9	10	----	57.9	0.0	8	-8.0
Edmn St D to St J - 50'	277	1	0.0	63.4	66	63.4	10	----	63.4	0.0	8	-8.0
Edmn St D to St J - 100'	281	1	0.0	60.8	66	60.8	10	----	60.8	0.0	8	-8.0
Edmn St D to St J - 150'	285	1	0.0	59.5	66	59.5	10	----	59.5	0.0	8	-8.0
Edmn St D to St J - 200'	286	1	0.0	58.7	66	58.7	10	----	58.7	0.0	8	-8.0
Edmn St D to St J - 250'	281	1	0.0	58.2	66	58.2	10	----	58.2	0.0	8	-8.0
Edmn St J to St K - 50'	287	1	0.0	62.3	66	62.3	10	----	62.3	0.0	8	-8.0

Edmn St J to St K - 100'	288	1	0.0	58.8	66	58.8	10	----	58.8	0.0	8	-8.0
Edmn St J to St K - 150'	290	1	0.0	57.1	66	57.1	10	----	57.1	0.0	8	-8.0
Edmn St J to St K - 200'	291	1	0.0	55.8	66	55.8	10	----	55.8	0.0	8	-8.0
Edmn St J to St K - 250'	293	1	0.0	54.9	66	54.9	10	----	54.9	0.0	8	-8.0
Edmn E of St K - 50'	281	1	0.0	61.7	66	61.7	10	----	61.7	0.0	8	-8.0
Edmn E of St K - 100'	294	1	0.0	58.3	66	58.3	10	----	58.3	0.0	8	-8.0
Edmn E of St K - 150'	295	1	0.0	56.4	66	56.4	10	----	56.4	0.0	8	-8.0
Edmn E of St K - 200'	296	1	0.0	55.0	66	55.0	10	----	55.0	0.0	8	-8.0
Edmn E of St K - 250'	298	1	0.0	53.9	66	53.9	10	----	53.9	0.0	8	-8.0
Del Oro Dr St R to St T - 50'	299	1	0.0	72.7	66	72.7	10	Snd Lvl	72.7	0.0	8	-8.0
Del Oro Dr St R to St T - 100'	300	1	0.0	69.2	66	69.2	10	Snd Lvl	69.2	0.0	8	-8.0
Del Oro Dr St R to St T - 150'	304	1	0.0	67.1	66	67.1	10	Snd Lvl	67.1	0.0	8	-8.0
Del Oro Dr St R to St T - 200'	305	1	0.0	65.7	66	65.7	10	----	65.7	0.0	8	-8.0
Del Oro Dr St R to St T - 250'	306	1	0.0	64.7	66	64.7	10	----	64.7	0.0	8	-8.0
Farmhouse S. of Project	314	1	0.0	64.3	66	64.3	10	----	64.3	0.0	8	-8.0
Ramada Limited	315	1	0.0	65.7	66	65.7	10	----	65.7	0.0	8	-8.0
Best Western	316	1	0.0	71.1	66	71.1	10	Snd Lvl	71.1	0.0	8	-8.0
Microtel Inn & Suites	317	1	0.0	68.3	66	68.3	10	Snd Lvl	68.3	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	211	0.0	0.0	0.0
All Impacted	74	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek					**2 October 2015**							
M Greene					**TNM 2.5**							
INPUT: ROADWAYS							**Average pavement type shall be used unless**					
PROJECT/CONTRACT:	**P/N 7667**						**a State highway agency substantiates the use**					
RUN:	**Grapevine Project - Cumulative**						**of a different type with the approval of FHWA**					
Roadway		**Points**										
Name	**Width**	**Name**	**No.**	**Coordinates (pavement)**			**Flow Control**			**Segment**		
				X	**Y**	**Z**	**Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Pvmt Type**	**On Struct?**	
	ft			ft	ft	ft		mph	%			
I-5NB Laval Rd Offramp	35.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average		
		point376	376	37,146,912.0	12,708,531.0	1,180.00						
Roadway116	100.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average		
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average		
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average		
		point390	390	37,146,196.0	12,707,262.0	1,170.00						
I5 NB onramp - Laval Rd	35.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average		
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average		
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average		
		point380	380	37,146,436.0	12,709,337.0	1,170.00						
Roadway128	35.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average		
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average		
		point400	400	37,146,536.0	12,706,551.0	1,175.00						
Roadway129	75.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average		
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average		
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average		
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average		
		point406	406	37,146,832.0	12,706,142.0	1,180.00						
I5 NB Offamp - Grapevine Rd E.	35.0	point609	609	37,150,884.0	12,691,390.0	1,500.00				Average		
		point605	605	37,150,932.0	12,691,551.0	1,510.00				Average		
		point606	606	37,151,040.0	12,691,584.0	1,515.00				Average		
		point607	607	37,151,168.0	12,691,523.0	1,520.00						
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average		
		point363	363	37,147,644.0	12,715,708.0	980.00				Average		
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average		
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average		
		point382	382	37,147,388.0	12,711,444.0	1,100.00						

I-5 NB - Fort Tejon to Grapevine	60.0		point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
			point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
			point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
			point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
			point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
			point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
			point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
			point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
			point10	10	37,150,956.0	12,690,697.0	1,525.57					
I-5 SB - SR99 to Laval Rd	60.0		point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
			point348	348	37,146,312.0	12,708,896.0	1,170.00					
I5 SB Onramp	35.0		point610	610	37,150,288.0	12,691,462.0	1,520.00				Average	
			point587	587	37,150,376.0	12,691,601.0	1,510.00				Average	
			point589	589	37,150,472.0	12,691,584.0	1,500.00				Average	
			point590	590	37,150,564.0	12,691,479.0	1,490.00					
I-5 SB Laval Rd Offramp/DnnsMcCrthy	45.0		point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
			point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
			point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
			point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
			point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
			point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	90.0		point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
			point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
			point416	416	37,146,152.0	12,707,244.0	1,170.00					
Wheeler Ridge Rd-2	100.0		point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
			point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
			point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
			point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
			point386	386	37,146,700.0	12,708,330.0	1,185.00					
I-5 NB - Grapevine to Laval Rd	60.0		point791	791	37,150,956.0	12,690,697.0	1,525.57				Average	
			point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
			point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
			point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
			point719	719	37,149,448.0	12,696,794.0	1,374.66				Average	
			point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
			point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
			point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
			point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
			point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
			point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	

		point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	
		point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 SB - Grapevine to Fort Tejon	60.0	point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50					
I-5 NB - Laval Rd to SR99	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17				Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	
		point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	
		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	
		point44	44	37,150,824.0	12,690,687.0	1,525.60					
I5 SB offramp - Grapevine Rd West	50.0	point617	617	37,150,412.0	12,692,013.0	1,480.00				Average	
		point616	616	37,150,412.0	12,691,912.0	1,490.00				Average	
		point615	615	37,150,244.0	12,691,571.0	1,520.00				Average	
		point614	614	37,150,204.0	12,691,402.0	1,530.00					
Grapevine Road East	50.0	point146	146	37,151,216.0	12,690,473.0	1,550.00				Average	
		point816	816	37,151,432.0	12,690,534.0	1,545.00				Average	
		point623	623	37,151,500.0	12,690,625.0	1,535.00				Average	
		point619	619	37,151,220.0	12,691,565.0	1,520.00					
Edmonston Pumping Plant Rd	35.0	point156	156	37,151,376.0	12,691,167.0	1,525.00				Average	
		point157	157	37,151,832.0	12,691,306.0	1,500.00				Average	

		point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
		point798	798	37,153,608.0	12,690,806.0	1,480.00				Average	
		point799	799	37,154,252.0	12,690,716.0	1,450.00				Average	
		point801	801	37,155,832.0	12,690,652.0	1,420.00				Average	
		point802	802	37,157,604.0	12,690,592.0	1,400.00				Average	
		point803	803	37,159,760.0	12,690,254.0	1,375.00				Average	
		point804	804	37,161,912.0	12,689,916.0	1,350.00				Average	
		point805	805	37,161,992.0	12,689,907.0	1,350.00				Average	
		point806	806	37,163,484.0	12,689,688.0	1,300.00				Average	
		point807	807	37,165,736.0	12,689,344.0	1,250.00				Average	
		point808	808	37,168,656.0	12,689,314.0	1,200.00				Average	
		point810	810	37,169,252.0	12,689,409.0	1,200.00				Average	
		point809	809	37,169,832.0	12,689,734.0	1,200.00					
Grapevine Rd E. -I-5 NB Onramp	50.0	point833	833	37,151,220.0	12,691,565.0	1,520.00				Average	
		point620	620	37,150,988.0	12,691,709.0	1,510.00				Average	
		point621	621	37,150,780.0	12,691,877.0	1,500.00				Average	
		point613	613	37,150,696.0	12,692,047.0	1,490.00					
Grapevine Rd West-2	50.0	point834	834	37,150,204.0	12,691,402.0	1,530.00				Average	
		point612	612	37,150,476.0	12,690,329.0	1,538.00				Average	
		point812	812	37,150,524.0	12,690,307.0	1,537.50				Average	
		point707	707	37,150,732.0	12,690,361.0	1,535.00					
De Sol Dr / Laval Rd-Laval Rd E	95.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	
		point342	342	37,147,568.0	12,709,945.0	1,120.00					

Dudek
M Greene

2 October 201
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Percentages

PROJECT/CONTRACT: P/N 7667
RUN: Grapevine Project - Cumulative

Roadway Name	Points Name	No.	Segment Total Volume veh/hr	Autos P %	Autos S mph	MTrucks P %	MTrucks S mph	HTrucks P %	HTrucks S mph	Buses P %	Buses S mph	Motorcycles P %	Motorcycles S mph
I-5NB Laval Rd Offramp	point375	375	320	76	50	6	50	18	50	0	0	0	0
	point376	376											
Roadway116	point387	387	0	0	0	0	0	0	0	0	0	0	0
	point388	388	0	0	0	0	0	0	0	0	0	0	0
	point389	389	0	0	0	0	0	0	0	0	0	0	0
	point390	390											
I5 NB onramp - Laval Rd	point398	398	450	76	50	6	50	18	50	0	0	0	0
	point378	378	450	76	50	6	50	18	50	0	0	0	0
	point379	379	450	76	50	6	50	18	50	0	0	0	0
	point380	380											
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0	0
	point400	400											
Roadway129	point422	422	0	0	0	0	0	0	0	0	0	0	0
	point403	403	0	0	0	0	0	0	0	0	0	0	0
	point404	404	0	0	0	0	0	0	0	0	0	0	0
	point405	405	0	0	0	0	0	0	0	0	0	0	0
	point406	406											
I5 NB Offamp - Grapevine Rd E.	point609	609	100	76	50	6	50	18	50	0	0	0	0
	point605	605	100	76	50	6	50	18	50	0	0	0	0
	point606	606	100	76	50	6	50	18	50	0	0	0	0
	point607	607											
Wheeler Ridge Rd	point364	364	880	76	45	6	45	18	45	0	0	0	0
	point363	363	880	76	45	6	45	18	45	0	0	0	0
	point361	361	880	76	45	6	45	18	45	0	0	0	0

	point374	374	880	76	45	6	45	18	45	0	0	0	0
	point382	382											
I-5 NB - Fort Tejon to Grapevine	point1	1	5570	76	65	6	65	18	65	0	0	0	0
	point3	3	5570	76	65	6	65	18	65	0	0	0	0
	point4	4	5570	76	65	6	65	18	65	0	0	0	0
	point5	5	5570	76	65	6	65	18	65	0	0	0	0
	point6	6	5570	76	65	6	65	18	65	0	0	0	0
	point7	7	5570	76	65	6	65	18	65	0	0	0	0
	point8	8	5570	76	65	6	65	18	65	0	0	0	0
	point9	9	5570	76	65	6	65	18	65	0	0	0	0
	point10	10											
I-5 SB - SR99 to Laval Rd	point351	351	4860	76	70	6	70	18	70	0	0	0	0
	point348	348											
I5 SB Onramp	point610	610	40	76	50	6	50	18	50	0	0	0	0
	point587	587	40	76	50	6	50	18	50	0	0	0	0
	point589	589	40	76	50	6	50	18	50	0	0	0	0
	point590	590											
I-5 SB Laval Rd Offramp/DnnsMcCrthy	point426	426	370	76	50	6	50	18	50	0	0	0	0
	point418	418	370	76	50	6	50	18	50	0	0	0	0
	point419	419	370	76	50	6	50	18	50	0	0	0	0
	point420	420	370	76	50	6	50	18	50	0	0	0	0
	point399	399	370	76	50	6	50	18	50	0	0	0	0
	point401	401											
Laval Rd	point743	743	570	76	30	6	30	18	30	0	0	0	0
	point424	424	570	76	30	6	30	18	30	0	0	0	0
	point416	416											
Wheeler Ridge Rd-2	point755	755	770	76	45	6	45	18	45	0	0	0	0
	point383	383	770	76	45	6	45	18	45	0	0	0	0
	point393	393	770	76	45	6	45	18	45	0	0	0	0
	point394	394	770	76	45	6	45	18	45	0	0	0	0
	point386	386											
I-5 NB - Grapevine to Laval Rd	point791	791	5480	76	70	6	70	18	70	0	0	0	0
	point11	11	5480	76	70	6	70	18	70	0	0	0	0
	point12	12	5480	76	70	6	70	18	70	0	0	0	0
	point720	720	5480	76	70	6	70	18	70	0	0	0	0
	point719	719	5480	76	70	6	70	18	70	0	0	0	0
	point721	721	5480	76	70	6	70	18	70	0	0	0	0

	point722	722	5480	76	70	6	70	18	70	0	0	0	0
	point723	723	5480	76	70	6	70	18	70	0	0	0	0
	point724	724	5480	76	70	6	70	18	70	0	0	0	0
	point13	13	5480	76	70	6	70	18	70	0	0	0	0
	point14	14	5480	76	70	6	70	18	70	0	0	0	0
	point15	15	5480	76	70	6	70	18	70	0	0	0	0
	point344	344											
I-5 SB - Grapevine to Fort Tejon	point792	792	4890	76	65	6	65	18	65	0	0	0	0
	point45	45	4890	76	65	6	65	18	65	0	0	0	0
	point46	46	4890	76	65	6	65	18	65	0	0	0	0
	point47	47	4890	76	65	6	65	18	65	0	0	0	0
	point48	48	4890	76	65	6	65	18	65	0	0	0	0
	point49	49	4890	76	65	6	65	18	65	0	0	0	0
	point50	50	4890	76	65	6	65	18	65	0	0	0	0
	point51	51	4890	76	65	6	65	18	65	0	0	0	0
	point43	43	4890	76	65	6	65	18	65	0	0	0	0
	point52	52	4890	76	65	6	65	18	65	0	0	0	0
	point53	53	4890	76	65	6	65	18	65	0	0	0	0
	point54	54											
I-5 NB - Laval Rd to SR99	point796	796	5510	76	70	6	70	18	70	0	0	0	0
	point345	345	5510	76	70	6	70	18	70	0	0	0	0
	point346	346											
I-5 SB-Laval Rd to Grapevine	point797	797	4770	76	70	6	70	18	70	0	0	0	0
	point349	349	4770	76	70	6	70	18	70	0	0	0	0
	point341	341	4770	76	70	6	70	18	70	0	0	0	0
	point17	17	4770	76	70	6	70	18	70	0	0	0	0
	point18	18	4770	76	70	6	70	18	70	0	0	0	0
	point725	725	4770	76	70	6	70	18	70	0	0	0	0
	point726	726	4770	76	70	6	70	18	70	0	0	0	0
	point729	729	4770	76	70	6	70	18	70	0	0	0	0
	point727	727	4770	76	70	6	70	18	70	0	0	0	0
	point728	728	4770	76	70	6	70	18	70	0	0	0	0
	point19	19	4770	76	70	6	70	18	70	0	0	0	0
	point42	42	4770	76	70	6	70	18	70	0	0	0	0
	point44	44											
I5 SB offramp - Grapevine Rd West	point617	617	80	76	50	6	50	18	50	0	0	0	0
	point616	616	80	76	50	6	50	18	50	0	0	0	0

	point615	615	80	76	50	6	50	18	50	0	0	0	0
	point614	614											
Grapevine Road East	point146	146	174	76	30	6	30	18	30	0	0	0	0
	point816	816	174	76	30	6	30	18	30	0	0	0	0
	point623	623	174	76	30	6	30	18	30	0	0	0	0
	point619	619											
Edmonston Pumping Plant Rd	point156	156	0	0	0	0	0	0	0	0	0	0	0
	point157	157	0	0	0	0	0	0	0	0	0	0	0
	point167	167	0	0	0	0	0	0	0	0	0	0	0
	point798	798	0	0	0	0	0	0	0	0	0	0	0
	point799	799	0	0	0	0	0	0	0	0	0	0	0
	point801	801	0	0	0	0	0	0	0	0	0	0	0
	point802	802	0	0	0	0	0	0	0	0	0	0	0
	point803	803	0	0	0	0	0	0	0	0	0	0	0
	point804	804	0	0	0	0	0	0	0	0	0	0	0
	point805	805	0	0	0	0	0	0	0	0	0	0	0
	point806	806	0	0	0	0	0	0	0	0	0	0	0
	point807	807	0	0	0	0	0	0	0	0	0	0	0
	point808	808	0	0	0	0	0	0	0	0	0	0	0
	point810	810	0	0	0	0	0	0	0	0	0	0	0
	point809	809											
Grapevine Rd E. -I-5 NB Onramp	point833	833	10	76	50	6	50	18	50	0	0	0	0
	point620	620	10	76	50	6	50	18	50	0	0	0	0
	point621	621	10	76	50	6	50	18	50	0	0	0	0
	point613	613											
Grapevine Rd West-2	point834	834	174	76	30	6	30	18	30	0	0	0	0
	point612	612	174	76	30	6	30	18	30	0	0	0	0
	point812	812	174	76	30	6	30	18	30	0	0	0	0
	point707	707											
De Sol Dr / Laval Rd-Laval Rd E	point340	340	580	76	45	6	45	18	45	0	0	0	0
	point354	354	580	76	45	6	45	18	45	0	0	0	0
	point355	355	580	76	45	6	45	18	45	0	0	0	0
	point356	356	580	76	45	6	45	18	45	0	0	0	0
	point357	357	580	76	45	6	45	18	45	0	0	0	0
	point756	756	580	76	45	6	45	18	45	0	0	0	0
	point359	359	580	76	45	6	45	18	45	0	0	0	0
	point360	360	580	76	45	6	45	18	45	0	0	0	0

		point342	342												

Dudek **2 October 2015**
M Greene **TNM 2.5**

INPUT: RECEIVERS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cumulative**

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Farmhouse S. of Project	1	1	37,151,464.0	12,688,662.0	1,620.00	5.00	0.00	66	10.0	8.0	Y
Ramada Limited	3	1	37,150,324.0	12,690,333.0	1,535.00	5.00	0.00	66	10.0	8.0	Y
Best Western	5	1	37,145,996.0	12,708,367.0	1,175.00	5.00	0.00	66	10.0	8.0	Y
Microtel Inn & Suites	7	1	37,148,404.0	12,709,171.0	1,120.00	5.00	0.00	66	10.0	8.0	Y

Dudek 2 October 2015
M Greene TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: P/N 7667
RUN: Grapevine Project - Cumulative
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Farmhouse S. of Project	1	1	0.0	66.2	66	66.2	10	Snd Lvl	66.2	0.0	8	-8.0
Ramada Limited	3	1	0.0	67.1	66	67.1	10	Snd Lvl	67.1	0.0	8	-8.0
Best Western	5	1	0.0	72.6	66	72.6	10	Snd Lvl	72.6	0.0	8	-8.0
Microtel Inn & Suites	7	1	0.0	64.0	66	64.0	10	----	64.0	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	3	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek **30 November 2015**
M Greene **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cumulative w Proj**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Street B I-5 to St C	75.0	point55	55	37,149,896.0	12,694,183.0	1,430.00				Average	
		point937	937	37,149,396.0	12,694,059.0	1,495.00				Average	
		point938	938	37,149,144.0	12,693,997.0	1,527.50				Average	
		point57	57	37,148,896.0	12,693,935.0	1,560.00					
Street D N of St B	75.0	point66	66	37,151,060.0	12,694,684.0	1,420.00				Average	
		point930	930	37,151,056.0	12,695,314.0	1,405.00				Average	
		point778	778	37,151,052.0	12,695,944.0	1,390.00					
Street L St A to St B	50.0	point73	73	37,156,016.0	12,694,811.0	1,390.00				Average	
		point828	828	37,155,528.0	12,695,704.0	1,340.00				Average	
		point74	74	37,155,036.0	12,696,598.0	1,290.00					
Street A I-5 to St C	75.0	point81	81	37,149,124.0	12,697,077.0	1,360.00				Average	
		point79	79	37,148,000.0	12,696,798.0	1,370.00					
Street A I-5 to St D	75.0	point82	82	37,149,444.0	12,697,174.0	1,370.00				Average	
		point76	76	37,150,328.0	12,697,405.0	1,360.00				Average	
		point77	77	37,150,820.0	12,697,412.0	1,360.00					
Street A St D to St I	75.0	point84	84	37,151,204.0	12,697,391.0	1,360.00				Average	
		point945	945	37,152,072.0	12,697,391.0	1,330.00				Average	
		point85	85	37,152,936.0	12,697,391.0	1,300.00					
Street D S of St B	75.0	point114	114	37,151,104.0	12,694,432.0	1,420.00				Average	
		point840	840	37,151,308.0	12,693,661.0	1,440.00				Average	
		point781	781	37,151,512.0	12,692,890.0	1,460.00					
Street B I-5 to St A	75.0	point116	116	37,150,156.0	12,694,246.0	1,430.00				Average	
		point118	118	37,150,996.0	12,694,445.0	1,420.00					
Street B St D to St I	75.0	point127	127	37,151,224.0	12,694,535.0	1,420.00				Average	
		point120	120	37,151,944.0	12,694,702.0	1,410.00					
Edmonston Pumping Plant Rd-4	75.0	point195	195	37,161,992.0	12,689,907.0	1,350.00				Average	
		point189	189	37,163,484.0	12,689,688.0	1,300.00				Average	

			point190	190	37,165,736.0	12,689,344.0	1,250.00				Average	
			point191	191	37,168,656.0	12,689,314.0	1,200.00				Average	
			point192	192	37,169,252.0	12,689,409.0	1,200.00				Average	
			point193	193	37,169,832.0	12,689,734.0	1,200.00					
Street M East	50.0		point197	197	37,163,368.0	12,689,727.0	1,300.00				Average	
			point199	199	37,163,584.0	12,691,754.0	1,300.00				Average	
			point200	200	37,162,624.0	12,692,327.0	1,310.00				Average	
			point201	201	37,161,880.0	12,692,333.0	1,310.00					
Street K	50.0		point208	208	37,155,764.0	12,692,346.0	1,350.00				Average	
			point203	203	37,155,568.0	12,692,606.0	1,340.00				Average	
			point204	204	37,155,100.0	12,694,604.0	1,400.00					
Street J St A to St B	75.0		point213	213	37,154,296.0	12,694,767.0	1,405.00				Average	
			point863	863	37,154,288.0	12,695,319.0	1,357.50				Average	
			point215	215	37,154,280.0	12,695,871.0	1,310.00					
Roadway70	50.0		point221	221	37,154,276.0	12,696,899.0	1,290.00				Average	
			point219	219	37,154,308.0	12,697,081.0	1,300.00				Average	
			point214	214	37,154,884.0	12,698,052.0	1,310.00				Average	
			point222	222	37,155,116.0	12,698,403.0	1,320.00				Average	
			point224	224	37,155,672.0	12,698,763.0	1,320.00				Average	
			point225	225	37,156,416.0	12,698,756.0	1,320.00				Average	
			point226	226	37,157,116.0	12,698,398.0	1,320.00				Average	
			point227	227	37,157,772.0	12,698,020.0	1,330.00				Average	
			point228	228	37,158,780.0	12,697,299.0	1,330.00				Average	
			point229	229	37,159,384.0	12,696,485.0	1,340.00				Average	
			point230	230	37,159,772.0	12,695,818.0	1,350.00				Average	
			point231	231	37,160,072.0	12,695,370.0	1,360.00				Average	
			point232	232	37,159,692.0	12,695,164.0	1,370.00				Average	
			point223	223	37,158,432.0	12,694,481.0	1,390.00					
Roadway72	50.0		point233	233	37,155,700.0	12,696,841.0	1,290.00				Average	
			point235	235	37,155,704.0	12,698,724.0	1,320.00					
Street B - St C to St E	50.0		point244	244	37,148,488.0	12,693,761.0	1,560.00				Average	
			point237	237	37,147,080.0	12,692,235.0	1,560.00				Average	
			point238	238	37,145,208.0	12,690,108.0	1,560.00					
Street G	50.0		point269	269	37,147,756.0	12,697,321.0	1,360.00				Average	
			point263	263	37,147,220.0	12,697,531.0	1,410.00				Average	
			point741	741	37,146,680.0	12,697,736.0	1,480.00				Average	
			point742	742	37,146,140.0	12,697,942.0	1,485.00				Average	
			point264	264	37,145,600.0	12,698,147.0	1,490.00					
Street E St C to St B	50.0		point248	248	37,149,172.0	12,690,430.0	1,560.00				Average	
			point881	881	37,148,560.0	12,690,945.0	1,560.00				Average	

		point250	250	37,147,952.0	12,691,460.0	1,560.00				Average	
		point251	251	37,147,092.0	12,692,213.0	1,560.00					
Street H East	50.0	point272	272	37,146,848.0	12,695,949.0	1,500.00				Average	
		point274	274	37,147,472.0	12,696,107.0	1,450.00				Average	
		point275	275	37,148,100.0	12,696,246.0	1,410.00					
Roadway8	50.0	point283	283	37,148,284.0	12,693,815.0	1,560.00				Average	
		point279	279	37,146,812.0	12,694,380.0	1,560.00					
Roadway188	50.0	point285	285	37,146,492.0	12,693,414.0	1,560.00				Average	
		point281	281	37,147,568.0	12,692,892.0	1,560.00					
Roadway 89	50.0	point297	297	37,146,324.0	12,689,588.0	1,560.00				Average	
		point291	291	37,147,908.0	12,691,420.0	1,560.00					
Roadway91	50.0	point298	298	37,159,512.0	12,692,385.0	1,320.00				Average	
		point300	300	37,159,512.0	12,693,176.0	1,390.00					
Roadway97	50.0	point324	324	37,150,120.0	12,697,241.0	1,365.00				Average	
		point326	326	37,150,168.0	12,696,134.0	1,380.00				Average	
		point327	327	37,150,960.0	12,696,128.0	1,370.00					
Roadway99	50.0	point335	335	37,151,096.0	12,696,169.0	1,370.00				Average	
		point329	329	37,152,604.0	12,696,172.0	1,360.00					
Roadway98	50.0	point337	337	37,151,128.0	12,698,772.0	1,330.00				Average	
		point331	331	37,153,440.0	12,698,774.0	1,300.00					
Roadway 92	50.0	point338	338	37,149,800.0	12,698,784.0	1,350.00				Average	
		point333	333	37,150,940.0	12,698,776.0	1,330.00					
Street I St A to St B	50.0	point309	309	37,152,240.0	12,694,757.0	1,410.00				Average	
		point873	873	37,152,456.0	12,695,474.0	1,400.00				Average	
		point302	302	37,152,676.0	12,696,191.0	1,390.00					
Laval Rd E	50.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point358	358	37,148,312.0	12,708,412.0	1,120.00					
I5 NB offramp at Laval Rd	50.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
I5 SB offramp at Laval	50.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
I5 NB onramp at Laval	50.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	

		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	50.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
I5 SB onramp at Laval	50.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
Street F Central	50.0	point428	428	37,146,812.0	12,696,032.0	1,500.00				Average	
		point430	430	37,146,520.0	12,697,245.0	1,490.00				Average	
		point431	431	37,146,664.0	12,697,668.0	1,480.00					
Roadway125	50.0	point441	441	37,157,144.0	12,696,814.0	1,290.00				Average	
		point436	436	37,158,412.0	12,697,512.0	1,330.00					
Street F	50.0	point444	444	37,146,712.0	12,697,821.0	1,480.00				Average	
		point433	433	37,147,312.0	12,699,423.0	1,380.00				Average	
		point434	434	37,147,592.0	12,699,490.0	1,360.00					
Roadway141	50.0	point445	445	37,157,076.0	12,696,843.0	1,290.00				Average	
		point447	447	37,157,084.0	12,698,366.0	1,320.00					
Street L St B to St M	50.0	point458	458	37,157,288.0	12,692,442.0	1,330.00				Average	
		point819	819	37,156,924.0	12,693,146.0	1,350.00				Average	
		point820	820	37,156,556.0	12,693,851.0	1,370.00				Average	
		point451	451	37,156,192.0	12,694,555.0	1,390.00					
Roadway144	50.0	point453	453	37,159,480.0	12,690,361.0	1,380.00				Average	
		point460	460	37,159,492.0	12,692,251.0	1,320.00					
I5 onramp loop at Grapevine	50.0	point546	546	37,149,792.0	12,697,111.0	1,365.00				Average	
		point539	539	37,149,800.0	12,696,905.0	1,372.00				Average	
		point540	540	37,149,676.0	12,696,805.0	1,375.00				Average	
		point541	541	37,149,588.0	12,696,811.0	1,375.00					
I5 NB onramp slip at Grapevine	50.0	point572	572	37,149,776.0	12,697,299.0	1,365.00				Average	
		point564	564	37,149,692.0	12,697,604.0	1,360.00				Average	
		point565	565	37,149,652.0	12,697,751.0	1,355.00				Average	
		point566	566	37,149,540.0	12,697,890.0	1,350.00				Average	
		point567	567	37,149,400.0	12,698,053.0	1,345.00				Average	
		point568	568	37,149,252.0	12,698,201.0	1,345.00				Average	
		point569	569	37,149,128.0	12,698,373.0	1,340.00					
I5 SB loop onramp at Grapevine	50.0	point575	575	37,148,772.0	12,697,326.0	1,360.00				Average	
		point577	577	37,148,796.0	12,697,431.0	1,360.00				Average	
		point578	578	37,148,868.0	12,697,492.0	1,355.00				Average	
		point579	579	37,148,964.0	12,697,503.0	1,355.00				Average	

		point580	580	37,149,064.0	12,697,442.0	1,355.00					
I5 SB onramp slip at Grapevine	50.0	point586	586	37,148,776.0	12,696,932.0	1,365.00				Average	
		point582	582	37,148,864.0	12,696,588.0	1,370.00				Average	
		point583	583	37,148,948.0	12,696,443.0	1,375.00				Average	
		point584	584	37,149,032.0	12,696,349.0	1,380.00				Average	
		point559	559	37,149,176.0	12,696,234.0	1,385.00				Average	
		point561	561	37,149,284.0	12,696,151.0	1,390.00				Average	
		point562	562	37,149,440.0	12,695,973.0	1,395.00					
I5 SB offramp at Grapevine	50.0	point598	598	37,148,844.0	12,698,353.0	1,340.00				Average	
		point592	592	37,148,800.0	12,697,975.0	1,345.00				Average	
		point593	593	37,148,724.0	12,697,758.0	1,350.00				Average	
		point594	594	37,148,672.0	12,697,514.0	1,355.00				Average	
		point595	595	37,148,680.0	12,697,330.0	1,360.00				Average	
		point596	596	37,148,724.0	12,697,036.0	1,365.00					
Street R Del Oro Dr to St T	50.0	point624	624	37,150,820.0	12,704,506.0	1,200.00				Average	
		point626	626	37,152,532.0	12,704,507.0	1,190.00				Average	
		point627	627	37,155,008.0	12,704,513.0	1,170.00				Average	
		point628	628	37,157,168.0	12,704,524.0	1,150.00					
Roadway185	50.0	point636	636	37,154,976.0	12,704,560.0	1,170.00				Average	
		point630	630	37,154,976.0	12,706,123.0	1,150.00					
Street T North	50.0	point638	638	37,152,536.0	12,704,550.0	1,190.00				Average	
		point632	632	37,152,536.0	12,706,162.0	1,170.00					
Roadway191	50.0	point640	640	37,154,984.0	12,701,055.0	1,250.00				Average	
		point642	642	37,154,976.0	12,702,935.0	1,210.00					
Street D Del Oro Dr to St S	75.0	point651	651	37,152,116.0	12,702,347.0	1,250.00				Average	
		point641	641	37,152,532.0	12,702,942.0	1,230.00					
Street S	50.0	point653	653	37,156,208.0	12,702,970.0	1,200.00				Average	
		point646	646	37,154,980.0	12,702,977.0	1,210.00				Average	
		point647	647	37,152,544.0	12,702,983.0	1,230.00					
Roadway194	50.0	point665	665	37,152,092.0	12,702,080.0	1,250.00				Average	
		point663	663	37,152,244.0	12,701,807.0	1,250.00				Average	
		point655	655	37,154,880.0	12,700,845.0	1,220.00					
Roadway200	50.0	point321	321	37,151,068.0	12,700,676.0	1,290.00				Average	
		point667	667	37,149,788.0	12,701,117.0	1,300.00				Average	
		point669	669	37,149,608.0	12,701,075.0	1,300.00				Average	
		point670	670	37,149,460.0	12,700,959.0	1,300.00				Average	
		point671	671	37,149,344.0	12,700,802.0	1,310.00				Average	
		point672	672	37,149,332.0	12,700,639.0	1,320.00				Average	
		point673	673	37,149,364.0	12,700,383.0	1,330.00				Average	
		point674	674	37,149,764.0	12,698,759.0	1,350.00				Average	

		point675	675	37,150,104.0	12,697,399.0	1,365.00					
Street H	50.0	point695	695	37,146,756.0	12,695,940.0	1,500.00				Average	
		point696	696	37,145,148.0	12,695,505.0	1,560.00					
Street Q	75.0	point140	140	37,151,924.0	12,691,321.0	1,500.00				Average	
		point142	142	37,151,980.0	12,690,999.0	1,510.00				Average	
		point143	143	37,151,924.0	12,690,788.0	1,520.00				Average	
		point144	144	37,151,780.0	12,690,650.0	1,530.00				Average	
		point145	145	37,151,652.0	12,690,596.0	1,540.00				Average	
		point146	146	37,151,216.0	12,690,473.0	1,550.00					
Street C S of St B	75.0	point136	136	37,148,712.0	12,693,732.0	1,560.00				Average	
		point833	833	37,148,896.0	12,692,984.0	1,560.00				Average	
		point784	784	37,149,080.0	12,692,235.0	1,560.00					
Edmnstn Pumpg Plnt Rd St D to St J	75.0	point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
		point159	159	37,153,608.0	12,690,806.0	1,480.00					
Roadway57	50.0	point183	183	37,161,744.0	12,692,347.0	1,310.00				Average	
		point177	177	37,161,356.0	12,693,207.0	1,380.00				Average	
		point178	178	37,161,032.0	12,694,020.0	1,350.00				Average	
		point179	179	37,160,672.0	12,694,408.0	1,360.00				Average	
		point180	180	37,160,364.0	12,694,591.0	1,370.00				Average	
		point181	181	37,160,028.0	12,694,633.0	1,370.00				Average	
		point184	184	37,159,676.0	12,694,584.0	1,380.00				Average	
		point186	186	37,159,320.0	12,694,381.0	1,390.00				Average	
		point187	187	37,158,684.0	12,693,904.0	1,395.00					
Roadway55	50.0	point699	699	37,161,912.0	12,689,916.0	1,350.00				Average	
		point170	170	37,161,908.0	12,692,023.0	1,320.00				Average	
		point171	171	37,161,772.0	12,692,324.0	1,310.00					
I5 NB offramp at Grapevine	50.0	point573	573	37,149,716.0	12,696,036.0	1,400.00				Average	
		point560	560	37,149,772.0	12,696,316.0	1,390.00				Average	
		point534	534	37,149,896.0	12,696,597.0	1,380.00				Average	
		point536	536	37,149,868.0	12,696,942.0	1,370.00				Average	
		point537	537	37,149,808.0	12,697,186.0	1,365.00					
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average	
		point363	363	37,147,644.0	12,715,708.0	980.00				Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00					
Del Oro Dr St R to St T	100.0	point637	637	37,151,908.0	12,702,410.0	1,250.00				Average	
		point915	915	37,151,336.0	12,703,472.0	1,225.00				Average	
		point366	366	37,150,768.0	12,704,535.0	1,200.00					
Roadway95	50.0	point704	704	37,152,968.0	12,697,460.0	1,300.00				Average	

		point306	306	37,153,524.0	12,698,744.0	1,300.00				Average	
		point307	307	37,153,744.0	12,699,246.0	1,290.00				Average	
		point299	299	37,153,736.0	12,699,545.0	1,280.00				Average	
		point310	310	37,153,620.0	12,699,708.0	1,280.00				Average	
		point312	312	37,153,516.0	12,699,830.0	1,270.00				Average	
		point313	313	37,151,212.0	12,700,629.0	1,290.00					
Street A St L to St N	75.0	point152	152	37,155,080.0	12,696,800.0	1,290.00				Average	
		point164	164	37,155,692.0	12,696,793.0	1,290.00				Average	
		point952	952	37,156,396.0	12,696,796.0	1,290.00				Average	
		point165	165	37,157,100.0	12,696,800.0	1,290.00					
Street Q West	75.0	point707	707	37,150,732.0	12,690,361.0	1,535.00				Average	
		point148	148	37,150,260.0	12,690,234.0	1,540.00				Average	
		point149	149	37,150,072.0	12,690,213.0	1,550.00				Average	
		point141	141	37,149,892.0	12,690,204.0	1,560.00				Average	
		point150	150	37,149,628.0	12,690,212.0	1,560.00				Average	
		point151	151	37,149,292.0	12,690,351.0	1,560.00					
Street E	50.0	point709	709	37,147,004.0	12,692,270.0	1,560.00				Average	
		point253	253	37,146,232.0	12,692,976.0	1,560.00				Average	
		point254	254	37,145,344.0	12,693,747.0	1,560.00				Average	
		point255	255	37,145,136.0	12,694,097.0	1,550.00				Average	
		point256	256	37,145,076.0	12,694,375.0	1,540.00				Average	
		point257	257	37,145,072.0	12,695,368.0	1,520.00				Average	
		point249	249	37,145,088.0	12,697,058.0	1,510.00				Average	
		point258	258	37,145,428.0	12,697,976.0	1,500.00				Average	
		point260	260	37,146,120.0	12,699,868.0	1,370.00				Average	
		point261	261	37,146,460.0	12,700,769.0	1,315.00					
Roadway89	50.0	point711	711	37,147,976.0	12,691,492.0	1,560.00				Average	
		point293	293	37,148,256.0	12,691,783.0	1,560.00				Average	
		point294	294	37,148,124.0	12,692,384.0	1,560.00				Average	
		point295	295	37,147,656.0	12,692,831.0	1,560.00					
Roadway88	50.0	point698	698	37,145,724.0	12,690,807.0	1,560.00				Average	
		point287	287	37,144,948.0	12,691,543.0	1,560.00				Average	
		point289	289	37,146,172.0	12,692,916.0	1,560.00					
Street B East	50.0	point133	133	37,156,272.0	12,694,676.0	1,390.00				Average	
		point129	129	37,156,504.0	12,694,689.0	1,390.00					
I-5 SB - N of Laval Rd	60.0	point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
		point864	864	37,145,472.0	12,712,280.0	1,165.00				Average	
		point865	865	37,145,752.0	12,711,152.0	1,166.67				Average	
		point866	866	37,146,032.0	12,710,024.0	1,168.33				Average	
		point348	348	37,146,312.0	12,708,896.0	1,170.00					

Roadway195	50.0	point716	716	37,154,972.0	12,703,002.0	1,210.00				Average	
		point644	644	37,154,980.0	12,704,445.0	1,170.00					
Street D N of St A	75.0	point91	91	37,151,044.0	12,697,561.0	1,360.00				Average	
		point734	734	37,151,048.0	12,698,972.0	1,325.00				Average	
		point860	860	37,151,048.0	12,699,442.0	1,313.33				Average	
		point861	861	37,151,048.0	12,699,912.0	1,301.67				Average	
		point61	61	37,151,048.0	12,700,382.0	1,290.00					
Street J N of Edmnstn PumpPlnt Rd	75.0	point210	210	37,153,660.0	12,691,070.0	1,480.00				Average	
		point877	877	37,153,816.0	12,691,826.0	1,462.50				Average	
		point789	789	37,153,976.0	12,692,582.0	1,445.00					
Street M	50.0	point172	172	37,161,720.0	12,692,324.0	1,310.00				Average	
		point700	700	37,155,816.0	12,692,332.0	1,350.00					
Dennis McCarthy Dr	50.0	point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	50.0	point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00					
Street T St R to St S	50.0	point747	747	37,152,544.0	12,702,983.0	1,230.00				Average	
		point922	922	37,152,540.0	12,703,728.0	1,210.00				Average	
		point648	648	37,152,536.0	12,704,474.0	1,190.00					
Roadway54-2	50.0	point749	749	37,155,816.0	12,692,332.0	1,350.00				Average	
		point175	175	37,155,832.0	12,690,680.0	1,420.00					
Street B St L to St N	50.0	point750	750	37,156,504.0	12,694,689.0	1,390.00				Average	
		point960	960	37,157,168.0	12,695,050.0	1,385.00				Average	
		point124	124	37,157,832.0	12,695,411.0	1,380.00					
Street N	50.0	point449	449	37,157,100.0	12,696,755.0	1,290.00				Average	
		point751	751	37,157,836.0	12,695,412.0	1,380.00				Average	
		point125	125	37,158,280.0	12,694,630.0	1,390.00				Average	
		point714	714	37,158,864.0	12,693,536.0	1,400.00				Average	
		point713	713	37,158,988.0	12,693,352.0	1,400.00				Average	
		point134	134	37,159,220.0	12,693,242.0	1,390.00				Average	
		point135	135	37,161,348.0	12,693,221.0	1,380.00					
Street F South	50.0	point271	271	37,146,260.0	12,693,006.0	1,560.00				Average	
		point266	266	37,146,332.0	12,693,095.0	1,560.00				Average	
		point267	267	37,146,444.0	12,693,392.0	1,560.00				Average	
		point259	259	37,147,064.0	12,695,092.0	1,560.00				Average	

		point689	689	37,146,844.0	12,695,864.0	1,560.00					
Street C S of St A	75.0	point753	753	37,148,000.0	12,696,798.0	1,370.00				Average	
		point738	738	37,148,160.0	12,696,092.0	1,417.50				Average	
		point830	830	37,148,240.0	12,695,739.0	1,441.25				Average	
		point739	739	37,148,316.0	12,695,386.0	1,465.00				Average	
		point787	787	37,148,392.0	12,695,032.0	1,488.75					
Street B South	50.0	point754	754	37,145,208.0	12,690,108.0	1,560.00				Average	
		point239	239	37,145,668.0	12,689,776.0	1,560.00				Average	
		point240	240	37,146,372.0	12,689,498.0	1,560.00				Average	
		point241	241	37,146,852.0	12,689,433.0	1,560.00				Average	
		point242	242	37,147,476.0	12,689,479.0	1,560.00				Average	
		point245	245	37,148,084.0	12,689,588.0	1,560.00				Average	
		point246	246	37,148,564.0	12,689,832.0	1,560.00				Average	
		point247	247	37,148,920.0	12,690,085.0	1,560.00				Average	
		point234	234	37,149,220.0	12,690,308.0	1,560.00					
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00					
Laval Rd E-2	50.0	point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	
		point342	342	37,147,568.0	12,709,945.0	1,120.00					
Del Oro Dr-North	100.0	point759	759	37,150,768.0	12,704,535.0	1,200.00				Average	
		point367	367	37,149,904.0	12,706,125.0	1,150.00				Average	
		point368	368	37,149,640.0	12,706,611.0	1,130.00				Average	
		point369	369	37,149,592.0	12,707,300.0	1,115.00				Average	
		point370	370	37,149,612.0	12,708,979.0	1,080.00				Average	
		point362	362	37,149,612.0	12,711,400.0	1,040.00					
Street D S of Del Oro Dr	75.0	point760	760	37,151,048.0	12,700,382.0	1,290.00				Average	
		point878	878	37,151,352.0	12,701,170.0	1,267.50				Average	
		point62	62	37,151,660.0	12,701,957.0	1,245.00				Average	
		point63	63	37,151,796.0	12,702,088.0	1,250.00					
Street A St I St J	75.0	point761	761	37,152,936.0	12,697,391.0	1,300.00				Average	
		point959	959	37,153,600.0	12,697,106.0	1,295.00				Average	
		point86	86	37,154,264.0	12,696,822.0	1,290.00					
Street A St J to St L	75.0	point762	762	37,154,264.0	12,696,822.0	1,290.00				Average	
		point87	87	37,154,808.0	12,696,823.0	1,290.00					
Street I-2	50.0	point764	764	37,152,676.0	12,696,191.0	1,390.00				Average	

		point763	763	37,152,680.0	12,696,791.0	1,350.00				Average	
		point875	875	37,152,716.0	12,696,882.0	1,341.67				Average	
		point876	876	37,152,756.0	12,696,973.0	1,333.33				Average	
		point874	874	37,152,792.0	12,697,064.0	1,325.00				Average	
		point304	304	37,152,900.0	12,697,336.0	1,300.00					
Street J S of St A	75.0	point765	765	37,154,280.0	12,695,871.0	1,310.00				Average	
		point216	216	37,154,296.0	12,696,123.0	1,300.00				Average	
		point217	217	37,154,280.0	12,696,758.0	1,290.00					
Street B-2	50.0	point766	766	37,151,944.0	12,694,702.0	1,410.00				Average	
		point776	776	37,152,256.0	12,694,700.0	1,409.00					
Street B St J to St L	75.0	point768	768	37,155,092.0	12,694,679.0	1,400.00				Average	
		point130	130	37,155,484.0	12,694,678.0	1,395.00				Average	
		point131	131	37,155,964.0	12,694,656.0	1,390.00					
Street B-2 St J to St L	75.0	point775	775	37,154,252.0	12,694,685.0	1,402.67				Average	
		point121	121	37,155,092.0	12,694,679.0	1,400.00					
Street B St I to St J	75.0	point777	777	37,152,256.0	12,694,700.0	1,409.00				Average	
		point769	769	37,152,572.0	12,694,697.0	1,408.00				Average	
		point895	895	37,153,308.0	12,694,692.0	1,405.67				Average	
		point773	773	37,154,044.0	12,694,687.0	1,403.33				Average	
		point774	774	37,154,252.0	12,694,685.0	1,402.67					
Edmnstn Pumping Plnt Rd- St J to St K	75.0	point779	779	37,153,608.0	12,690,806.0	1,480.00				Average	
		point160	130	37,154,252.0	12,690,716.0	1,450.00				Average	
		point894	894	37,155,040.0	12,690,684.0	1,435.00				Average	
		point161	161	37,155,832.0	12,690,652.0	1,420.00					
Edmonstn Pumping Plant Rd E of St K	75.0	point780	780	37,155,832.0	12,690,652.0	1,420.00				Average	
		point162	162	37,157,604.0	12,690,592.0	1,400.00				Average	
		point737	737	37,159,760.0	12,690,254.0	1,375.00				Average	
		point163	163	37,161,912.0	12,689,916.0	1,350.00					
Street D N of Edmnstn Pmp Plnt Rd	75.0	point783	783	37,151,512.0	12,692,890.0	1,460.00				Average	
		point841	841	37,151,716.0	12,692,119.0	1,480.00				Average	
		point111	111	37,151,920.0	12,691,348.0	1,500.00					
Street C N of St E	75.0	point786	786	37,149,080.0	12,692,235.0	1,560.00				Average	
		point879	879	37,149,264.0	12,691,486.0	1,560.00				Average	
		point137	137	37,149,444.0	12,690,738.0	1,560.00				Average	
		point138	138	37,149,424.0	12,690,593.0	1,560.00				Average	
		point139	139	37,149,320.0	12,690,385.0	1,560.00					
Street C N of St B	75.0	point788	788	37,148,392.0	12,695,032.0	1,488.75				Average	
		point740	740	37,148,472.0	12,694,679.0	1,512.50				Average	
		point71	71	37,148,632.0	12,693,973.0	1,560.00					
Street J S of St B	75.0	point790	790	37,153,976.0	12,692,582.0	1,445.00				Average	

		point211	211	37,154,296.0	12,694,093.0	1,410.00				Average	
		point212	212	37,154,292.0	12,694,634.0	1,405.00					
Street C St G to Tejon Ind Dr	75.0	point690	690	37,148,000.0	12,696,798.0	1,370.00				Average	
		point691	691	37,147,860.0	12,697,313.0	1,360.00				Average	
		point692	692	37,147,976.0	12,698,532.0	1,360.00				Average	
		point829	829	37,147,824.0	12,699,048.0	1,360.00				Average	
		point693	693	37,147,668.0	12,699,564.0	1,360.00				Average	
		point694	694	37,147,424.0	12,700,259.0	1,350.00				Average	
		point102	102	37,147,412.0	12,700,267.0	1,340.00				Average	
		point104	104	37,147,228.0	12,700,470.0	1,330.00				Average	
		point105	105	37,146,940.0	12,700,631.0	1,320.00				Average	
		point793	793	37,146,336.0	12,700,866.0	1,316.67					
Tejon Industrial Dr-2	75.0	point795	795	37,146,336.0	12,700,866.0	1,316.67				Average	
		point794	794	37,145,728.0	12,701,102.0	1,313.33				Average	
		point745	745	37,145,124.0	12,701,337.0	1,310.00				Average	
		point107	107	37,144,752.0	12,701,478.0	1,300.00				Average	
		point112	112	37,144,376.0	12,701,749.0	1,280.00				Average	
		point109	109	37,144,088.0	12,702,152.0	1,270.00				Average	
		point429	429	37,144,124.0	12,703,527.0	1,260.00				Average	
		point411	411	37,144,260.0	12,703,950.0	1,250.00				Average	
		point413	413	37,144,528.0	12,707,155.0	1,150.00					
I-5 NB-N. of Laval Rd	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17					
I-5 NB - Grapevine to Laval Rd	60.0	point798	798	37,149,448.0	12,696,794.0	1,374.66				Average	
		point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
		point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
		point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
		point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
		point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
		point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	
		point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	

		point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 NB - S of Project	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
		point791	791	37,150,956.0	12,690,697.0	1,525.57				Average	
		point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
		point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
		point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
		point719	719	37,149,448.0	12,696,794.0	1,374.66					
I-5 SB-S of Project	60.0	point799	799	37,149,264.0	12,697,040.0	1,363.17				Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	
		point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	
		point842	842	37,150,568.0	12,691,750.0	1,489.48				Average	
		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	
		point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50					
Roadway305	50.0	point843	843	37,144,692.0	12,711,333.0	1,166.00				Average	
		point844	844	37,144,648.0	12,711,318.0	1,166.00				Average	
		point845	845	37,144,600.0	12,711,305.0	1,166.00				Average	
		point846	846	37,144,552.0	12,711,290.0	1,166.00				Average	
		point847	847	37,144,504.0	12,711,276.0	1,166.00				Average	
		point848	848	37,144,456.0	12,711,262.0	1,166.00				Average	
		point849	849	37,144,404.0	12,711,248.0	1,166.00				Average	
		point850	850	37,144,356.0	12,711,234.0	1,166.00				Average	

		point851	851	37,144,308.0	12,711,219.0	1,166.00				Average	
		point852	852	37,144,260.0	12,711,205.0	1,166.00				Average	
		point853	853	37,144,212.0	12,711,191.0	1,166.00					
Street D S of St A	75.0	point929	929	37,151,052.0	12,695,944.0	1,390.00				Average	
		point862	862	37,151,048.0	12,696,574.0	1,375.00				Average	
		point59	59	37,151,044.0	12,697,205.0	1,360.00					
Roadway329	50.0	point983	983	37,144,068.0	12,711,216.0	1,490.00				Average	
		point984	984	37,144,020.0	12,711,201.0	1,490.00				Average	
		point985	985	37,143,972.0	12,711,187.0	1,490.00				Average	
		point986	986	37,143,924.0	12,711,173.0	1,490.00				Average	
		point987	987	37,143,872.0	12,711,159.0	1,490.00				Average	
		point988	988	37,143,824.0	12,711,145.0	1,490.00				Average	
		point989	989	37,143,776.0	12,711,130.0	1,490.00				Average	
		point990	990	37,143,728.0	12,711,116.0	1,490.00				Average	
		point991	991	37,143,680.0	12,711,102.0	1,490.00					

Dudek							30 November							
M Greene							TNM 2.5							
INPUT: TRAFFIC FOR LAeq1h Percentages														
PROJECT/CONTRACT:	**P/N 7667**													
RUN:	**Grapevine Project - Cumulative w Proj**													
Roadway	**Points**													
Name	**Name**	**No.**	**Segment**											
			Total	**Autos**		**MTrucks**		**HTrucks**		**Buses**		**Motorcycles**		
			Volume	**P**	**S**	**P**	**S**	**P**	**S**	**P**	**S**	**P**	**S**	
			veh/hr	%	mph	%	mph	%	mph	%	mph	%	mph	
Street B I-5 to St C	point55	55	790	76	30	6	30	18	30	0	0	0	0	
	point937	937	790	76	30	6	30	18	30	0	0	0	0	
	point938	938	790	76	30	6	30	18	30	0	0	0	0	
	point57	57												
Street D N of St B	point66	66	920	76	30	6	30	18	30	0	0	0	0	
	point930	930	920	76	30	6	30	18	30	0	0	0	0	
	point778	778												
Street L St A to St B	point73	73	900	96	30	3	30	1	30	0	0	0	0	
	point828	828	900	96	30	3	30	1	30	0	0	0	0	
	point74	74												
Street A I-5 to St C	point81	81	0	0	0	0	0	0	0	0	0	0	0	
	point79	79												
Street A I-5 to St D	point82	82	0	0	0	0	0	0	0	0	0	0	0	
	point76	76	0	0	0	0	0	0	0	0	0	0	0	
	point77	77												
Street A St D to St I	point84	84	3550	76	30	6	30	18	30	0	0	0	0	
	point945	945	3550	76	30	6	30	18	30	0	0	0	0	
	point85	85												
Street D S of St B	point114	114	450	76	30	6	30	18	30	0	0	0	0	
	point840	840	450	76	30	6	30	18	30	0	0	0	0	
	point781	781												
Street B I-5 to St A	point116	116	790	76	30	6	30	18	30	0	0	0	0	
	point118	118												
Street B St D to St I	point127	127	900	76	30	6	30	18	30	0	0	0	0	
	point120	120												

Edmonston Pumping Plant Rd-4	point195	195	0	0	0	0	0	0	0	0	0	0	0
	point189	189	0	0	0	0	0	0	0	0	0	0	0
	point190	190	0	0	0	0	0	0	0	0	0	0	0
	point191	191	0	0	0	0	0	0	0	0	0	0	0
	point192	192	0	0	0	0	0	0	0	0	0	0	0
	point193	193											
Street M East	point197	197	0	0	0	0	0	0	0	0	0	0	0
	point199	199	0	0	0	0	0	0	0	0	0	0	0
	point200	200	0	0	0	0	0	0	0	0	0	0	0
	point201	201											
Street K	point208	208	0	0	0	0	0	0	0	0	0	0	0
	point203	203	0	0	0	0	0	0	0	0	0	0	0
	point204	204											
Street J St A to St B	point213	213	800	76	25	6	25	18	25	0	0	0	0
	point863	863	800	76	25	6	25	18	25	0	0	0	0
	point215	215											
Roadway70	point221	221	0	0	0	0	0	0	0	0	0	0	0
	point219	219	0	0	0	0	0	0	0	0	0	0	0
	point214	214	0	0	0	0	0	0	0	0	0	0	0
	point222	222	0	0	0	0	0	0	0	0	0	0	0
	point224	224	0	0	0	0	0	0	0	0	0	0	0
	point225	225	0	0	0	0	0	0	0	0	0	0	0
	point226	226	0	0	0	0	0	0	0	0	0	0	0
	point227	227	0	0	0	0	0	0	0	0	0	0	0
	point228	228	0	0	0	0	0	0	0	0	0	0	0
	point229	229	0	0	0	0	0	0	0	0	0	0	0
	point230	230	0	0	0	0	0	0	0	0	0	0	0
	point231	231	0	0	0	0	0	0	0	0	0	0	0
	point232	232	0	0	0	0	0	0	0	0	0	0	0
	point223	223											
Roadway72	point233	233	0	0	0	0	0	0	0	0	0	0	0
	point235	235											
Street B - St C to St E	point244	244	980	96	25	3	25	1	25	0	0	0	0
	point237	237	980	96	25	3	25	1	25	0	0	0	0
	point238	238											
Street G	point269	269	0	0	0	0	0	0	0	0	0	0	0
	point263	263	0	0	0	0	0	0	0	0	0	0	0

	point741	741	0	0	0	0	0	0	0	0	0	0	0
	point742	742	0	0	0	0	0	0	0	0	0	0	0
	point264	264											
Street E St C to St B	point248	248	410	96	25	3	25	1	25	0	0	0	0
	point881	881	410	96	25	3	25	1	25	0	0	0	0
	point250	250	410	96	25	3	25	1	25	0	0	0	0
	point251	251											
Street H East	point272	272	0	0	0	0	0	0	0	0	0	0	0
	point274	274	0	0	0	0	0	0	0	0	0	0	0
	point275	275											
Roadway8	point283	283	0	0	0	0	0	0	0	0	0	0	0
	point279	279											
Roadway188	point285	285	0	0	0	0	0	0	0	0	0	0	0
	point281	281											
Roadway 89	point297	297	0	0	0	0	0	0	0	0	0	0	0
	point291	291											
Roadway91	point298	298	0	0	0	0	0	0	0	0	0	0	0
	point300	300											
Roadway97	point324	324	0	0	0	0	0	0	0	0	0	0	0
	point326	326	0	0	0	0	0	0	0	0	0	0	0
	point327	327											
Roadway99	point335	335	0	0	0	0	0	0	0	0	0	0	0
	point329	329											
Roadway98	point337	337	0	0	0	0	0	0	0	0	0	0	0
	point331	331											
Roadway 92	point338	338	0	0	0	0	0	0	0	0	0	0	0
	point333	333											
Street I St A to St B	point309	309	80	96	25	3	25	1	25	0	0	0	0
	point873	873	80	96	25	3	25	1	25	0	0	0	0
	point302	302											
Laval Rd E	point340	340	1450	76	45	6	45	18	45	0	0	0	0
	point354	354	1450	76	45	6	45	18	45	0	0	0	0
	point355	355	1450	76	45	6	45	18	45	0	0	0	0
	point356	356	1450	76	45	6	45	18	45	0	0	0	0
	point357	357	1450	76	45	6	45	18	45	0	0	0	0
	point358	358											
I5 NB offramp at Laval Rd	point375	375	110	76	50	6	50	18	50	0	0	0	0

	point376	376											
I5 SB offramp at Laval	point387	387	490	76	50	6	50	18	50	0	0	0	0
	point388	388	490	76	50	6	50	18	50	0	0	0	0
	point389	389	490	76	50	6	50	18	50	0	0	0	0
	point390	390											
I5 NB onramp at Laval	point398	398	860	76	50	6	50	18	50	0	0	0	0
	point378	378	860	76	50	6	50	18	50	0	0	0	0
	point379	379	860	76	50	6	50	18	50	0	0	0	0
	point380	380											
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0	0
	point400	400											
I5 SB onramp at Laval	point422	422	650	76	50	6	50	18	50	0	0	0	0
	point403	403	650	76	50	6	50	18	50	0	0	0	0
	point404	404	650	76	50	6	50	18	50	0	0	0	0
	point405	405	650	76	50	6	50	18	50	0	0	0	0
	point406	406											
Street F Central	point428	428	0	0	0	0	0	0	0	0	0	0	0
	point430	430	0	0	0	0	0	0	0	0	0	0	0
	point431	431											
Roadway125	point441	441	0	0	0	0	0	0	0	0	0	0	0
	point436	436											
Street F	point444	444	0	0	0	0	0	0	0	0	0	0	0
	point433	433	0	0	0	0	0	0	0	0	0	0	0
	point434	434											
Roadway141	point445	445	0	0	0	0	0	0	0	0	0	0	0
	point447	447											
Street L St B to St M	point458	458	1140	96	25	3	25	1	25	0	0	0	0
	point819	819	1140	96	25	3	25	1	25	0	0	0	0
	point820	820	1140	96	25	3	25	1	25	0	0	0	0
	point451	451											
Roadway144	point453	453	0	0	0	0	0	0	0	0	0	0	0
	point460	460											
I5 onramp loop at Grapevine	point546	546	460	96	50	3	50	1	50	0	0	0	0
	point539	539	460	96	50	3	50	1	50	0	0	0	0
	point540	540	460	96	50	3	50	1	50	0	0	0	0
	point541	541											

I5 NB onramp slip at Grapevine	point572	572	510	76	50	6	50	18	50	0	0	0	0
	point564	564	510	76	50	6	50	18	50	0	0	0	0
	point565	565	510	76	50	6	50	18	50	0	0	0	0
	point566	566	510	76	50	6	50	18	50	0	0	0	0
	point567	567	510	76	50	6	50	18	50	0	0	0	0
	point568	568	510	76	50	6	50	18	50	0	0	0	0
	point569	569											
I5 SB loop onramp at Grapevine	point575	575	650	76	50	6	50	18	50	0	0	0	0
	point577	577	650	76	50	6	50	18	50	0	0	0	0
	point578	578	650	76	50	6	50	18	50	0	0	0	0
	point579	579	650	76	50	6	50	18	50	0	0	0	0
	point580	580											
I5 SB onramp slip at Grapevine	point586	586	360	76	50	6	50	18	50	0	0	0	0
	point582	582	360	76	50	6	50	18	50	0	0	0	0
	point583	583	360	76	50	6	50	18	50	0	0	0	0
	point584	584	360	76	50	6	50	18	50	0	0	0	0
	point559	559	360	76	50	6	50	18	50	0	0	0	0
	point561	561	360	76	50	6	50	18	50	0	0	0	0
	point562	562											
I5 SB offramp at Grapevine	point598	598	1370	76	50	6	50	18	50	0	0	0	0
	point592	592	1370	76	50	6	50	18	50	0	0	0	0
	point593	593	1370	76	50	6	50	18	50	0	0	0	0
	point594	594	1370	76	50	6	50	18	50	0	0	0	0
	point595	595	1370	76	50	6	50	18	50	0	0	0	0
	point596	596											
Street R Del Oro Dr to St T	point624	624	970	76	25	6	25	18	25	0	0	0	0
	point626	626	970	76	25	6	25	18	25	0	0	0	0
	point627	627	970	76	25	6	25	18	25	0	0	0	0
	point628	628											
Roadway185	point636	636	0	0	0	0	0	0	0	0	0	0	0
	point630	630											
Street T North	point638	638	0	0	0	0	0	0	0	0	0	0	0
	point632	632											
Roadway191	point640	640	0	0	0	0	0	0	0	0	0	0	0
	point642	642											
Street D Del Oro Dr to St S	point651	651	550	76	25	6	25	18	25	0	0	0	0
	point641	641											

Street S	point653	653	0	0	0	0	0	0	0	0	0	0	0
	point646	646	0	0	0	0	0	0	0	0	0	0	0
	point647	647											
Roadway194	point665	665	0	0	0	0	0	0	0	0	0	0	0
	point663	663	0	0	0	0	0	0	0	0	0	0	0
	point655	655											
Roadway200	point321	321	0	0	0	0	0	0	0	0	0	0	0
	point667	667	0	0	0	0	0	0	0	0	0	0	0
	point669	669	0	0	0	0	0	0	0	0	0	0	0
	point670	670	0	0	0	0	0	0	0	0	0	0	0
	point671	671	0	0	0	0	0	0	0	0	0	0	0
	point672	672	0	0	0	0	0	0	0	0	0	0	0
	point673	673	0	0	0	0	0	0	0	0	0	0	0
	point674	674	0	0	0	0	0	0	0	0	0	0	0
	point675	675											
Street H	point695	695	0	0	0	0	0	0	0	0	0	0	0
	point696	696											
Street Q	point140	140	140	76	30	6	30	18	30	0	0	0	0
	point142	142	140	76	30	6	30	18	30	0	0	0	0
	point143	143	140	76	30	6	30	18	30	0	0	0	0
	point144	144	140	76	30	6	30	18	30	0	0	0	0
	point145	145	140	76	30	6	30	18	30	0	0	0	0
	point146	146											
Street C S of St B	point136	136	860	76	30	6	30	18	30	0	0	0	0
	point833	833	860	76	30	6	30	18	30	0	0	0	0
	point784	784											
Edmnstn Pumpg Plnt Rd St D to St J	point167	167	230	76	30	6	30	18	30	0	0	0	0
	point159	159											
Roadway57	point183	183	0	0	0	0	0	0	0	0	0	0	0
	point177	177	0	0	0	0	0	0	0	0	0	0	0
	point178	178	0	0	0	0	0	0	0	0	0	0	0
	point179	179	0	0	0	0	0	0	0	0	0	0	0
	point180	180	0	0	0	0	0	0	0	0	0	0	0
	point181	181	0	0	0	0	0	0	0	0	0	0	0
	point184	184	0	0	0	0	0	0	0	0	0	0	0
	point186	186	0	0	0	0	0	0	0	0	0	0	0
	point187	187											

Roadway55	point699	699	0	0	0	0	0	0	0	0	0	0	0
	point170	170	0	0	0	0	0	0	0	0	0	0	0
	point171	171											
I5 NB offramp at Grapevine	point573	573	1070	76	50	6	50	18	50	0	0	0	0
	point560	560	1070	76	50	6	50	18	50	0	0	0	0
	point534	534	1070	76	50	6	50	18	50	0	0	0	0
	point536	536	1070	76	50	6	50	18	50	0	0	0	0
	point537	537											
Wheeler Ridge Rd	point364	364	880	76	45	6	45	18	45	0	0	0	0
	point363	363	880	76	45	6	45	18	45	0	0	0	0
	point361	361	880	76	45	6	45	18	45	0	0	0	0
	point374	374	880	76	45	6	45	18	45	0	0	0	0
	point382	382											
Del Oro Dr St R to St T	point637	637	2690	76	30	6	30	18	30	0	0	0	0
	point915	915	2690	76	30	6	30	18	30	0	0	0	0
	point366	366											
Roadway95	point704	704	0	0	0	0	0	0	0	0	0	0	0
	point306	306	0	0	0	0	0	0	0	0	0	0	0
	point307	307	0	0	0	0	0	0	0	0	0	0	0
	point299	299	0	0	0	0	0	0	0	0	0	0	0
	point310	310	0	0	0	0	0	0	0	0	0	0	0
	point312	312	0	0	0	0	0	0	0	0	0	0	0
	point313	313											
Street A St L to St N	point152	152	1050	76	25	6	25	18	25	0	0	0	0
	point164	164	1050	76	25	6	25	18	25	0	0	0	0
	point952	952	1050	76	25	6	25	18	25	0	0	0	0
	point165	165											
Street Q West	point707	707	140	76	30	6	30	18	30	0	0	0	0
	point148	148	140	76	30	6	30	18	30	0	0	0	0
	point149	149	140	76	30	6	30	18	30	0	0	0	0
	point141	141	140	76	30	6	30	18	30	0	0	0	0
	point150	150	140	76	30	6	30	18	30	0	0	0	0
	point151	151											
Street E	point709	709	0	0	0	0	0	0	0	0	0	0	0
	point253	253	0	0	0	0	0	0	0	0	0	0	0
	point254	254	0	0	0	0	0	0	0	0	0	0	0
	point255	255	0	0	0	0	0	0	0	0	0	0	0

	point256	256	0	0	0	0	0	0	0	0	0	0	0
	point257	257	0	0	0	0	0	0	0	0	0	0	0
	point249	249	0	0	0	0	0	0	0	0	0	0	0
	point258	258	0	0	0	0	0	0	0	0	0	0	0
	point260	260	0	0	0	0	0	0	0	0	0	0	0
	point261	261											
Roadway89	point711	711	0	0	0	0	0	0	0	0	0	0	0
	point293	293	0	0	0	0	0	0	0	0	0	0	0
	point294	294	0	0	0	0	0	0	0	0	0	0	0
	point295	295											
Roadway88	point698	698	0	0	0	0	0	0	0	0	0	0	0
	point287	287	0	0	0	0	0	0	0	0	0	0	0
	point289	289											
Street B East	point133	133	0	0	0	0	0	0	0	0	0	0	0
	point129	129											
I-5 SB - N of Laval Rd	point351	351	6690	76	70	6	70	18	70	0	0	0	0
	point864	864	6690	76	70	6	70	18	70	0	0	0	0
	point865	865	6690	76	70	6	70	18	70	0	0	0	0
	point866	866	6690	76	70	6	70	18	70	0	0	0	0
	point348	348											
Roadway195	point716	716	0	0	0	0	0	0	0	0	0	0	0
	point644	644											
Street D N of St A	point91	91	2990	76	30	6	30	18	30	0	0	0	0
	point734	734	2990	76	30	6	30	18	30	0	0	0	0
	point860	860	2990	76	30	6	30	18	30	0	0	0	0
	point861	861	2990	76	30	6	30	18	30	0	0	0	0
	point61	61											
Street J N of Edmnstn PumpPlnt Rd	point210	210	230	76	25	6	25	18	25	0	0	0	0
	point877	877	230	76	25	6	25	18	25	0	0	0	0
	point789	789											
Street M	point172	172	0	0	0	0	0	0	0	0	0	0	0
	point700	700											
Dennis McCarthy Dr	point426	426	710	76	25	6	25	18	25	0	0	0	0
	point418	418	710	76	25	6	25	18	25	0	0	0	0
	point419	419	710	76	25	6	25	18	25	0	0	0	0
	point420	420	710	76	25	6	25	18	25	0	0	0	0
	point399	399	710	76	25	6	25	18	25	0	0	0	0

	point401	401											
Laval Rd	point743	743	0	76	30	6	30	18	30	0	0	0	0
	point424	424	0	76	30	6	30	18	30	0	0	0	0
	point416	416											
Street T St R to St S	point747	747	430	76	25	6	25	18	25	0	0	0	0
	point922	922	430	76	25	6	25	18	25	0	0	0	0
	point648	648											
Roadway54-2	point749	749	0	0	0	0	0	0	0	0	0	0	0
	point175	175											
Street B St L to St N	point750	750	250	96	25	3	25	1	25	0	0	0	0
	point960	960	250	96	25	3	25	1	25	0	0	0	0
	point124	124											
Street N	point449	449	0	0	0	0	0	0	0	0	0	0	0
	point751	751	0	0	0	0	0	0	0	0	0	0	0
	point125	125	0	0	0	0	0	0	0	0	0	0	0
	point714	714	0	0	0	0	0	0	0	0	0	0	0
	point713	713	0	0	0	0	0	0	0	0	0	0	0
	point134	134	0	0	0	0	0	0	0	0	0	0	0
	point135	135											
Street F South	point271	271	0	0	0	0	0	0	0	0	0	0	0
	point266	266	0	0	0	0	0	0	0	0	0	0	0
	point267	267	0	0	0	0	0	0	0	0	0	0	0
	point259	259	0	0	0	0	0	0	0	0	0	0	0
	point689	689											
Street C S of St A	point753	753	2550	76	30	6	30	18	30	0	0	0	0
	point738	738	2550	76	30	6	30	18	30	0	0	0	0
	point830	830	2550	76	30	6	30	18	30	0	0	0	0
	point739	739	2550	76	30	6	30	18	30	0	0	0	0
	point787	787											
Street B South	point754	754	0	0	0	0	0	0	0	0	0	0	0
	point239	239	0	0	0	0	0	0	0	0	0	0	0
	point240	240	0	0	0	0	0	0	0	0	0	0	0
	point241	241	0	0	0	0	0	0	0	0	0	0	0
	point242	242	0	0	0	0	0	0	0	0	0	0	0
	point245	245	0	0	0	0	0	0	0	0	0	0	0
	point246	246	0	0	0	0	0	0	0	0	0	0	0
	point247	247	0	0	0	0	0	0	0	0	0	0	0

	point234	234											
Wheeler Ridge Rd-2	point755	755	1440	76	45	6	45	18	45	0	0	0	0
	point383	383	1440	76	45	6	45	18	45	0	0	0	0
	point393	393	1440	76	45	6	45	18	45	0	0	0	0
	point394	394	1440	76	45	6	45	18	45	0	0	0	0
	point386	386											
Laval Rd E-2	point756	756	1840	76	45	6	45	18	45	0	0	0	0
	point359	359	1840	76	45	6	45	18	45	0	0	0	0
	point360	360	1840	76	45	6	45	18	45	0	0	0	0
	point342	342											
Del Oro Dr-North	point759	759	2610	76	30	6	30	18	30	0	0	0	0
	point367	367	2610	76	30	6	30	18	30	0	0	0	0
	point368	368	2610	76	30	6	30	18	30	0	0	0	0
	point369	369	2610	76	30	6	30	18	30	0	0	0	0
	point370	370	2610	76	30	6	30	18	30	0	0	0	0
	point362	362											
Street D S of Del Oro Dr	point760	760	3130	76	30	6	30	18	30	0	0	0	0
	point878	878	3130	76	30	6	30	18	30	0	0	0	0
	point62	62	3130	76	30	6	30	18	30	0	0	0	0
	point63	63											
Street A St I St J	point761	761	2910	76	30	6	30	18	30	0	0	0	0
	point959	959	2910	76	30	6	30	18	30	0	0	0	0
	point86	86											
Street A St J to St L	point762	762	1850	76	30	6	30	18	30	0	0	0	0
	point87	87											
Street I-2	point764	764	80	96	25	3	25	1	25	0	0	0	0
	point763	763	80	96	25	3	25	1	25	0	0	0	0
	point875	875	80	96	25	3	25	1	25	0	0	0	0
	point876	876	80	96	25	3	25	1	25	0	0	0	0
	point874	874	80	96	25	3	25	1	25	0	0	0	0
	point304	304											
Street J S of St A	point765	765	0	0	0	0	0	0	0	0	0	0	0
	point216	216	0	0	0	0	0	0	0	0	0	0	0
	point217	217											
Street B-2	point766	766	0	0	0	0	0	0	0	0	0	0	0
	point776	776											
Street B St J to St L	point768	768	500	76	30	6	30	18	30	0	0	0	0

	point130	130	500	76	30	6	30	18	30	0	0	0	0
	point131	131											
Street B-2 St J to St L	point775	775	720	76	30	6	30	18	30	0	0	0	0
	point121	121											
Street B St I to St J	point777	777	720	76	30	6	30	18	30	0	0	0	0
	point769	769	720	76	30	6	30	18	30	0	0	0	0
	point895	895	720	76	30	6	30	18	30	0	0	0	0
	point773	773	720	76	30	6	30	18	30	0	0	0	0
	point774	774											
Edmnstn Pumping Plnt Rd- St J to St K	point779	779	430	76	30	6	30	18	30	0	0	0	0
	point160	160	430	76	30	6	30	18	30	0	0	0	0
	point894	894	430	76	30	6	30	18	30	0	0	0	0
	point161	161											
Edmonstn Pumping Plant Rd E of St K	point780	780	510	76	30	6	30	18	30	0	0	0	0
	point162	162	510	76	30	6	30	18	30	0	0	0	0
	point737	737	510	76	30	6	30	18	30	0	0	0	0
	point163	163											
Street D N of Edmnstn Pmp Plnt Rd	point783	783	220	76	30	6	30	18	30	0	0	0	0
	point841	841	220	76	30	6	30	18	30	0	0	0	0
	point111	111											
Street C N of St E	point786	786	430	76	30	6	30	18	30	0	0	0	0
	point879	879	430	76	30	6	30	18	30	0	0	0	0
	point137	137	430	76	30	6	30	18	30	0	0	0	0
	point138	138	430	76	30	6	30	18	30	0	0	0	0
	point139	139											
Street C N of St B	point788	788	1440	76	30	6	30	18	30	0	0	0	0
	point740	740	1440	76	30	6	30	18	30	0	0	0	0
	point71	71											
Street J S of St B	point790	790	660	76	25	6	25	18	25	0	0	0	0
	point211	211	660	76	25	6	25	18	25	0	0	0	0
	point212	212											
Street C St G to Tejon Ind Dr	point690	690	1340	76	30	6	30	18	30	0	0	0	0
	point691	691	1340	76	30	6	30	18	30	0	0	0	0
	point692	692	1340	76	30	6	30	18	30	0	0	0	0
	point829	829	1340	76	30	6	30	18	30	0	0	0	0
	point693	693	1340	76	30	6	30	18	30	0	0	0	0
	point694	694	1340	76	30	6	30	18	30	0	0	0	0

	point102	102	1340	76	30	6	30	18	30	0	0	0	0
	point104	104	1340	76	30	6	30	18	30	0	0	0	0
	point105	105	1340	76	30	6	30	18	30	0	0	0	0
	point793	793											
Tejon Industrial Dr-2	point795	795	1430	76	30	6	30	18	30	0	0	0	0
	point794	794	1430	76	30	6	30	18	30	0	0	0	0
	point745	745	1430	76	30	6	30	18	30	0	0	0	0
	point107	107	1430	76	30	6	30	18	30	0	0	0	0
	point112	112	1430	76	30	6	30	18	30	0	0	0	0
	point109	109	1430	76	30	6	30	18	30	0	0	0	0
	point429	429	1430	76	30	6	30	18	30	0	0	0	0
	point411	411	1430	76	30	6	30	18	30	0	0	0	0
	point413	413											
I-5 NB-N. of Laval Rd	point796	796	6730	76	70	6	70	18	70	0	0	0	0
	point345	345	6730	76	70	6	70	18	70	0	0	0	0
	point346	346											
I-5 SB-Laval Rd to Grapevine	point797	797	6140	76	70	6	70	18	70	0	0	0	0
	point349	349	6140	76	70	6	70	18	70	0	0	0	0
	point341	341	6140	76	70	6	70	18	70	0	0	0	0
	point17	17	6140	76	70	6	70	18	70	0	0	0	0
	point18	18	6140	76	70	6	70	18	70	0	0	0	0
	point725	725	6140	76	70	6	70	18	70	0	0	0	0
	point726	726	6140	76	70	6	70	18	70	0	0	0	0
	point729	729											
I-5 NB - Grapevine to Laval Rd	point798	798	6450	76	70	6	70	18	70	0	0	0	0
	point721	721	6450	76	70	6	70	18	70	0	0	0	0
	point722	722	6450	76	70	6	70	18	70	0	0	0	0
	point723	723	6450	76	70	6	70	18	70	0	0	0	0
	point724	724	6450	76	70	6	70	18	70	0	0	0	0
	point13	13	6450	76	70	6	70	18	70	0	0	0	0
	point14	14	6450	76	70	6	70	18	70	0	0	0	0
	point15	15	6450	76	70	6	70	18	70	0	0	0	0
	point344	344											
I-5 NB - S of Project	point1	1	6550	76	70	6	70	18	70	0	0	0	0
	point3	3	6550	76	70	6	70	18	70	0	0	0	0
	point4	4	6550	76	70	6	70	18	70	0	0	0	0
	point5	5	6550	76	70	6	70	18	70	0	0	0	0

		point6	6	6550	76	70	6	70	18	70	0	0	0	0
		point7	7	6550	76	70	6	70	18	70	0	0	0	0
		point8	8	6550	76	70	6	70	18	70	0	0	0	0
		point9	9	6550	76	70	6	70	18	70	0	0	0	0
		point791	791	6550	76	70	6	70	18	70	0	0	0	0
		point11	11	6550	76	70	6	70	18	70	0	0	0	0
		point12	12	6550	76	70	6	70	18	70	0	0	0	0
		point720	720	6550	76	70	6	70	18	70	0	0	0	0
		point719	719											
I-5 SB-S of Project		point799	799	5810	76	70	6	70	18	70	0	0	0	0
		point727	727	5810	76	70	6	70	18	70	0	0	0	0
		point728	728	5810	76	70	6	70	18	70	0	0	0	0
		point19	19	5810	76	70	6	70	18	70	0	0	0	0
		point842	842	5810	76	70	6	70	18	70	0	0	0	0
		point42	42	5810	76	70	6	70	18	70	0	0	0	0
		point792	792	5810	76	70	6	70	18	70	0	0	0	0
		point45	45	5810	76	70	6	70	18	70	0	0	0	0
		point46	46	5810	76	70	6	70	18	70	0	0	0	0
		point47	47	5810	76	70	6	70	18	70	0	0	0	0
		point48	48	5810	76	70	6	70	18	70	0	0	0	0
		point49	49	5810	76	70	6	70	18	70	0	0	0	0
		point50	50	5810	76	70	6	70	18	70	0	0	0	0
		point51	51	5810	76	70	6	70	18	70	0	0	0	0
		point43	43	5810	76	70	6	70	18	70	0	0	0	0
		point52	52	5810	76	70	6	70	18	70	0	0	0	0
		point53	53	5810	76	70	6	70	18	70	0	0	0	0
		point54	54											
Roadway305		point843	843	0	0	0	0	0	0	0	0	0	0	0
		point844	844	0	0	0	0	0	0	0	0	0	0	0
		point845	845	0	0	0	0	0	0	0	0	0	0	0
		point846	846	0	0	0	0	0	0	0	0	0	0	0
		point847	847	0	0	0	0	0	0	0	0	0	0	0
		point848	848	0	0	0	0	0	0	0	0	0	0	0
		point849	849	0	0	0	0	0	0	0	0	0	0	0
		point850	850	0	0	0	0	0	0	0	0	0	0	0
		point851	851	0	0	0	0	0	0	0	0	0	0	0
		point852	852	0	0	0	0	0	0	0	0	0	0	0

		point853	853											
Street D S of St A		point929	929	1570	76	30	6	30	18	30	0	0	0	0
		point862	862	1570	76	30	6	30	18	30	0	0	0	0
		point59	59											
Roadway329		point983	983	0	0	0	0	0	0	0	0	0	0	0
		point984	984	0	0	0	0	0	0	0	0	0	0	0
		point985	985	0	0	0	0	0	0	0	0	0	0	0
		point986	986	0	0	0	0	0	0	0	0	0	0	0
		point987	987	0	0	0	0	0	0	0	0	0	0	0
		point988	988	0	0	0	0	0	0	0	0	0	0	0
		point989	989	0	0	0	0	0	0	0	0	0	0	0
		point990	990	0	0	0	0	0	0	0	0	0	0	0
		point991	991											

Dudek **30 November 2015**
M Greene **TNM 2.5**

INPUT: RECEIVERS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cumulative w Proj**

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
I-5 Grapevine - 100'	8	1	37,150,536.0	12,691,664.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 200'	10	1	37,150,440.0	12,691,635.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 300'	12	1	37,150,340.0	12,691,607.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 400'	17	1	37,150,244.0	12,691,578.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 500'	19	1	37,150,148.0	12,691,550.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 600'	20	1	37,150,056.0	12,691,522.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 700'	26	1	37,149,956.0	12,691,494.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 800'	28	1	37,149,860.0	12,691,465.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 900'	31	1	37,149,764.0	12,691,437.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 1000'	33	1	37,149,668.0	12,691,407.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 1100'	34	1	37,149,572.0	12,691,382.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 100'	37	1	37,148,476.0	12,700,950.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 200'	39	1	37,148,572.0	12,700,979.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 300'	41	1	37,148,672.0	12,701,007.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 400'	44	1	37,148,768.0	12,701,036.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 500'	45	1	37,148,860.0	12,701,064.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 600'	46	1	37,148,952.0	12,701,090.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 700'	47	1	37,149,056.0	12,701,124.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 800'	49	1	37,149,152.0	12,701,156.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 900'	50	1	37,149,252.0	12,701,185.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 1000'	51	1	37,149,348.0	12,701,215.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 1100'	52	1	37,149,444.0	12,701,243.0	1,283.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 1200'	53	1	37,149,540.0	12,701,269.0	1,283.00	5.00	0.00	66	10.0	8.0	Y
I-5 N of Laval - 100'	55	1	37,145,680.0	12,711,297.0	1,166.00	5.00	0.00	65	10.0	8.0	Y

I-5 N of Laval - 200'	56	1	37,145,584.0	12,711,268.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N of Laval - 300'	57	1	37,145,484.0	12,711,240.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N of Laval - 400'	58	1	37,145,388.0	12,711,211.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N of Laval - 500'	59	1	37,145,292.0	12,711,183.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 600'	62	1	37,145,200.0	12,711,153.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 700'	63	1	37,145,104.0	12,711,125.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 800'	64	1	37,145,004.0	12,711,097.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 900'	65	1	37,144,912.0	12,711,070.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 1000'	67	1	37,144,816.0	12,711,041.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
I-5 N. of Laval - 1200'	68	1	37,144,628.0	12,710,984.0	1,166.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 50'	69	1	37,152,072.0	12,697,441.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 100'	70	1	37,152,072.0	12,697,491.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 150'	71	1	37,152,072.0	12,697,541.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 200'	83	1	37,152,072.0	12,697,591.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 250'	84	1	37,152,072.0	12,697,641.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 50'	85	1	37,154,572.0	12,696,877.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L -100'	86	1	37,154,572.0	12,696,927.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 150'	86	1	37,154,572.0	12,696,977.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 200'	87	1	37,154,572.0	12,697,027.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 250'	88	1	37,154,572.0	12,697,077.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 50'	89	1	37,156,396.0	12,696,851.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 100'	90	1	37,156,396.0	12,696,901.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 150'	91	1	37,156,396.0	12,696,951.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 200'	93	1	37,156,396.0	12,697,001.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 250'	94	1	37,156,396.0	12,697,051.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St I St J - 50'	95	1	37,153,624.0	12,697,147.0	1,295.00	5.00	0.00	65	10.0	8.0	Y
St A St I St J - 100'	96	1	37,153,652.0	12,697,188.0	1,295.00	5.00	0.00	65	10.0	8.0	Y
St A St I St J - 150'	97	1	37,153,684.0	12,697,229.0	1,295.00	5.00	0.00	65	10.0	8.0	Y
St A St I St J - 200'	99	1	37,153,712.0	12,697,270.0	1,295.00	5.00	0.00	65	10.0	8.0	Y
St A St I St J - 250'	100	1	37,153,740.0	12,697,311.0	1,295.00	5.00	0.00	65	10.0	8.0	Y
St B St D to St I - 100'	101	1	37,151,656.0	12,694,744.0	1,415.00	5.00	0.00	65	10.0	8.0	Y
St B St D to St I - 150'	102	1	37,151,656.0	12,694,794.0	1,415.00	5.00	0.00	65	10.0	8.0	Y
St B St D to St I - 200'	103	1	37,151,656.0	12,694,844.0	1,415.00	5.00	0.00	65	10.0	8.0	Y
St B St D to St I - 250'	105	1	37,151,656.0	12,694,894.0	1,415.00	5.00	0.00	65	10.0	8.0	Y
St B St L to St N - 50'	106	1	37,157,132.0	12,695,089.0	1,385.00	5.00	0.00	65	10.0	8.0	Y
St B St L to St N - 100'	107	1	37,157,104.0	12,695,130.0	1,385.00	5.00	0.00	65	10.0	8.0	Y
St B St L to St N - 150'	108	1	37,157,072.0	12,695,172.0	1,385.00	5.00	0.00	65	10.0	8.0	Y

St B St L to St N - 200'	109	1	37,157,044.0	12,695,213.0	1,385.00	5.00	0.00	65	10.0	8.0	Y
St B St L to St N - 250'	119	1	37,157,016.0	12,695,255.0	1,385.00	5.00	0.00	65	10.0	8.0	Y
St B St I to St J - 50'	120	1	37,153,304.0	12,694,746.0	1,406.00	5.00	0.00	65	10.0	8.0	Y
St B St I to St J - 100'	121	1	37,153,304.0	12,694,796.0	1,406.00	5.00	0.00	65	10.0	8.0	Y
St B St I to St J - 150'	122	1	37,153,304.0	12,694,846.0	1,406.00	5.00	0.00	65	10.0	8.0	Y
St B St I to St J - 200'	123	1	37,153,304.0	12,694,896.0	1,406.00	5.00	0.00	65	10.0	8.0	Y
St B St I to St J - 250'	124	1	37,153,304.0	12,694,946.0	1,406.00	5.00	0.00	65	10.0	8.0	Y
St B St J to St L - 50'	125	1	37,155,480.0	12,694,728.0	1,395.00	5.00	0.00	65	10.0	8.0	Y
St B St J to St L - 100'	126	1	37,155,480.0	12,694,778.0	1,395.00	5.00	0.00	65	10.0	8.0	Y
St B St J to St L - 150'	127	1	37,155,480.0	12,694,828.0	1,395.00	5.00	0.00	65	10.0	8.0	Y
St B St J to St L - 200'	129	1	37,155,480.0	12,694,878.0	1,395.00	5.00	0.00	65	10.0	8.0	Y
St B St J to St L - 250'	130	1	37,155,480.0	12,694,928.0	1,395.00	5.00	0.00	65	10.0	8.0	Y
St B-E St C to St E - 50'	131	1	37,146,424.0	12,691,413.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St B-E St C to St E - 100'	116	1	37,146,464.0	12,691,381.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St B-E St C to St E - 150'	132	1	37,146,500.0	12,691,348.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St B-E St C to St E - 200'	135	1	37,146,540.0	12,691,316.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St B-E St C to St E - 250'	138	1	37,146,576.0	12,691,283.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C St G to Tejon Ind Dr - 50'	116	1	37,147,780.0	12,699,015.0	1,360.00	5.00	0.00	65	10.0	8.0	Y
St C St G to Tejon Ind Dr - 100'	139	1	37,147,732.0	12,698,988.0	1,360.00	5.00	0.00	65	10.0	8.0	Y
St C St G to Tejon Ind Dr - 150'	141	1	37,147,692.0	12,698,962.0	1,360.00	5.00	0.00	65	10.0	8.0	Y
St C St G to Tejon Ind Dr - 200'	143	1	37,147,648.0	12,698,937.0	1,360.00	5.00	0.00	65	10.0	8.0	Y
St C St G to Tejon Ind Dr - 250'	144	1	37,147,604.0	12,698,912.0	1,360.00	5.00	0.00	65	10.0	8.0	Y
St C S of St A - 200'	116	1	37,148,068.0	12,695,617.0	1,442.00	5.00	0.00	65	10.0	8.0	Y
St C S of St A - 250'	145	1	37,148,028.0	12,695,594.0	1,442.00	5.00	0.00	65	10.0	8.0	Y
St C S of St A - 300'	147	1	37,147,988.0	12,695,567.0	1,442.00	5.00	0.00	65	10.0	8.0	Y
St C S of St A - 350'	149	1	37,147,944.0	12,695,538.0	1,442.00	5.00	0.00	65	10.0	8.0	Y
St C S of St A - 400'	147	1	37,147,904.0	12,695,512.0	1,442.00	5.00	0.00	65	10.0	8.0	Y
St C N of St B - 250'	153	1	37,148,244.0	12,694,564.0	1,513.00	5.00	0.00	65	10.0	8.0	Y
St C N of St B - 300'	155	1	37,148,200.0	12,694,545.0	1,513.00	5.00	0.00	65	10.0	8.0	Y
St C N of St B - 350'	156	1	37,148,152.0	12,694,516.0	1,513.00	5.00	0.00	65	10.0	8.0	Y
St C N of St B - 400'	145	1	37,148,112.0	12,694,489.0	1,513.00	5.00	0.00	65	10.0	8.0	Y
St C N of St B - 450'	157	1	37,148,068.0	12,694,462.0	1,513.00	5.00	0.00	65	10.0	8.0	Y
St C S of St B - 50'	159	1	37,148,844.0	12,692,986.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C S of St B - 100'	161	1	37,148,796.0	12,692,959.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C S of St B - 150'	162	1	37,148,756.0	12,692,933.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C S of St B - 200'	145	1	37,148,712.0	12,692,908.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C S of St B - 250'	163	1	37,148,668.0	12,692,883.0	1,560.00	5.00	0.00	65	10.0	8.0	Y

St C N of St E - 50'	165	1	37,149,216.0	12,691,475.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C N of St E - 100'	167	1	37,149,168.0	12,691,461.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C N of St E - 150'	145	1	37,149,120.0	12,691,446.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C N of St E - 200'	168	1	37,149,072.0	12,691,432.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St C N of St E - 250'	170	1	37,149,024.0	12,691,418.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St D N of St A - 50'	172	1	37,151,088.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	Y
St D N of St A - 100'	173	1	37,151,140.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	Y
St D N of St A - 150'	174	1	37,151,188.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	Y
St D N of St A - 200'	175	1	37,151,240.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	Y
St D N of St A - 250'	176	1	37,151,288.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	Y
St D S of Del Oro Dr - 50'	178	1	37,151,400.0	12,701,153.0	1,268.00	5.00	0.00	65	10.0	8.0	Y
St D S of Del Oro Dr - 100'	179	1	37,151,448.0	12,701,137.0	1,268.00	5.00	0.00	65	10.0	8.0	Y
St D S of Del Oro Dr - 150'	180	1	37,151,496.0	12,701,122.0	1,268.00	5.00	0.00	65	10.0	8.0	Y
St D S of Del Oro Dr - 200'	181	1	37,151,544.0	12,701,106.0	1,268.00	5.00	0.00	65	10.0	8.0	Y
St D S of Del Oro Dr - 250'	182	1	37,151,588.0	12,701,089.0	1,268.00	5.00	0.00	65	10.0	8.0	Y
St D Oro Dr to St S - 50'	187	1	37,152,396.0	12,702,656.0	1,240.00	5.00	0.00	65	10.0	8.0	Y
St D Oro Dr to St S - 100'	188	1	37,152,444.0	12,702,640.0	1,240.00	5.00	0.00	65	10.0	8.0	Y
St D Oro Dr to St S - 150'	189	1	37,152,492.0	12,702,625.0	1,240.00	5.00	0.00	65	10.0	8.0	Y
St D Oro Dr to St S - 200'	190	1	37,152,540.0	12,702,609.0	1,240.00	5.00	0.00	65	10.0	8.0	Y
St D Oro Dr to St S - 250'	191	1	37,152,588.0	12,702,593.0	1,240.00	5.00	0.00	65	10.0	8.0	Y
St D S of St B - 50'	193	1	37,151,364.0	12,693,679.0	1,440.00	5.00	0.00	65	10.0	8.0	Y
St D S of St B - 100'	194	1	37,151,412.0	12,693,689.0	1,440.00	5.00	0.00	65	10.0	8.0	Y
St D S of St B - 150'	145	1	37,151,460.0	12,693,706.0	1,440.00	5.00	0.00	65	10.0	8.0	Y
St D S of St B - 200'	201	1	37,151,508.0	12,693,721.0	1,440.00	5.00	0.00	65	10.0	8.0	Y
St D S of St B - 250'	203	1	37,151,552.0	12,693,738.0	1,440.00	5.00	0.00	65	10.0	8.0	Y
St D N of EdstnPmpPlnt Rd - 50'	205	1	37,151,764.0	12,692,138.0	1,480.00	5.00	0.00	65	10.0	8.0	Y
St D N of EdstnPmpPlnt Rd - 100'	206	1	37,151,808.0	12,692,148.0	1,480.00	5.00	0.00	65	10.0	8.0	Y
St D N of EdstnPmpPlnt Rd - 150'	207	1	37,151,864.0	12,692,166.0	1,480.00	5.00	0.00	65	10.0	8.0	Y
St D N of EdstnPmpPlnt Rd - 200'	208	1	37,151,912.0	12,692,180.0	1,480.00	5.00	0.00	65	10.0	8.0	Y
St D N of EdstnPmpPlnt Rd - 250'	209	1	37,151,956.0	12,692,193.0	1,480.00	5.00	0.00	65	10.0	8.0	Y
St D S of St A - 50'	211	1	37,151,096.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	Y
St D S of St A - 100'	212	1	37,151,148.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	Y
St D S of St A - 150'	203	1	37,151,196.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	Y
St D S of St A - 200'	213	1	37,151,248.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	Y
St D S of St A - 250'	215	1	37,151,296.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	Y
St D N of St B - 50'	217	1	37,151,108.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	Y
St D N of St B - 100'	218	1	37,151,156.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	Y

St D N of St B - 150'	219	1	37,151,208.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	Y
St D N of St B - 200'	220	1	37,151,256.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	Y
St D N of St B - 250'	221	1	37,151,308.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	Y
St E St C to St B - 50'	223	1	37,148,596.0	12,690,984.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St E St C to St B - 100'	224	1	37,148,632.0	12,691,019.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St E St C to St B - 150'	225	1	37,148,668.0	12,691,053.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St E St C to St B - 200'	226	1	37,148,704.0	12,691,086.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St E St C to St B - 250'	227	1	37,148,740.0	12,691,123.0	1,560.00	5.00	0.00	65	10.0	8.0	Y
St I St A to St B - 50'	229	1	37,152,812.0	12,696,979.0	1,398.00	5.00	0.00	65	10.0	8.0	Y
St I St A to St B - 100'	230	1	37,152,860.0	12,696,963.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St I St A to St B - 150'	231	1	37,152,908.0	12,696,948.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St I St A to St B - 200'	232	1	37,152,956.0	12,696,932.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St I St A to St B - 250'	233	1	37,153,004.0	12,696,916.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St J St A to St B - 50'	235	1	37,154,336.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	Y
St J St A to St B - 100'	236	1	37,154,388.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	Y
St J St A to St B - 150'	221	1	37,154,436.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	Y
St J St A to St B - 200'	237	1	37,154,488.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	Y
St J St A to St B - 250'	239	1	37,154,536.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	Y
St J S of St B - 50'	241	1	37,154,340.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	Y
St J S of St B - 100'	242	1	37,154,392.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	Y
St J S of St B - 150'	243	1	37,154,440.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	Y
St J S of St B - 200'	244	1	37,154,492.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	Y
St J S of St B - 250'	245	1	37,154,540.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	Y
St J N of EdmstnPmpPlnt Rd - 50'	247	1	37,153,860.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	Y
St J N of EdmstnPmpPlnt Rd - 100'	248	1	37,153,912.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	Y
St J N of EdmstnPmpPlnt Rd - 150'	249	1	37,153,960.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	Y
St J N of EdmstnPmpPlnt Rd - 200'	250	1	37,154,012.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	Y
St J N of EdmstnPmpPlnt Rd - 250'	251	1	37,154,060.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	Y
St L St A to St B 50'	253	1	37,155,484.0	12,695,684.0	1,340.00	5.00	0.00	65	10.0	8.0	Y
St L St A to St B 100'	254	1	37,155,436.0	12,695,657.0	1,340.00	5.00	0.00	65	10.0	8.0	Y
St L St A to St B 150'	255	1	37,155,396.0	12,695,631.0	1,340.00	5.00	0.00	65	10.0	8.0	Y
St L St A to St B 200'	256	1	37,155,352.0	12,695,606.0	1,340.00	5.00	0.00	65	10.0	8.0	Y
St L St A to St B 250'	257	1	37,155,308.0	12,695,581.0	1,340.00	5.00	0.00	65	10.0	8.0	Y
St R Del Oro Dr to St T- 50'	259	1	37,153,756.0	12,704,563.0	1,180.00	5.00	0.00	65	10.0	8.0	Y
St R Del Oro Dr to St T- 100'	260	1	37,153,756.0	12,704,613.0	1,180.00	5.00	0.00	65	10.0	8.0	Y
St R Del Oro Dr to St T- 150'	261	1	37,153,756.0	12,704,663.0	1,180.00	5.00	0.00	65	10.0	8.0	Y
St R Del Oro Dr to St T- 200'	262	1	37,153,756.0	12,704,713.0	1,180.00	5.00	0.00	65	10.0	8.0	Y

St R Del Oro Dr to St T- 250'	263	1	37,153,756.0	12,704,763.0	1,180.00	5.00	0.00	65	10.0	8.0	Y
St L St B to St M - 50'	265	1	37,156,512.0	12,693,827.0	1,370.00	5.00	0.00	65	10.0	8.0	Y
St L St B to St M - 100'	266	1	37,156,468.0	12,693,802.0	1,370.00	5.00	0.00	65	10.0	8.0	Y
St L St B to St M - 150'	267	1	37,156,428.0	12,693,776.0	1,370.00	5.00	0.00	65	10.0	8.0	Y
St L St B to St M - 200'	268	1	37,156,384.0	12,693,751.0	1,370.00	5.00	0.00	65	10.0	8.0	Y
St L St B to St M - 250'	269	1	37,156,340.0	12,693,726.0	1,370.00	5.00	0.00	65	10.0	8.0	Y
St T St R to St S- 50'	271	1	37,152,592.0	12,703,721.0	1,210.00	5.00	0.00	65	10.0	8.0	Y
St T St R to St S- 100'	273	1	37,152,640.0	12,703,721.0	1,210.00	5.00	0.00	65	10.0	8.0	Y
St T St R to St S- 150'	275	1	37,152,692.0	12,703,721.0	1,210.00	5.00	0.00	65	10.0	8.0	Y
St T St R to St S- 200'	276	1	37,152,740.0	12,703,721.0	1,210.00	5.00	0.00	66	10.0	8.0	Y
St T St R to St S- 250'	277	1	37,152,792.0	12,703,721.0	1,210.00	5.00	0.00	66	10.0	8.0	Y
Edmn St D to St J - 50'	281	1	37,152,976.0	12,691,041.0	1,485.00	5.00	0.00	66	10.0	8.0	Y
Edmn St D to St J - 100'	285	1	37,152,992.0	12,691,088.0	1,485.00	5.00	0.00	66	10.0	8.0	Y
Edmn St D to St J - 150'	286	1	37,153,012.0	12,691,135.0	1,485.00	5.00	0.00	66	10.0	8.0	Y
Edmn St D to St J - 200'	281	1	37,153,028.0	12,691,182.0	1,485.00	5.00	0.00	66	10.0	8.0	Y
Edmn St D to St J - 250'	287	1	37,153,044.0	12,691,229.0	1,485.00	5.00	0.00	66	10.0	8.0	Y
Edmn St J to St K - 50'	288	1	37,155,072.0	12,690,730.0	1,435.00	5.00	0.00	66	10.0	8.0	Y
Edmn St J to St K - 100'	290	1	37,155,072.0	12,690,780.0	1,435.00	5.00	0.00	66	10.0	8.0	Y
Edmn St J to St K - 150'	291	1	37,155,072.0	12,690,830.0	1,435.00	5.00	0.00	66	10.0	8.0	Y
Edmn St J to St K - 200'	293	1	37,155,072.0	12,690,880.0	1,435.00	5.00	0.00	66	10.0	8.0	Y
Edmn St J to St K - 250'	281	1	37,155,072.0	12,690,930.0	1,435.00	5.00	0.00	66	10.0	8.0	Y
Edmn E of St K - 50'	294	1	37,157,608.0	12,690,642.0	1,400.00	5.00	0.00	66	10.0	8.0	Y
Edmn E of St K - 100'	295	1	37,157,608.0	12,690,692.0	1,400.00	5.00	0.00	66	10.0	8.0	Y
Edmn E of St K - 150'	296	1	37,157,608.0	12,690,742.0	1,400.00	5.00	0.00	66	10.0	8.0	Y
Edmn E of St K - 200'	298	1	37,157,608.0	12,690,792.0	1,400.00	5.00	0.00	66	10.0	8.0	Y
Edmn E of St K - 250'	299	1	37,157,608.0	12,690,842.0	1,400.00	5.00	0.00	66	10.0	8.0	Y
Del Oro Dr St R to St T - 50'	300	1	37,151,368.0	12,703,534.0	1,225.00	5.00	0.00	66	10.0	8.0	Y
Del Oro Dr St R to St T - 100'	304	1	37,151,412.0	12,703,555.0	1,225.00	5.00	0.00	66	10.0	8.0	Y
Del Oro Dr St R to St T - 150'	305	1	37,151,460.0	12,703,577.0	1,225.00	5.00	0.00	66	10.0	8.0	Y
Del Oro Dr St R to St T - 200'	306	1	37,151,504.0	12,703,598.0	1,225.00	5.00	0.00	66	10.0	8.0	Y
Del Oro Dr St R to St T - 250'	314	1	37,151,552.0	12,703,598.0	1,225.00	5.00	0.00	66	10.0	8.0	Y
Farmhouse S. of Project	315	1	37,151,464.0	12,688,662.0	1,620.00	5.00	0.00	66	10.0	8.0	Y
Ramada Limited	316	1	37,150,324.0	12,690,333.0	1,535.00	5.00	0.00	66	10.0	8.0	Y
Best Western	317	1	37,145,996.0	12,708,367.0	1,175.00	5.00	0.00	66	10.0	8.0	Y
Microtel Inn & Suites	320	1	37,148,404.0	12,709,171.0	1,120.00	5.00	0.00	66	10.0	8.0	Y

Dudek							**30 November 2015**					
M Greene							**TNM 2.5**					
							Calculated with TNM 2.5					
RESULTS: SOUND LEVELS												
PROJECT/CONTRACT:	**P/N 7667**											
RUN:	**Grapevine Project - Cumulative w Proj**											
BARRIER DESIGN:	**INPUT HEIGHTS**							**Average pavement type shall be used unless**				
								a State highway agency substantiates the use				
ATMOSPHERICS:	**68 deg F, 50% RH**							**of a different type with approval of FHWA.**				

Receiver												
Name	**No.**	**#DUs**	**Existing**	**No Barrier**					**With Barrier**			
			LAeq1h	**LAeq1h**		**Increase over existing**		**Type**	**Calculated**	**Noise Reduction**		
				Calculated	**Crit'n**	**Calculated**	**Crit'n Sub'l Inc**	**Impact**	**LAeq1h**	**Calculated**	**Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
I-5 Grapevine - 100'	8	1	0.0	83.7	65	83.7	10	Snd Lvl	83.7	0.0	8	-8.0
I-5 Grapevine - 200'	10	1	0.0	77.9	65	77.9	10	Snd Lvl	77.9	0.0	8	-8.0
I-5 Grapevine - 300'	12	1	0.0	74.8	65	74.8	10	Snd Lvl	74.8	0.0	8	-8.0
I-5 Grapevine - 400'	17	1	0.0	71.5	65	71.5	10	Snd Lvl	71.5	0.0	8	-8.0
I-5 Grapevine - 500'	19	1	0.0	69.0	65	69.0	10	Snd Lvl	69.0	0.0	8	-8.0
I-5 Grapevine - 600'	20	1	0.0	67.2	65	67.2	10	Snd Lvl	67.2	0.0	8	-8.0
I-5 Grapevine - 700'	26	1	0.0	65.7	65	65.7	10	Snd Lvl	65.7	0.0	8	-8.0
I-5 Grapevine - 800'	28	1	0.0	64.3	65	64.3	10	----	64.3	0.0	8	-8.0
I-5 Grapevine - 900'	31	1	0.0	63.1	65	63.1	10	----	63.1	0.0	8	-8.0
I-5 Grapevine - 1000'	33	1	0.0	62.4	65	62.4	10	----	62.4	0.0	8	-8.0
I-5 Grapevine - 1100'	34	1	0.0	61.9	65	61.9	10	----	61.9	0.0	8	-8.0
I-5 Laval - 100'	37	1	0.0	86.7	65	86.7	10	Snd Lvl	86.7	0.0	8	-8.0
I-5 Laval - 200'	39	1	0.0	79.7	65	79.7	10	Snd Lvl	79.7	0.0	8	-8.0
I-5 Laval - 300'	41	1	0.0	76.4	65	76.4	10	Snd Lvl	76.4	0.0	8	-8.0
I-5 Laval - 400'	44	1	0.0	72.6	65	72.6	10	Snd Lvl	72.6	0.0	8	-8.0
I-5 Laval - 500'	45	1	0.0	70.0	65	70.0	10	Snd Lvl	70.0	0.0	8	-8.0
I-5 Laval - 600'	46	1	0.0	68.0	65	68.0	10	Snd Lvl	68.0	0.0	8	-8.0
I-5 Laval - 700'	47	1	0.0	66.0	65	66.0	10	Snd Lvl	66.0	0.0	8	-8.0
I-5 Laval - 800'	49	1	0.0	64.6	65	64.6	10	----	64.6	0.0	8	-8.0
I-5 Laval - 900'	50	1	0.0	63.4	65	63.4	10	----	63.4	0.0	8	-8.0
I-5 Laval - 1000'	51	1	0.0	62.4	65	62.4	10	----	62.4	0.0	8	-8.0
I-5 Laval - 1100'	52	1	0.0	61.2	65	61.2	10	----	61.2	0.0	8	-8.0
I-5 Laval - 1200'	53	1	0.0	60.4	66	60.4	10	----	60.4	0.0	8	-8.0
I-5 N of Laval - 100'	55	1	0.0	87.4	65	87.4	10	Snd Lvl	87.4	0.0	8	-8.0
I-5 N of Laval - 200'	56	1	0.0	81.1	65	81.1	10	Snd Lvl	81.1	0.0	8	-8.0

I-5 N of Laval - 300'	57	1	0.0	77.7	65	77.7	10	Snd Lvl	77.7	0.0	8	-8.0
I-5 N of Laval - 400'	58	1	0.0	74.0	65	74.0	10	Snd Lvl	74.0	0.0	8	-8.0
I-5 N of Laval - 500'	59	1	0.0	71.1	65	71.1	10	Snd Lvl	71.1	0.0	8	-8.0
I-5 N. of Laval - 600'	62	1	0.0	68.9	65	68.9	10	Snd Lvl	68.9	0.0	8	-8.0
I-5 N. of Laval - 700'	63	1	0.0	66.9	65	66.9	10	Snd Lvl	66.9	0.0	8	-8.0
I-5 N. of Laval - 800'	64	1	0.0	65.2	65	65.2	10	Snd Lvl	65.2	0.0	8	-8.0
I-5 N. of Laval - 900'	65	1	0.0	64.4	65	64.4	10	----	64.4	0.0	8	-8.0
I-5 N. of Laval - 1000'	67	1	0.0	63.7	65	63.7	10	----	63.7	0.0	8	-8.0
I-5 N. of Laval - 1200'	68	1	0.0	62.6	65	62.6	10	----	62.6	0.0	8	-8.0
St A St D to St I- 50'	69	1	0.0	74.1	65	74.1	10	Snd Lvl	74.1	0.0	8	-8.0
St A St D to St I- 100'	70	1	0.0	70.5	65	70.5	10	Snd Lvl	70.5	0.0	8	-8.0
St A St D to St I- 150'	71	1	0.0	68.4	65	68.4	10	Snd Lvl	68.4	0.0	8	-8.0
St A St D to St I- 200'	83	1	0.0	66.9	65	66.9	10	Snd Lvl	66.9	0.0	8	-8.0
St A St D to St I- 250'	84	1	0.0	65.6	65	65.6	10	Snd Lvl	65.6	0.0	8	-8.0
St A St J to St L - 50'	85	1	0.0	70.9	65	70.9	10	Snd Lvl	70.9	0.0	8	-8.0
St A St J to St L -100'	86	1	0.0	67.6	65	67.6	10	Snd Lvl	67.6	0.0	8	-8.0
St A St J to St L - 150'	86	1	0.0	65.6	65	65.6	10	Snd Lvl	65.6	0.0	8	-8.0
St A St J to St L - 200'	87	1	0.0	63.9	65	63.9	10	----	63.9	0.0	8	-8.0
St A St J to St L - 250'	88	1	0.0	62.4	65	62.4	10	----	62.4	0.0	8	-8.0
St A St L to St N - 50'	89	1	0.0	67.9	65	67.9	10	Snd Lvl	67.9	0.0	8	-8.0
St A St L to St N - 100'	90	1	0.0	64.8	65	64.8	10	----	64.8	0.0	8	-8.0
St A St L to St N - 150'	91	1	0.0	62.8	65	62.8	10	----	62.8	0.0	8	-8.0
St A St L to St N - 200'	93	1	0.0	61.4	65	61.4	10	----	61.4	0.0	8	-8.0
St A St L to St N - 250'	94	1	0.0	60.1	65	60.1	10	----	60.1	0.0	8	-8.0
St A St I St J - 50'	95	1	0.0	73.8	65	73.8	10	Snd Lvl	73.8	0.0	8	-8.0
St A St I St J - 100'	96	1	0.0	70.1	65	70.1	10	Snd Lvl	70.1	0.0	8	-8.0
St A St I St J - 150'	97	1	0.0	68.0	65	68.0	10	Snd Lvl	68.0	0.0	8	-8.0
St A St I St J - 200'	99	1	0.0	66.4	65	66.4	10	Snd Lvl	66.4	0.0	8	-8.0
St A St I St J - 250'	100	1	0.0	65.1	65	65.1	10	Snd Lvl	65.1	0.0	8	-8.0
St B St D to St I - 100'	101	1	0.0	65.8	65	65.8	10	Snd Lvl	65.8	0.0	8	-8.0
St B St D to St I - 150'	102	1	0.0	64.4	65	64.4	10	----	64.4	0.0	8	-8.0
St B St D to St I - 200'	103	1	0.0	63.4	65	63.4	10	----	63.4	0.0	8	-8.0
St B St D to St I - 250'	105	1	0.0	62.7	65	62.7	10	----	62.7	0.0	8	-8.0
St B St L to St N - 50'	106	1	0.0	56.9	65	56.9	10	----	56.9	0.0	8	-8.0
St B St L to St N - 100'	107	1	0.0	55.0	65	55.0	10	----	55.0	0.0	8	-8.0
St B St L to St N - 150'	108	1	0.0	54.1	65	54.1	10	----	54.1	0.0	8	-8.0
St B St L to St N - 200'	109	1	0.0	53.6	65	53.6	10	----	53.6	0.0	8	-8.0
St B St L to St N - 250'	119	1	0.0	53.1	65	53.1	10	----	53.1	0.0	8	-8.0
St B St I to St J - 50'	120	1	0.0	67.3	65	67.3	10	Snd Lvl	67.3	0.0	8	-8.0
St B St I to St J - 100'	121	1	0.0	64.3	65	64.3	10	----	64.3	0.0	8	-8.0
St B St I to St J - 150'	122	1	0.0	62.8	65	62.8	10	----	62.8	0.0	8	-8.0
St B St I to St J - 200'	123	1	0.0	61.4	65	61.4	10	----	61.4	0.0	8	-8.0

St B St I to St J - 250'	124	1	0.0	60.5	65	60.5	10	----	60.5	0.0	8	-8.0
St B St J to St L - 50'	125	1	0.0	66.0	65	66.0	10	Snd Lvl	66.0	0.0	8	-8.0
St B St J to St L - 100'	126	1	0.0	62.7	65	62.7	10	----	62.7	0.0	8	-8.0
St B St J to St L - 150'	127	1	0.0	61.0	65	61.0	10	----	61.0	0.0	8	-8.0
St B St J to St L - 200'	129	1	0.0	59.8	65	59.8	10	----	59.8	0.0	8	-8.0
St B St J to St L - 250'	130	1	0.0	59.0	65	59.0	10	----	59.0	0.0	8	-8.0
St B-E St C to St E - 50'	131	1	0.0	61.7	65	61.7	10	----	61.7	0.0	8	-8.0
St B-E St C to St E - 100'	116	1	0.0	58.7	65	58.7	10	----	58.7	0.0	8	-8.0
St B-E St C to St E - 150'	132	1	0.0	57.2	65	57.2	10	----	57.2	0.0	8	-8.0
St B-E St C to St E - 200'	135	1	0.0	56.0	65	56.0	10	----	56.0	0.0	8	-8.0
St B-E St C to St E - 250'	138	1	0.0	54.6	65	54.6	10	----	54.6	0.0	8	-8.0
St C St G to Tejon Ind Dr - 50'	116	1	0.0	71.1	65	71.1	10	Snd Lvl	71.1	0.0	8	-8.0
St C St G to Tejon Ind Dr - 100'	139	1	0.0	68.5	65	68.5	10	Snd Lvl	68.5	0.0	8	-8.0
St C St G to Tejon Ind Dr - 150'	141	1	0.0	67.2	65	67.2	10	Snd Lvl	67.2	0.0	8	-8.0
St C St G to Tejon Ind Dr - 200'	143	1	0.0	66.0	65	66.0	10	Snd Lvl	66.0	0.0	8	-8.0
St C St G to Tejon Ind Dr - 250'	144	1	0.0	65.1	65	65.1	10	Snd Lvl	65.1	0.0	8	-8.0
St C S of St A - 200'	116	1	0.0	69.1	65	69.1	10	Snd Lvl	69.1	0.0	8	-8.0
St C S of St A - 250'	145	1	0.0	67.7	65	67.7	10	Snd Lvl	67.7	0.0	8	-8.0
St C S of St A - 300'	147	1	0.0	66.7	65	66.7	10	Snd Lvl	66.7	0.0	8	-8.0
St C S of St A - 350'	149	1	0.0	65.6	65	65.6	10	Snd Lvl	65.6	0.0	8	-8.0
St C S of St A - 400'	147	1	0.0	64.5	65	64.5	10	----	64.5	0.0	8	-8.0
St C N of St B - 250'	153	1	0.0	65.8	65	65.8	10	Snd Lvl	65.8	0.0	8	-8.0
St C N of St B - 300'	155	1	0.0	64.9	65	64.9	10	----	64.9	0.0	8	-8.0
St C N of St B - 350'	156	1	0.0	63.8	65	63.8	10	----	63.8	0.0	8	-8.0
St C N of St B - 400'	145	1	0.0	62.8	65	62.8	10	----	62.8	0.0	8	-8.0
St C N of St B - 450'	157	1	0.0	61.9	65	61.9	10	----	61.9	0.0	8	-8.0
St C S of St B - 50'	159	1	0.0	69.3	65	69.3	10	Snd Lvl	69.3	0.0	8	-8.0
St C S of St B - 100'	161	1	0.0	66.4	65	66.4	10	Snd Lvl	66.4	0.0	8	-8.0
St C S of St B - 150'	162	1	0.0	64.8	65	64.8	10	----	64.8	0.0	8	-8.0
St C S of St B - 200'	145	1	0.0	63.7	65	63.7	10	----	63.7	0.0	8	-8.0
St C S of St B - 250'	163	1	0.0	62.8	65	62.8	10	----	62.8	0.0	8	-8.0
St C N of St E - 50'	165	1	0.0	67.3	65	67.3	10	Snd Lvl	67.3	0.0	8	-8.0
St C N of St E - 100'	167	1	0.0	65.3	65	65.3	10	Snd Lvl	65.3	0.0	8	-8.0
St C N of St E - 150'	145	1	0.0	63.9	65	63.9	10	----	63.9	0.0	8	-8.0
St C N of St E - 200'	168	1	0.0	63.0	65	63.0	10	----	63.0	0.0	8	-8.0
St C N of St E - 250'	170	1	0.0	62.3	65	62.3	10	----	62.3	0.0	8	-8.0
St D N of St A - 50'	172	1	0.0	74.8	65	74.8	10	Snd Lvl	74.8	0.0	8	-8.0
St D N of St A - 100'	173	1	0.0	70.3	65	70.3	10	Snd Lvl	70.3	0.0	8	-8.0
St D N of St A - 150'	174	1	0.0	68.2	65	68.2	10	Snd Lvl	68.2	0.0	8	-8.0
St D N of St A - 200'	175	1	0.0	66.6	65	66.6	10	Snd Lvl	66.6	0.0	8	-8.0
St D N of St A - 250'	176	1	0.0	65.3	65	65.3	10	Snd Lvl	65.3	0.0	8	-8.0
St D S of Del Oro Dr - 50'	178	1	0.0	73.6	65	73.6	10	Snd Lvl	73.6	0.0	8	-8.0

St D S of Del Oro Dr - 100'	179	1	0.0	70.0	65	70.0	10	Snd Lvl	70.0	0.0	8	-8.0
St D S of Del Oro Dr - 150'	180	1	0.0	67.9	65	67.9	10	Snd Lvl	67.9	0.0	8	-8.0
St D S of Del Oro Dr - 200'	181	1	0.0	66.3	65	66.3	10	Snd Lvl	66.3	0.0	8	-8.0
St D S of Del Oro Dr - 250'	182	1	0.0	65.1	65	65.1	10	Snd Lvl	65.1	0.0	8	-8.0
St D Oro Dr to St S - 50'	187	1	0.0	66.1	65	66.1	10	Snd Lvl	66.1	0.0	8	-8.0
St D Oro Dr to St S - 100'	188	1	0.0	63.3	65	63.3	10	----	63.3	0.0	8	-8.0
St D Oro Dr to St S - 150'	189	1	0.0	61.9	65	61.9	10	----	61.9	0.0	8	-8.0
St D Oro Dr to St S - 200'	190	1	0.0	60.6	65	60.6	10	----	60.6	0.0	8	-8.0
St D Oro Dr to St S - 250'	191	1	0.0	59.7	65	59.7	10	----	59.7	0.0	8	-8.0
St D S of St B - 50'	193	1	0.0	67.1	65	67.1	10	Snd Lvl	67.1	0.0	8	-8.0
St D S of St B - 100'	194	1	0.0	65.3	65	65.3	10	Snd Lvl	65.3	0.0	8	-8.0
St D S of St B - 150'	145	1	0.0	64.5	65	64.5	10	----	64.5	0.0	8	-8.0
St D S of St B - 200'	201	1	0.0	64.1	65	64.1	10	----	64.1	0.0	8	-8.0
St D S of St B - 250'	203	1	0.0	63.6	65	63.6	10	----	63.6	0.0	8	-8.0
St D N of EdstnPmpPlnt Rd - 50'	205	1	0.0	65.6	65	65.6	10	Snd Lvl	65.6	0.0	8	-8.0
St D N of EdstnPmpPlnt Rd - 100'	206	1	0.0	64.2	65	64.2	10	----	64.2	0.0	8	-8.0
St D N of EdstnPmpPlnt Rd - 150'	207	1	0.0	63.5	65	63.5	10	----	63.5	0.0	8	-8.0
St D N of EdstnPmpPlnt Rd - 200'	208	1	0.0	62.9	65	62.9	10	----	62.9	0.0	8	-8.0
St D N of EdstnPmpPlnt Rd - 250'	209	1	0.0	62.3	65	62.3	10	----	62.3	0.0	8	-8.0
St D S of St A - 50'	211	1	0.0	71.3	65	71.3	10	Snd Lvl	71.3	0.0	8	-8.0
St D S of St A - 100'	212	1	0.0	67.7	65	67.7	10	Snd Lvl	67.7	0.0	8	-8.0
St D S of St A - 150'	203	1	0.0	66.2	65	66.2	10	Snd Lvl	66.2	0.0	8	-8.0
St D S of St A - 200'	213	1	0.0	64.9	65	64.9	10	----	64.9	0.0	8	-8.0
St D S of St A - 250'	215	1	0.0	64.1	65	64.1	10	----	64.1	0.0	8	-8.0
St D N of St B - 50'	217	1	0.0	69.0	65	69.0	10	Snd Lvl	69.0	0.0	8	-8.0
St D N of St B - 100'	218	1	0.0	66.4	65	66.4	10	Snd Lvl	66.4	0.0	8	-8.0
St D N of St B - 150'	219	1	0.0	65.2	65	65.2	10	Snd Lvl	65.2	0.0	8	-8.0
St D N of St B - 200'	220	1	0.0	64.4	65	64.4	10	----	64.4	0.0	8	-8.0
St D N of St B - 250'	221	1	0.0	63.4	65	63.4	10	----	63.4	0.0	8	-8.0
St E St C to St B - 50'	223	1	0.0	60.5	65	60.5	10	----	60.5	0.0	8	-8.0
St E St C to St B - 100'	224	1	0.0	59.3	65	59.3	10	----	59.3	0.0	8	-8.0
St E St C to St B - 150'	225	1	0.0	59.2	65	59.2	10	----	59.2	0.0	8	-8.0
St E St C to St B - 200'	226	1	0.0	59.1	65	59.1	10	----	59.1	0.0	8	-8.0
St E St C to St B - 250'	227	1	0.0	59.1	65	59.1	10	----	59.1	0.0	8	-8.0
St I St A to St B - 50'	229	1	0.0	64.6	65	64.6	10	----	64.6	0.0	8	-8.0
St I St A to St B - 100'	230	1	0.0	62.4	65	62.4	10	----	62.4	0.0	8	-8.0
St I St A to St B - 150'	231	1	0.0	62.3	65	62.3	10	----	62.3	0.0	8	-8.0
St I St A to St B - 200'	232	1	0.0	62.2	65	62.2	10	----	62.2	0.0	8	-8.0
St I St A to St B - 250'	233	1	0.0	62.1	65	62.1	10	----	62.1	0.0	8	-8.0
St J St A to St B - 50'	235	1	0.0	67.3	65	67.3	10	Snd Lvl	67.3	0.0	8	-8.0
St J St A to St B - 100'	236	1	0.0	63.5	65	63.5	10	----	63.5	0.0	8	-8.0
St J St A to St B - 150'	221	1	0.0	61.7	65	61.7	10	----	61.7	0.0	8	-8.0

St J St A to St B - 200'	237	1	0.0	60.3	65	60.3	10	----	60.3	0.0	8	-8.0
St J St A to St B - 250'	239	1	0.0	59.3	65	59.3	10	----	59.3	0.0	8	-8.0
St J S of St B - 50'	241	1	0.0	67.0	65	67.0	10	Snd Lvl	67.0	0.0	8	-8.0
St J S of St B - 100'	242	1	0.0	63.4	65	63.4	10	----	63.4	0.0	8	-8.0
St J S of St B - 150'	243	1	0.0	61.6	65	61.6	10	----	61.6	0.0	8	-8.0
St J S of St B - 200'	244	1	0.0	60.4	65	60.4	10	----	60.4	0.0	8	-8.0
St J S of St B - 250'	245	1	0.0	59.6	65	59.6	10	----	59.6	0.0	8	-8.0
St J N of EdmstnPmpPlnt Rd - 50'	247	1	0.0	63.1	65	63.1	10	----	63.1	0.0	8	-8.0
St J N of EdmstnPmpPlnt Rd - 100'	248	1	0.0	60.6	65	60.6	10	----	60.6	0.0	8	-8.0
St J N of EdmstnPmpPlnt Rd - 150'	249	1	0.0	59.5	65	59.5	10	----	59.5	0.0	8	-8.0
St J N of EdmstnPmpPlnt Rd - 200'	250	1	0.0	58.7	65	58.7	10	----	58.7	0.0	8	-8.0
St J N of EdmstnPmpPlnt Rd - 250'	251	1	0.0	58.3	65	58.3	10	----	58.3	0.0	8	-8.0
St L St A to St B 50'	253	1	0.0	62.8	65	62.8	10	----	62.8	0.0	8	-8.0
St L St A to St B 100'	254	1	0.0	59.4	65	59.4	10	----	59.4	0.0	8	-8.0
St L St A to St B 150'	255	1	0.0	57.8	65	57.8	10	----	57.8	0.0	8	-8.0
St L St A to St B 200'	256	1	0.0	56.6	65	56.6	10	----	56.6	0.0	8	-8.0
St L St A to St B 250'	257	1	0.0	55.5	65	55.5	10	----	55.5	0.0	8	-8.0
St R Del Oro Dr to St T- 50'	259	1	0.0	67.7	65	67.7	10	Snd Lvl	67.7	0.0	8	-8.0
St R Del Oro Dr to St T- 100'	260	1	0.0	64.7	65	64.7	10	----	64.7	0.0	8	-8.0
St R Del Oro Dr to St T- 150'	261	1	0.0	62.9	65	62.9	10	----	62.9	0.0	8	-8.0
St R Del Oro Dr to St T- 200'	262	1	0.0	61.5	65	61.5	10	----	61.5	0.0	8	-8.0
St R Del Oro Dr to St T- 250'	263	1	0.0	59.6	65	59.6	10	----	59.6	0.0	8	-8.0
St L St B to St M - 50'	265	1	0.0	62.3	65	62.3	10	----	62.3	0.0	8	-8.0
St L St B to St M - 100'	266	1	0.0	59.1	65	59.1	10	----	59.1	0.0	8	-8.0
St L St B to St M - 150'	267	1	0.0	57.4	65	57.4	10	----	57.4	0.0	8	-8.0
St L St B to St M - 200'	268	1	0.0	56.2	65	56.2	10	----	56.2	0.0	8	-8.0
St L St B to St M - 250'	269	1	0.0	54.6	65	54.6	10	----	54.6	0.0	8	-8.0
St T St R to St S- 50'	271	1	0.0	64.8	65	64.8	10	----	64.8	0.0	8	-8.0
St T St R to St S- 100'	273	1	0.0	62.2	65	62.2	10	----	62.2	0.0	8	-8.0
St T St R to St S- 150'	275	1	0.0	60.7	65	60.7	10	----	60.7	0.0	8	-8.0
St T St R to St S- 200'	276	1	0.0	59.6	66	59.6	10	----	59.6	0.0	8	-8.0
St T St R to St S- 250'	277	1	0.0	58.6	66	58.6	10	----	58.6	0.0	8	-8.0
Edmn St D to St J - 50'	281	1	0.0	64.3	66	64.3	10	----	64.3	0.0	8	-8.0
Edmn St D to St J - 100'	285	1	0.0	62.2	66	62.2	10	----	62.2	0.0	8	-8.0
Edmn St D to St J - 150'	286	1	0.0	61.3	66	61.3	10	----	61.3	0.0	8	-8.0
Edmn St D to St J - 200'	281	1	0.0	60.7	66	60.7	10	----	60.7	0.0	8	-8.0
Edmn St D to St J - 250'	287	1	0.0	60.4	66	60.4	10	----	60.4	0.0	8	-8.0
Edmn St J to St K - 50'	288	1	0.0	65.7	66	65.7	10	----	65.7	0.0	8	-8.0
Edmn St J to St K - 100'	290	1	0.0	62.1	66	62.1	10	----	62.1	0.0	8	-8.0
Edmn St J to St K - 150'	291	1	0.0	60.3	66	60.3	10	----	60.3	0.0	8	-8.0
Edmn St J to St K - 200'	293	1	0.0	59.0	66	59.0	10	----	59.0	0.0	8	-8.0
Edmn St J to St K - 250'	281	1	0.0	58.1	66	58.1	10	----	58.1	0.0	8	-8.0

Edmn E of St K - 50'	294	1	0.0	65.8	66	65.8	10	----	65.8	0.0	8	-8.0
Edmn E of St K - 100'	295	1	0.0	62.3	66	62.3	10	----	62.3	0.0	8	-8.0
Edmn E of St K - 150'	296	1	0.0	60.4	66	60.4	10	----	60.4	0.0	8	-8.0
Edmn E of St K - 200'	298	1	0.0	58.9	66	58.9	10	----	58.9	0.0	8	-8.0
Edmn E of St K - 250'	299	1	0.0	57.8	66	57.8	10	----	57.8	0.0	8	-8.0
Del Oro Dr St R to St T - 50'	300	1	0.0	72.8	66	72.8	10	Snd Lvl	72.8	0.0	8	-8.0
Del Oro Dr St R to St T - 100'	304	1	0.0	69.3	66	69.3	10	Snd Lvl	69.3	0.0	8	-8.0
Del Oro Dr St R to St T - 150'	305	1	0.0	67.2	66	67.2	10	Snd Lvl	67.2	0.0	8	-8.0
Del Oro Dr St R to St T - 200'	306	1	0.0	65.8	66	65.8	10	----	65.8	0.0	8	-8.0
Del Oro Dr St R to St T - 250'	314	1	0.0	64.8	66	64.8	10	----	64.8	0.0	8	-8.0
Farmhouse S. of Project	315	1	0.0	67.6	66	67.6	10	Snd Lvl	67.6	0.0	8	-8.0
Ramada Limited	316	1	0.0	68.5	66	68.5	10	Snd Lvl	68.5	0.0	8	-8.0
Best Western	317	1	0.0	73.5	66	73.5	10	Snd Lvl	73.5	0.0	8	-8.0
Microtel Inn & Suites	320	1	0.0	68.5	66	68.5	10	Snd Lvl	68.5	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	207	0.0	0.0	0.0
All Impacted	83	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek **30 November 2015**
M Greene **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cumtv w Proj w Mit**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Street B I-5 to St C	75.0	point55	55	37,149,896.0	12,694,183.0	1,430.00				Average	
		point937	937	37,149,396.0	12,694,059.0	1,495.00				Average	
		point938	938	37,149,144.0	12,693,997.0	1,527.50				Average	
		point57	57	37,148,896.0	12,693,935.0	1,560.00					
Street D N of St B	75.0	point66	66	37,151,060.0	12,694,684.0	1,420.00				Average	
		point930	930	37,151,056.0	12,695,314.0	1,405.00				Average	
		point778	778	37,151,052.0	12,695,944.0	1,390.00					
Street L St A to St B	50.0	point73	73	37,156,016.0	12,694,811.0	1,390.00				Average	
		point828	828	37,155,528.0	12,695,704.0	1,340.00				Average	
		point74	74	37,155,036.0	12,696,598.0	1,290.00					
Street A I-5 to St C	75.0	point81	81	37,149,124.0	12,697,077.0	1,360.00				Average	
		point79	79	37,148,000.0	12,696,798.0	1,370.00					
Street A I-5 to St D	75.0	point82	82	37,149,444.0	12,697,174.0	1,370.00				Average	
		point76	76	37,150,328.0	12,697,405.0	1,360.00				Average	
		point77	77	37,150,820.0	12,697,412.0	1,360.00					
Street A St D to St I	75.0	point84	84	37,151,204.0	12,697,391.0	1,360.00				Average	
		point945	945	37,152,072.0	12,697,391.0	1,330.00				Average	
		point85	85	37,152,936.0	12,697,391.0	1,300.00					
Street D S of St B	75.0	point114	114	37,151,104.0	12,694,432.0	1,420.00				Average	
		point840	840	37,151,308.0	12,693,661.0	1,440.00				Average	
		point781	781	37,151,512.0	12,692,890.0	1,460.00					
Street B I-5 to St A	75.0	point116	116	37,150,156.0	12,694,246.0	1,430.00				Average	
		point118	118	37,150,996.0	12,694,445.0	1,420.00					
Street B St D to St I	75.0	point127	127	37,151,224.0	12,694,535.0	1,420.00				Average	
		point120	120	37,151,944.0	12,694,702.0	1,410.00					
Edmonston Pumping Plant Rd-4	75.0	point195	195	37,161,992.0	12,689,907.0	1,350.00				Average	
		point189	189	37,163,484.0	12,689,688.0	1,300.00				Average	

		point190	190	37,165,736.0	12,689,344.0	1,250.00				Average	
		point191	191	37,168,656.0	12,689,314.0	1,200.00				Average	
		point192	192	37,169,252.0	12,689,409.0	1,200.00				Average	
		point193	193	37,169,832.0	12,689,734.0	1,200.00					
Street M East	50.0	point197	197	37,163,368.0	12,689,727.0	1,300.00				Average	
		point199	199	37,163,584.0	12,691,754.0	1,300.00				Average	
		point200	200	37,162,624.0	12,692,327.0	1,310.00				Average	
		point201	201	37,161,880.0	12,692,333.0	1,310.00					
Street K	50.0	point208	208	37,155,764.0	12,692,346.0	1,350.00				Average	
		point203	203	37,155,568.0	12,692,606.0	1,340.00				Average	
		point204	204	37,155,100.0	12,694,604.0	1,400.00					
Street J St A to St B	75.0	point213	213	37,154,296.0	12,694,767.0	1,405.00				Average	
		point863	863	37,154,288.0	12,695,319.0	1,357.50				Average	
		point215	215	37,154,280.0	12,695,871.0	1,310.00					
Roadway70	50.0	point221	221	37,154,276.0	12,696,899.0	1,290.00				Average	
		point219	219	37,154,308.0	12,697,081.0	1,300.00				Average	
		point214	214	37,154,884.0	12,698,052.0	1,310.00				Average	
		point222	222	37,155,116.0	12,698,403.0	1,320.00				Average	
		point224	224	37,155,672.0	12,698,763.0	1,320.00				Average	
		point225	225	37,156,416.0	12,698,756.0	1,320.00				Average	
		point226	226	37,157,116.0	12,698,398.0	1,320.00				Average	
		point227	227	37,157,772.0	12,698,020.0	1,330.00				Average	
		point228	228	37,158,780.0	12,697,299.0	1,330.00				Average	
		point229	229	37,159,384.0	12,696,485.0	1,340.00				Average	
		point230	230	37,159,772.0	12,695,818.0	1,350.00				Average	
		point231	231	37,160,072.0	12,695,370.0	1,360.00				Average	
		point232	232	37,159,692.0	12,695,164.0	1,370.00				Average	
		point223	223	37,158,432.0	12,694,481.0	1,390.00					
Roadway72	50.0	point233	233	37,155,700.0	12,696,841.0	1,290.00				Average	
		point235	235	37,155,704.0	12,698,724.0	1,320.00					
Street B - St C to St E	50.0	point244	244	37,148,488.0	12,693,761.0	1,560.00				Average	
		point237	237	37,147,080.0	12,692,235.0	1,560.00				Average	
		point238	238	37,145,208.0	12,690,108.0	1,560.00					
Street G	50.0	point269	269	37,147,756.0	12,697,321.0	1,360.00				Average	
		point263	263	37,147,220.0	12,697,531.0	1,410.00				Average	
		point741	741	37,146,680.0	12,697,736.0	1,480.00				Average	
		point742	742	37,146,140.0	12,697,942.0	1,485.00				Average	
		point264	264	37,145,600.0	12,698,147.0	1,490.00					
Street E St C to St B	50.0	point248	248	37,149,172.0	12,690,430.0	1,560.00				Average	
		point881	881	37,148,560.0	12,690,945.0	1,560.00				Average	

		point250	250	37,147,952.0	12,691,460.0	1,560.00				Average	
		point251	251	37,147,092.0	12,692,213.0	1,560.00					
Street H East	50.0	point272	272	37,146,848.0	12,695,949.0	1,500.00				Average	
		point274	274	37,147,472.0	12,696,107.0	1,450.00				Average	
		point275	275	37,148,100.0	12,696,246.0	1,410.00					
Roadway8	50.0	point283	283	37,148,284.0	12,693,815.0	1,560.00				Average	
		point279	279	37,146,812.0	12,694,380.0	1,560.00					
Roadway188	50.0	point285	285	37,146,492.0	12,693,414.0	1,560.00				Average	
		point281	281	37,147,568.0	12,692,892.0	1,560.00					
Roadway 89	50.0	point297	297	37,146,324.0	12,689,588.0	1,560.00				Average	
		point291	291	37,147,908.0	12,691,420.0	1,560.00					
Roadway91	50.0	point298	298	37,159,512.0	12,692,385.0	1,320.00				Average	
		point300	300	37,159,512.0	12,693,176.0	1,390.00					
Roadway97	50.0	point324	324	37,150,120.0	12,697,241.0	1,365.00				Average	
		point326	326	37,150,168.0	12,696,134.0	1,380.00				Average	
		point327	327	37,150,960.0	12,696,128.0	1,370.00					
Roadway99	50.0	point335	335	37,151,096.0	12,696,169.0	1,370.00				Average	
		point329	329	37,152,604.0	12,696,172.0	1,360.00					
Roadway98	50.0	point337	337	37,151,128.0	12,698,772.0	1,330.00				Average	
		point331	331	37,153,440.0	12,698,774.0	1,300.00					
Roadway 92	50.0	point338	338	37,149,800.0	12,698,784.0	1,350.00				Average	
		point333	333	37,150,940.0	12,698,776.0	1,330.00					
Street I St A to St B	50.0	point309	309	37,152,240.0	12,694,757.0	1,410.00				Average	
		point873	873	37,152,456.0	12,695,474.0	1,400.00				Average	
		point302	302	37,152,676.0	12,696,191.0	1,390.00					
Laval Rd E	50.0	point340	340	37,149,532.0	12,707,334.0	1,115.00				Average	
		point354	354	37,149,000.0	12,707,387.0	1,120.00				Average	
		point355	355	37,148,804.0	12,707,422.0	1,120.00				Average	
		point356	356	37,148,504.0	12,707,705.0	1,120.00				Average	
		point357	357	37,148,348.0	12,708,041.0	1,120.00				Average	
		point358	358	37,148,312.0	12,708,412.0	1,120.00					
I5 NB offramp at Laval Rd	50.0	point375	375	37,146,856.0	12,707,618.0	1,180.00				Average	
		point376	376	37,146,912.0	12,708,531.0	1,180.00					
I5 SB offramp at Laval	50.0	point387	387	37,146,384.0	12,707,885.0	1,185.00				Average	
		point388	388	37,146,260.0	12,707,607.0	1,180.00				Average	
		point389	389	37,146,208.0	12,707,434.0	1,170.00				Average	
		point390	390	37,146,196.0	12,707,262.0	1,170.00					
I5 NB onramp at Laval	50.0	point398	398	37,147,060.0	12,708,914.0	1,170.00				Average	
		point378	378	37,146,692.0	12,709,059.0	1,170.00				Average	
		point379	379	37,146,512.0	12,709,192.0	1,170.00				Average	

		point380	380	37,146,436.0	12,709,337.0	1,170.00					
Roadway128	50.0	point409	409	37,146,656.0	12,706,683.0	1,175.00				Average	
		point408	408	37,146,580.0	12,706,573.0	1,175.00				Average	
		point400	400	37,146,536.0	12,706,551.0	1,175.00					
I5 SB onramp at Laval	50.0	point422	422	37,146,208.0	12,707,244.0	1,170.00				Average	
		point403	403	37,146,228.0	12,706,766.0	1,170.00				Average	
		point404	404	37,146,328.0	12,706,599.0	1,175.00				Average	
		point405	405	37,146,676.0	12,706,321.0	1,175.00				Average	
		point406	406	37,146,832.0	12,706,142.0	1,180.00					
Street F Central	50.0	point428	428	37,146,812.0	12,696,032.0	1,500.00				Average	
		point430	430	37,146,520.0	12,697,245.0	1,490.00				Average	
		point431	431	37,146,664.0	12,697,668.0	1,480.00					
Roadway125	50.0	point441	441	37,157,144.0	12,696,814.0	1,290.00				Average	
		point436	436	37,158,412.0	12,697,512.0	1,330.00					
Street F	50.0	point444	444	37,146,712.0	12,697,821.0	1,480.00				Average	
		point433	433	37,147,312.0	12,699,423.0	1,380.00				Average	
		point434	434	37,147,592.0	12,699,490.0	1,360.00					
Roadway141	50.0	point445	445	37,157,076.0	12,696,843.0	1,290.00				Average	
		point447	447	37,157,084.0	12,698,366.0	1,320.00					
Street L St B to St M	50.0	point458	458	37,157,288.0	12,692,442.0	1,330.00				Average	
		point819	819	37,156,924.0	12,693,146.0	1,350.00				Average	
		point820	820	37,156,556.0	12,693,851.0	1,370.00				Average	
		point451	451	37,156,192.0	12,694,555.0	1,390.00					
Roadway144	50.0	point453	453	37,159,480.0	12,690,361.0	1,380.00				Average	
		point460	460	37,159,492.0	12,692,251.0	1,320.00					
I5 onramp loop at Grapevine	50.0	point546	546	37,149,792.0	12,697,111.0	1,365.00				Average	
		point539	539	37,149,800.0	12,696,905.0	1,372.00				Average	
		point540	540	37,149,676.0	12,696,805.0	1,375.00				Average	
		point541	541	37,149,588.0	12,696,811.0	1,375.00					
I5 NB onramp slip at Grapevine	50.0	point572	572	37,149,776.0	12,697,299.0	1,365.00				Average	
		point564	564	37,149,692.0	12,697,604.0	1,360.00				Average	
		point565	565	37,149,652.0	12,697,751.0	1,355.00				Average	
		point566	566	37,149,540.0	12,697,890.0	1,350.00				Average	
		point567	567	37,149,400.0	12,698,053.0	1,345.00				Average	
		point568	568	37,149,252.0	12,698,201.0	1,345.00				Average	
		point569	569	37,149,128.0	12,698,373.0	1,340.00					
I5 SB loop onramp at Grapevine	50.0	point575	575	37,148,772.0	12,697,326.0	1,360.00				Average	
		point577	577	37,148,796.0	12,697,431.0	1,360.00				Average	
		point578	578	37,148,868.0	12,697,492.0	1,355.00				Average	
		point579	579	37,148,964.0	12,697,503.0	1,355.00				Average	

		point580	580	37,149,064.0	12,697,442.0	1,355.00					
I5 SB onramp slip at Grapevine	50.0	point586	586	37,148,776.0	12,696,932.0	1,365.00				Average	
		point582	582	37,148,864.0	12,696,588.0	1,370.00				Average	
		point583	583	37,148,948.0	12,696,443.0	1,375.00				Average	
		point584	584	37,149,032.0	12,696,349.0	1,380.00				Average	
		point559	559	37,149,176.0	12,696,234.0	1,385.00				Average	
		point561	561	37,149,284.0	12,696,151.0	1,390.00				Average	
		point562	562	37,149,440.0	12,695,973.0	1,395.00					
I5 SB offramp at Grapevine	50.0	point598	598	37,148,844.0	12,698,353.0	1,340.00				Average	
		point592	592	37,148,800.0	12,697,975.0	1,345.00				Average	
		point593	593	37,148,724.0	12,697,758.0	1,350.00				Average	
		point594	594	37,148,672.0	12,697,514.0	1,355.00				Average	
		point595	595	37,148,680.0	12,697,330.0	1,360.00				Average	
		point596	596	37,148,724.0	12,697,036.0	1,365.00					
Street R Del Oro Dr to St T	50.0	point624	624	37,150,820.0	12,704,506.0	1,200.00				Average	
		point626	626	37,152,532.0	12,704,507.0	1,190.00				Average	
		point627	627	37,155,008.0	12,704,513.0	1,170.00				Average	
		point628	628	37,157,168.0	12,704,524.0	1,150.00					
Roadway185	50.0	point636	636	37,154,976.0	12,704,560.0	1,170.00				Average	
		point630	630	37,154,976.0	12,706,123.0	1,150.00					
Street T North	50.0	point638	638	37,152,536.0	12,704,550.0	1,190.00				Average	
		point632	632	37,152,536.0	12,706,162.0	1,170.00					
Roadway191	50.0	point640	640	37,154,984.0	12,701,055.0	1,250.00				Average	
		point642	642	37,154,976.0	12,702,935.0	1,210.00					
Street D Del Oro Dr to St S	75.0	point651	651	37,152,116.0	12,702,347.0	1,250.00				Average	
		point641	641	37,152,532.0	12,702,942.0	1,230.00					
Street S	50.0	point653	653	37,156,208.0	12,702,970.0	1,200.00				Average	
		point646	646	37,154,980.0	12,702,977.0	1,210.00				Average	
		point647	647	37,152,544.0	12,702,983.0	1,230.00					
Roadway194	50.0	point665	665	37,152,092.0	12,702,080.0	1,250.00				Average	
		point663	663	37,152,244.0	12,701,807.0	1,250.00				Average	
		point655	655	37,154,880.0	12,700,845.0	1,220.00					
Roadway200	50.0	point321	321	37,151,068.0	12,700,676.0	1,290.00				Average	
		point667	667	37,149,788.0	12,701,117.0	1,300.00				Average	
		point669	669	37,149,608.0	12,701,075.0	1,300.00				Average	
		point670	670	37,149,460.0	12,700,959.0	1,300.00				Average	
		point671	671	37,149,344.0	12,700,802.0	1,310.00				Average	
		point672	672	37,149,332.0	12,700,639.0	1,320.00				Average	
		point673	673	37,149,364.0	12,700,383.0	1,330.00				Average	
		point674	674	37,149,764.0	12,698,759.0	1,350.00				Average	

		point675	675	37,150,104.0	12,697,399.0	1,365.00					
Street H	50.0	point695	695	37,146,756.0	12,695,940.0	1,500.00				Average	
		point696	696	37,145,148.0	12,695,505.0	1,560.00					
Street Q	75.0	point140	140	37,151,924.0	12,691,321.0	1,500.00				Average	
		point142	142	37,151,980.0	12,690,999.0	1,510.00				Average	
		point143	143	37,151,924.0	12,690,788.0	1,520.00				Average	
		point144	144	37,151,780.0	12,690,650.0	1,530.00				Average	
		point145	145	37,151,652.0	12,690,596.0	1,540.00				Average	
		point146	146	37,151,216.0	12,690,473.0	1,550.00					
Street C S of St B	75.0	point136	136	37,148,712.0	12,693,732.0	1,560.00				Average	
		point833	833	37,148,896.0	12,692,984.0	1,560.00				Average	
		point784	784	37,149,080.0	12,692,235.0	1,560.00					
Edmnstn Pumpg Plnt Rd St D to St J	75.0	point167	167	37,151,972.0	12,691,283.0	1,500.00				Average	
		point159	159	37,153,608.0	12,690,806.0	1,480.00					
Roadway57	50.0	point183	183	37,161,744.0	12,692,347.0	1,310.00				Average	
		point177	177	37,161,356.0	12,693,207.0	1,380.00				Average	
		point178	178	37,161,032.0	12,694,020.0	1,350.00				Average	
		point179	179	37,160,672.0	12,694,408.0	1,360.00				Average	
		point180	180	37,160,364.0	12,694,591.0	1,370.00				Average	
		point181	181	37,160,028.0	12,694,633.0	1,370.00				Average	
		point184	184	37,159,676.0	12,694,584.0	1,380.00				Average	
		point186	186	37,159,320.0	12,694,381.0	1,390.00				Average	
		point187	187	37,158,684.0	12,693,904.0	1,395.00					
Roadway55	50.0	point699	699	37,161,912.0	12,689,916.0	1,350.00				Average	
		point170	170	37,161,908.0	12,692,023.0	1,320.00				Average	
		point171	171	37,161,772.0	12,692,324.0	1,310.00					
I5 NB offramp at Grapevine	50.0	point573	573	37,149,716.0	12,696,036.0	1,400.00				Average	
		point560	560	37,149,772.0	12,696,316.0	1,390.00				Average	
		point534	534	37,149,896.0	12,696,597.0	1,380.00				Average	
		point536	536	37,149,868.0	12,696,942.0	1,370.00				Average	
		point537	537	37,149,808.0	12,697,186.0	1,365.00					
Wheeler Ridge Rd	100.0	point364	364	37,148,428.0	12,717,278.0	950.00				Average	
		point363	363	37,147,644.0	12,715,708.0	980.00				Average	
		point361	361	37,147,276.0	12,715,062.0	1,000.00				Average	
		point374	374	37,147,220.0	12,714,754.0	1,010.00				Average	
		point382	382	37,147,388.0	12,711,444.0	1,100.00					
Del Oro Dr St R to St T	100.0	point637	637	37,151,908.0	12,702,410.0	1,250.00				Average	
		point915	915	37,151,336.0	12,703,472.0	1,225.00				Average	
		point366	366	37,150,768.0	12,704,535.0	1,200.00					
Roadway95	50.0	point704	704	37,152,968.0	12,697,460.0	1,300.00				Average	

			point306	306	37,153,524.0	12,698,744.0	1,300.00				Average	
			point307	307	37,153,744.0	12,699,246.0	1,290.00				Average	
			point299	299	37,153,736.0	12,699,545.0	1,280.00				Average	
			point310	310	37,153,620.0	12,699,708.0	1,280.00				Average	
			point312	312	37,153,516.0	12,699,830.0	1,270.00				Average	
			point313	313	37,151,212.0	12,700,629.0	1,290.00					
Street A St L to St N	75.0		point152	152	37,155,080.0	12,696,800.0	1,290.00				Average	
			point164	164	37,155,692.0	12,696,793.0	1,290.00				Average	
			point952	952	37,156,396.0	12,696,796.0	1,290.00				Average	
			point165	165	37,157,100.0	12,696,800.0	1,290.00					
Street Q West	75.0		point707	707	37,150,732.0	12,690,361.0	1,535.00				Average	
			point148	148	37,150,260.0	12,690,234.0	1,540.00				Average	
			point149	149	37,150,072.0	12,690,213.0	1,550.00				Average	
			point141	141	37,149,892.0	12,690,204.0	1,560.00				Average	
			point150	150	37,149,628.0	12,690,212.0	1,560.00				Average	
			point151	151	37,149,292.0	12,690,351.0	1,560.00					
Street E	50.0		point709	709	37,147,004.0	12,692,270.0	1,560.00				Average	
			point253	253	37,146,232.0	12,692,976.0	1,560.00				Average	
			point254	254	37,145,344.0	12,693,747.0	1,560.00				Average	
			point255	255	37,145,136.0	12,694,097.0	1,550.00				Average	
			point256	256	37,145,076.0	12,694,375.0	1,540.00				Average	
			point257	257	37,145,072.0	12,695,368.0	1,520.00				Average	
			point249	249	37,145,088.0	12,697,058.0	1,510.00				Average	
			point258	258	37,145,428.0	12,697,976.0	1,500.00				Average	
			point260	260	37,146,120.0	12,699,868.0	1,370.00				Average	
			point261	261	37,146,460.0	12,700,769.0	1,315.00					
Roadway89	50.0		point711	711	37,147,976.0	12,691,492.0	1,560.00				Average	
			point293	293	37,148,256.0	12,691,783.0	1,560.00				Average	
			point294	294	37,148,124.0	12,692,384.0	1,560.00				Average	
			point295	295	37,147,656.0	12,692,831.0	1,560.00					
Roadway88	50.0		point698	698	37,145,724.0	12,690,807.0	1,560.00				Average	
			point287	287	37,144,948.0	12,691,543.0	1,560.00				Average	
			point289	289	37,146,172.0	12,692,916.0	1,560.00					
Street B East	50.0		point133	133	37,156,272.0	12,694,676.0	1,390.00				Average	
			point129	129	37,156,504.0	12,694,689.0	1,390.00					
I-5 SB - N of Laval Rd	60.0		point351	351	37,144,632.0	12,715,664.0	1,160.00				Average	
			point864	864	37,145,472.0	12,712,280.0	1,165.00				Average	
			point865	865	37,145,752.0	12,711,152.0	1,166.67				Average	
			point866	866	37,146,032.0	12,710,024.0	1,168.33				Average	
			point348	348	37,146,312.0	12,708,896.0	1,170.00					

Roadway195	50.0	point716	716	37,154,972.0	12,703,002.0	1,210.00				Average	
		point644	644	37,154,980.0	12,704,445.0	1,170.00					
Street D N of St A	75.0	point91	91	37,151,044.0	12,697,561.0	1,360.00				Average	
		point734	734	37,151,048.0	12,698,972.0	1,325.00				Average	
		point860	860	37,151,048.0	12,699,442.0	1,313.33				Average	
		point861	861	37,151,048.0	12,699,912.0	1,301.67				Average	
		point61	61	37,151,048.0	12,700,382.0	1,290.00					
Street J N of Edmnstn PumpPlnt Rd	75.0	point210	210	37,153,660.0	12,691,070.0	1,480.00				Average	
		point877	877	37,153,816.0	12,691,826.0	1,462.50				Average	
		point789	789	37,153,976.0	12,692,582.0	1,445.00					
Street M	50.0	point172	172	37,161,720.0	12,692,324.0	1,310.00				Average	
		point700	700	37,155,816.0	12,692,332.0	1,350.00					
Dennis McCarthy Dr	50.0	point426	426	37,146,220.0	12,708,669.0	1,170.00				Average	
		point418	418	37,146,128.0	12,708,224.0	1,170.00				Average	
		point419	419	37,145,996.0	12,707,790.0	1,170.00				Average	
		point420	420	37,145,808.0	12,707,578.0	1,160.00				Average	
		point399	399	37,145,540.0	12,707,389.0	1,160.00				Average	
		point401	401	37,145,540.0	12,707,278.0	1,160.00					
Laval Rd	50.0	point743	743	37,144,528.0	12,707,155.0	1,150.00				Average	
		point424	424	37,145,540.0	12,707,233.0	1,160.00				Average	
		point416	416	37,146,152.0	12,707,244.0	1,170.00					
Street T St R to St S	50.0	point747	747	37,152,544.0	12,702,983.0	1,230.00				Average	
		point922	922	37,152,540.0	12,703,728.0	1,210.00				Average	
		point648	648	37,152,536.0	12,704,474.0	1,190.00					
Roadway54-2	50.0	point749	749	37,155,816.0	12,692,332.0	1,350.00				Average	
		point175	175	37,155,832.0	12,690,680.0	1,420.00					
Street B St L to St N	50.0	point750	750	37,156,504.0	12,694,689.0	1,390.00				Average	
		point960	960	37,157,168.0	12,695,050.0	1,385.00				Average	
		point124	124	37,157,832.0	12,695,411.0	1,380.00					
Street N	50.0	point449	449	37,157,100.0	12,696,755.0	1,290.00				Average	
		point751	751	37,157,836.0	12,695,412.0	1,380.00				Average	
		point125	125	37,158,280.0	12,694,630.0	1,390.00				Average	
		point714	714	37,158,864.0	12,693,536.0	1,400.00				Average	
		point713	713	37,158,988.0	12,693,352.0	1,400.00				Average	
		point134	134	37,159,220.0	12,693,242.0	1,390.00				Average	
		point135	135	37,161,348.0	12,693,221.0	1,380.00					
Street F South	50.0	point271	271	37,146,260.0	12,693,006.0	1,560.00				Average	
		point266	266	37,146,332.0	12,693,095.0	1,560.00				Average	
		point267	267	37,146,444.0	12,693,392.0	1,560.00				Average	
		point259	259	37,147,064.0	12,695,092.0	1,560.00				Average	

		point689	689	37,146,844.0	12,695,864.0	1,560.00					
Street C S of St A	75.0	point753	753	37,148,000.0	12,696,798.0	1,370.00				Average	
		point738	738	37,148,160.0	12,696,092.0	1,417.50				Average	
		point830	830	37,148,240.0	12,695,739.0	1,441.25				Average	
		point739	739	37,148,316.0	12,695,386.0	1,465.00				Average	
		point787	787	37,148,392.0	12,695,032.0	1,488.75					
Street B South	50.0	point754	754	37,145,208.0	12,690,108.0	1,560.00				Average	
		point239	239	37,145,668.0	12,689,776.0	1,560.00				Average	
		point240	240	37,146,372.0	12,689,498.0	1,560.00				Average	
		point241	241	37,146,852.0	12,689,433.0	1,560.00				Average	
		point242	242	37,147,476.0	12,689,479.0	1,560.00				Average	
		point245	245	37,148,084.0	12,689,588.0	1,560.00				Average	
		point246	246	37,148,564.0	12,689,832.0	1,560.00				Average	
		point247	247	37,148,920.0	12,690,085.0	1,560.00				Average	
		point234	234	37,149,220.0	12,690,308.0	1,560.00					
Wheeler Ridge Rd-2	100.0	point755	755	37,147,388.0	12,711,444.0	1,100.00				Average	
		point383	383	37,147,500.0	12,709,897.0	1,120.00				Average	
		point393	393	37,147,404.0	12,709,371.0	1,150.00				Average	
		point394	394	37,147,132.0	12,708,915.0	1,170.00				Average	
		point386	386	37,146,700.0	12,708,330.0	1,185.00					
Laval Rd E-2	50.0	point756	756	37,148,312.0	12,708,412.0	1,120.00				Average	
		point359	359	37,148,276.0	12,709,030.0	1,120.00				Average	
		point360	360	37,148,152.0	12,709,419.0	1,120.00				Average	
		point342	342	37,147,568.0	12,709,945.0	1,120.00					
Del Oro Dr-North	100.0	point759	759	37,150,768.0	12,704,535.0	1,200.00				Average	
		point367	367	37,149,904.0	12,706,125.0	1,150.00				Average	
		point368	368	37,149,640.0	12,706,611.0	1,130.00				Average	
		point369	369	37,149,592.0	12,707,300.0	1,115.00				Average	
		point370	370	37,149,612.0	12,708,979.0	1,080.00				Average	
		point362	362	37,149,612.0	12,711,400.0	1,040.00					
Street D S of Del Oro Dr	75.0	point760	760	37,151,048.0	12,700,382.0	1,290.00				Average	
		point878	878	37,151,352.0	12,701,170.0	1,267.50				Average	
		point62	62	37,151,660.0	12,701,957.0	1,245.00				Average	
		point63	63	37,151,796.0	12,702,088.0	1,250.00					
Street A St I St J	75.0	point761	761	37,152,936.0	12,697,391.0	1,300.00				Average	
		point959	959	37,153,600.0	12,697,106.0	1,295.00				Average	
		point86	86	37,154,264.0	12,696,822.0	1,290.00					
Street A St J to St L	75.0	point762	762	37,154,264.0	12,696,822.0	1,290.00				Average	
		point87	87	37,154,808.0	12,696,823.0	1,290.00					
Street I-2	50.0	point764	764	37,152,676.0	12,696,191.0	1,390.00				Average	

		point763	763	37,152,680.0	12,696,791.0	1,350.00				Average	
		point875	875	37,152,716.0	12,696,882.0	1,341.67				Average	
		point876	876	37,152,756.0	12,696,973.0	1,333.33				Average	
		point874	874	37,152,792.0	12,697,064.0	1,325.00				Average	
		point304	304	37,152,900.0	12,697,336.0	1,300.00					
Street J S of St A	75.0	point765	765	37,154,280.0	12,695,871.0	1,310.00				Average	
		point216	216	37,154,296.0	12,696,123.0	1,300.00				Average	
		point217	217	37,154,280.0	12,696,758.0	1,290.00					
Street B-2	50.0	point766	766	37,151,944.0	12,694,702.0	1,410.00				Average	
		point776	776	37,152,256.0	12,694,700.0	1,409.00					
Street B St J to St L	75.0	point768	768	37,155,092.0	12,694,679.0	1,400.00				Average	
		point130	130	37,155,484.0	12,694,678.0	1,395.00				Average	
		point131	131	37,155,964.0	12,694,656.0	1,390.00					
Street B-2 St J to St L	75.0	point775	775	37,154,252.0	12,694,685.0	1,402.67				Average	
		point121	121	37,155,092.0	12,694,679.0	1,400.00					
Street B St I to St J	75.0	point777	777	37,152,256.0	12,694,700.0	1,409.00				Average	
		point769	769	37,152,572.0	12,694,697.0	1,408.00				Average	
		point895	895	37,153,308.0	12,694,692.0	1,405.67				Average	
		point773	773	37,154,044.0	12,694,687.0	1,403.33				Average	
		point774	774	37,154,252.0	12,694,685.0	1,402.67					
Edmnstn Pumping Plnt Rd- St J to St K	75.0	point779	779	37,153,608.0	12,690,806.0	1,480.00				Average	
		point160	160	37,154,252.0	12,690,716.0	1,450.00				Average	
		point894	894	37,155,040.0	12,690,684.0	1,435.00				Average	
		point161	161	37,155,832.0	12,690,652.0	1,420.00					
Edmonstn Pumping Plant Rd E of St K	75.0	point780	780	37,155,832.0	12,690,652.0	1,420.00				Average	
		point162	162	37,157,604.0	12,690,592.0	1,400.00				Average	
		point737	737	37,159,760.0	12,690,254.0	1,375.00				Average	
		point163	163	37,161,912.0	12,689,916.0	1,350.00					
Street D N of Edmnstn Pmp Plnt Rd	75.0	point783	783	37,151,512.0	12,692,890.0	1,460.00				Average	
		point841	841	37,151,716.0	12,692,119.0	1,480.00				Average	
		point111	111	37,151,920.0	12,691,348.0	1,500.00					
Street C N of St E	75.0	point786	786	37,149,080.0	12,692,235.0	1,560.00				Average	
		point879	879	37,149,264.0	12,691,486.0	1,560.00				Average	
		point137	137	37,149,444.0	12,690,738.0	1,560.00				Average	
		point138	138	37,149,424.0	12,690,593.0	1,560.00				Average	
		point139	139	37,149,320.0	12,690,385.0	1,560.00					
Street C N of St B	75.0	point788	788	37,148,392.0	12,695,032.0	1,488.75				Average	
		point740	740	37,148,472.0	12,694,679.0	1,512.50				Average	
		point71	71	37,148,632.0	12,693,973.0	1,560.00					
Street J S of St B	75.0	point790	790	37,153,976.0	12,692,582.0	1,445.00				Average	

		point211	211	37,154,296.0	12,694,093.0	1,410.00				Average	
		point212	212	37,154,292.0	12,694,634.0	1,405.00					
Street C St G to Tejon Ind Dr	75.0	point690	690	37,148,000.0	12,696,798.0	1,370.00				Average	
		point691	691	37,147,860.0	12,697,313.0	1,360.00				Average	
		point692	692	37,147,976.0	12,698,532.0	1,360.00				Average	
		point829	829	37,147,824.0	12,699,048.0	1,360.00				Average	
		point693	693	37,147,668.0	12,699,564.0	1,360.00				Average	
		point694	694	37,147,424.0	12,700,259.0	1,350.00				Average	
		point102	102	37,147,412.0	12,700,267.0	1,340.00				Average	
		point104	104	37,147,228.0	12,700,470.0	1,330.00				Average	
		point105	105	37,146,940.0	12,700,631.0	1,320.00				Average	
		point793	793	37,146,336.0	12,700,866.0	1,316.67					
Tejon Industrial Dr-2	75.0	point795	795	37,146,336.0	12,700,866.0	1,316.67				Average	
		point794	794	37,145,728.0	12,701,102.0	1,313.33				Average	
		point745	745	37,145,124.0	12,701,337.0	1,310.00				Average	
		point107	107	37,144,752.0	12,701,478.0	1,300.00				Average	
		point112	112	37,144,376.0	12,701,749.0	1,280.00				Average	
		point109	109	37,144,088.0	12,702,152.0	1,270.00				Average	
		point429	429	37,144,124.0	12,703,527.0	1,260.00				Average	
		point411	411	37,144,260.0	12,703,950.0	1,250.00				Average	
		point413	413	37,144,528.0	12,707,155.0	1,150.00					
I-5 NB-N. of Laval Rd	60.0	point796	796	37,146,780.0	12,707,546.0	1,180.00				Average	
		point345	345	37,146,344.0	12,709,339.0	1,170.00				Average	
		point346	346	37,144,756.0	12,715,700.0	1,160.00					
I-5 SB-Laval Rd to Grapevine	60.0	point797	797	37,146,312.0	12,708,896.0	1,170.00				Average	
		point349	349	37,147,016.0	12,706,140.0	1,180.00				Average	
		point341	341	37,147,448.0	12,704,400.0	1,187.00				Average	
		point17	17	37,147,964.0	12,702,354.0	1,243.42				Average	
		point18	18	37,148,072.0	12,701,834.0	1,249.98				Average	
		point725	725	37,148,548.0	12,699,917.0	1,295.26				Average	
		point726	726	37,149,024.0	12,697,999.0	1,340.53				Average	
		point729	729	37,149,264.0	12,697,040.0	1,363.17					
I-5 NB - Grapevine to Laval Rd	60.0	point798	798	37,149,448.0	12,696,794.0	1,374.66				Average	
		point721	721	37,149,196.0	12,697,836.0	1,351.69				Average	
		point722	722	37,148,944.0	12,698,879.0	1,328.72				Average	
		point723	723	37,148,688.0	12,699,921.0	1,305.76				Average	
		point724	724	37,148,436.0	12,700,964.0	1,282.79				Average	
		point13	13	37,148,184.0	12,702,006.0	1,259.83				Average	
		point14	14	37,148,076.0	12,702,449.0	1,243.42				Average	
		point15	15	37,147,608.0	12,704,330.0	1,187.65				Average	

		point344	344	37,146,780.0	12,707,546.0	1,180.00					
I-5 NB - S of Project	60.0	point1	1	37,153,028.0	12,684,391.0	1,929.11				Average	
		point3	3	37,153,248.0	12,685,181.0	1,902.86				Average	
		point4	4	37,153,384.0	12,685,928.0	1,843.81				Average	
		point5	5	37,153,160.0	12,686,660.0	1,771.63				Average	
		point6	6	37,152,824.0	12,687,382.0	1,735.54				Average	
		point7	7	37,152,404.0	12,688,176.0	1,696.17				Average	
		point8	8	37,151,928.0	12,689,142.0	1,614.15				Average	
		point9	9	37,151,432.0	12,689,932.0	1,568.22				Average	
		point791	791	37,150,956.0	12,690,697.0	1,525.57				Average	
		point11	11	37,150,784.0	12,691,266.0	1,499.33				Average	
		point12	12	37,150,708.0	12,691,583.0	1,489.48				Average	
		point720	720	37,150,080.0	12,694,188.0	1,432.07				Average	
		point719	719	37,149,448.0	12,696,794.0	1,374.66					
I-5 SB-S of Project	60.0	point799	799	37,149,264.0	12,697,040.0	1,363.17				Average	
		point727	727	37,149,504.0	12,696,082.0	1,385.81				Average	
		point728	728	37,149,980.0	12,694,164.0	1,431.08				Average	
		point19	19	37,150,456.0	12,692,247.0	1,476.36				Average	
		point842	842	37,150,568.0	12,691,750.0	1,489.48				Average	
		point42	42	37,150,684.0	12,691,252.0	1,502.60				Average	
		point792	792	37,150,824.0	12,690,687.0	1,525.60				Average	
		point45	45	37,150,836.0	12,690,078.0	1,548.50				Average	
		point46	46	37,150,796.0	12,689,211.0	1,604.30				Average	
		point47	47	37,150,732.0	12,688,230.0	1,647.00				Average	
		point48	48	37,150,768.0	12,687,925.0	1,673.20				Average	
		point49	49	37,150,932.0	12,687,584.0	1,706.00				Average	
		point50	50	37,151,108.0	12,687,279.0	1,755.20				Average	
		point51	51	37,151,420.0	12,686,623.0	1,768.40				Average	
		point43	43	37,151,468.0	12,685,985.0	1,804.40				Average	
		point52	52	37,151,600.0	12,685,185.0	1,843.80				Average	
		point53	53	37,151,740.0	12,684,824.0	1,879.90				Average	
		point54	54	37,151,984.0	12,684,316.0	1,886.50					
Roadway305	50.0	point843	843	37,144,692.0	12,711,333.0	1,166.00				Average	
		point844	844	37,144,648.0	12,711,318.0	1,166.00				Average	
		point845	845	37,144,600.0	12,711,305.0	1,166.00				Average	
		point846	846	37,144,552.0	12,711,290.0	1,166.00				Average	
		point847	847	37,144,504.0	12,711,276.0	1,166.00				Average	
		point848	848	37,144,456.0	12,711,262.0	1,166.00				Average	
		point849	849	37,144,404.0	12,711,248.0	1,166.00				Average	
		point850	850	37,144,356.0	12,711,234.0	1,166.00				Average	

			point851	851	37,144,308.0	12,711,219.0	1,166.00				Average	
			point852	852	37,144,260.0	12,711,205.0	1,166.00				Average	
			point853	853	37,144,212.0	12,711,191.0	1,166.00					
Street D S of St A	75.0		point929	929	37,151,052.0	12,695,944.0	1,390.00				Average	
			point862	862	37,151,048.0	12,696,574.0	1,375.00				Average	
			point59	59	37,151,044.0	12,697,205.0	1,360.00					
Roadway329	50.0		point983	983	37,144,068.0	12,711,216.0	1,490.00				Average	
			point984	984	37,144,020.0	12,711,201.0	1,490.00				Average	
			point985	985	37,143,972.0	12,711,187.0	1,490.00				Average	
			point986	986	37,143,924.0	12,711,173.0	1,490.00				Average	
			point987	987	37,143,872.0	12,711,159.0	1,490.00				Average	
			point988	988	37,143,824.0	12,711,145.0	1,490.00				Average	
			point989	989	37,143,776.0	12,711,130.0	1,490.00				Average	
			point990	990	37,143,728.0	12,711,116.0	1,490.00				Average	
			point991	991	37,143,680.0	12,711,102.0	1,490.00					

Dudek 30 November
M Greene TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Percentages

PROJECT/CONTRACT: P/N 7667
RUN: Grapevine Project - Cumtv w Proj w Mit

Roadway	Points													
Name	Name	No.	Segment											
			Total	Autos		MTrucks		HTrucks		Buses		Motorcycles		
			Volume	P	S	P	S	P	S	P	S	P	S	
			veh/hr	%	mph	%	mph	%	mph	%	mph	%	mph	
Street B I-5 to St C	point55	55	790	76	30	6	30	18	30	0	0	0	0	
	point937	937	790	76	30	6	30	18	30	0	0	0	0	
	point938	938	790	76	30	6	30	18	30	0	0	0	0	
	point57	57												
Street D N of St B	point66	66	920	76	30	6	30	18	30	0	0	0	0	
	point930	930	920	76	30	6	30	18	30	0	0	0	0	
	point778	778												
Street L St A to St B	point73	73	900	96	30	3	30	1	30	0	0	0	0	
	point828	828	900	96	30	3	30	1	30	0	0	0	0	
	point74	74												
Street A I-5 to St C	point81	81	0	0	0	0	0	0	0	0	0	0	0	
	point79	79												
Street A I-5 to St D	point82	82	0	0	0	0	0	0	0	0	0	0	0	
	point76	76	0	0	0	0	0	0	0	0	0	0	0	
	point77	77												
Street A St D to St I	point84	84	3550	76	30	6	30	18	30	0	0	0	0	
	point945	945	3550	76	30	6	30	18	30	0	0	0	0	
	point85	85												
Street D S of St B	point114	114	450	76	30	6	30	18	30	0	0	0	0	
	point840	840	450	76	30	6	30	18	30	0	0	0	0	
	point781	781												
Street B I-5 to St A	point116	116	790	76	30	6	30	18	30	0	0	0	0	
	point118	118												
Street B St D to St I	point127	127	900	76	30	6	30	18	30	0	0	0	0	
	point120	120												

Edmonston Pumping Plant Rd-4	point195	195	0	0	0	0	0	0	0	0	0	0	0
	point189	189	0	0	0	0	0	0	0	0	0	0	0
	point190	190	0	0	0	0	0	0	0	0	0	0	0
	point191	191	0	0	0	0	0	0	0	0	0	0	0
	point192	192	0	0	0	0	0	0	0	0	0	0	0
	point193	193											
Street M East	point197	197	0	0	0	0	0	0	0	0	0	0	0
	point199	199	0	0	0	0	0	0	0	0	0	0	0
	point200	200	0	0	0	0	0	0	0	0	0	0	0
	point201	201											
Street K	point208	208	0	0	0	0	0	0	0	0	0	0	0
	point203	203	0	0	0	0	0	0	0	0	0	0	0
	point204	204											
Street J St A to St B	point213	213	800	76	25	6	25	18	25	0	0	0	0
	point863	863	800	76	25	6	25	18	25	0	0	0	0
	point215	215											
Roadway70	point221	221	0	0	0	0	0	0	0	0	0	0	0
	point219	219	0	0	0	0	0	0	0	0	0	0	0
	point214	214	0	0	0	0	0	0	0	0	0	0	0
	point222	222	0	0	0	0	0	0	0	0	0	0	0
	point224	224	0	0	0	0	0	0	0	0	0	0	0
	point225	225	0	0	0	0	0	0	0	0	0	0	0
	point226	226	0	0	0	0	0	0	0	0	0	0	0
	point227	227	0	0	0	0	0	0	0	0	0	0	0
	point228	228	0	0	0	0	0	0	0	0	0	0	0
	point229	229	0	0	0	0	0	0	0	0	0	0	0
	point230	230	0	0	0	0	0	0	0	0	0	0	0
	point231	231	0	0	0	0	0	0	0	0	0	0	0
	point232	232	0	0	0	0	0	0	0	0	0	0	0
	point223	223											
Roadway72	point233	233	0	0	0	0	0	0	0	0	0	0	0
	point235	235											
Street B - St C to St E	point244	244	980	96	25	3	25	1	25	0	0	0	0
	point237	237	980	96	25	3	25	1	25	0	0	0	0
	point238	238											
Street G	point269	269	0	0	0	0	0	0	0	0	0	0	0
	point263	263	0	0	0	0	0	0	0	0	0	0	0

	point741	741	0	0	0	0	0	0	0	0	0	0	0
	point742	742	0	0	0	0	0	0	0	0	0	0	0
	point264	264											
Street E St C to St B	point248	248	410	96	25	3	25	1	25	0	0	0	0
	point881	881	410	96	25	3	25	1	25	0	0	0	0
	point250	250	410	96	25	3	25	1	25	0	0	0	0
	point251	251											
Street H East	point272	272	0	0	0	0	0	0	0	0	0	0	0
	point274	274	0	0	0	0	0	0	0	0	0	0	0
	point275	275											
Roadway8	point283	283	0	0	0	0	0	0	0	0	0	0	0
	point279	279											
Roadway188	point285	285	0	0	0	0	0	0	0	0	0	0	0
	point281	281											
Roadway 89	point297	297	0	0	0	0	0	0	0	0	0	0	0
	point291	291											
Roadway91	point298	298	0	0	0	0	0	0	0	0	0	0	0
	point300	300											
Roadway97	point324	324	0	0	0	0	0	0	0	0	0	0	0
	point326	326	0	0	0	0	0	0	0	0	0	0	0
	point327	327											
Roadway99	point335	335	0	0	0	0	0	0	0	0	0	0	0
	point329	329											
Roadway98	point337	337	0	0	0	0	0	0	0	0	0	0	0
	point331	331											
Roadway 92	point338	338	0	0	0	0	0	0	0	0	0	0	0
	point333	333											
Street I St A to St B	point309	309	80	96	25	3	25	1	25	0	0	0	0
	point873	873	80	96	25	3	25	1	25	0	0	0	0
	point302	302											
Laval Rd E	point340	340	1450	76	45	6	45	18	45	0	0	0	0
	point354	354	1450	76	45	6	45	18	45	0	0	0	0
	point355	355	1450	76	45	6	45	18	45	0	0	0	0
	point356	356	1450	76	45	6	45	18	45	0	0	0	0
	point357	357	1450	76	45	6	45	18	45	0	0	0	0
	point358	358											
I5 NB offramp at Laval Rd	point375	375	110	76	50	6	50	18	50	0	0	0	0

	point376	376											
I5 SB offramp at Laval	point387	387	490	76	50	6	50	18	50	0	0	0	0
	point388	388	490	76	50	6	50	18	50	0	0	0	0
	point389	389	490	76	50	6	50	18	50	0	0	0	0
	point390	390											
I5 NB onramp at Laval	point398	398	860	76	50	6	50	18	50	0	0	0	0
	point378	378	860	76	50	6	50	18	50	0	0	0	0
	point379	379	860	76	50	6	50	18	50	0	0	0	0
	point380	380											
Roadway128	point409	409	0	0	0	0	0	0	0	0	0	0	0
	point408	408	0	0	0	0	0	0	0	0	0	0	0
	point400	400											
I5 SB onramp at Laval	point422	422	650	76	50	6	50	18	50	0	0	0	0
	point403	403	650	76	50	6	50	18	50	0	0	0	0
	point404	404	650	76	50	6	50	18	50	0	0	0	0
	point405	405	650	76	50	6	50	18	50	0	0	0	0
	point406	406											
Street F Central	point428	428	0	0	0	0	0	0	0	0	0	0	0
	point430	430	0	0	0	0	0	0	0	0	0	0	0
	point431	431											
Roadway125	point441	441	0	0	0	0	0	0	0	0	0	0	0
	point436	436											
Street F	point444	444	0	0	0	0	0	0	0	0	0	0	0
	point433	433	0	0	0	0	0	0	0	0	0	0	0
	point434	434											
Roadway141	point445	445	0	0	0	0	0	0	0	0	0	0	0
	point447	447											
Street L St B to St M	point458	458	1140	96	25	3	25	1	25	0	0	0	0
	point819	819	1140	96	25	3	25	1	25	0	0	0	0
	point820	820	1140	96	25	3	25	1	25	0	0	0	0
	point451	451											
Roadway144	point453	453	0	0	0	0	0	0	0	0	0	0	0
	point460	460											
I5 onramp loop at Grapevine	point546	546	460	96	50	3	50	1	50	0	0	0	0
	point539	539	460	96	50	3	50	1	50	0	0	0	0
	point540	540	460	96	50	3	50	1	50	0	0	0	0
	point541	541											

I5 NB onramp slip at Grapevine	point572	572	510	76	50	6	50	18	50	0	0	0	0
	point564	564	510	76	50	6	50	18	50	0	0	0	0
	point565	565	510	76	50	6	50	18	50	0	0	0	0
	point566	566	510	76	50	6	50	18	50	0	0	0	0
	point567	567	510	76	50	6	50	18	50	0	0	0	0
	point568	568	510	76	50	6	50	18	50	0	0	0	0
	point569	569											
I5 SB loop onramp at Grapevine	point575	575	650	76	50	6	50	18	50	0	0	0	0
	point577	577	650	76	50	6	50	18	50	0	0	0	0
	point578	578	650	76	50	6	50	18	50	0	0	0	0
	point579	579	650	76	50	6	50	18	50	0	0	0	0
	point580	580											
I5 SB onramp slip at Grapevine	point586	586	360	76	50	6	50	18	50	0	0	0	0
	point582	582	360	76	50	6	50	18	50	0	0	0	0
	point583	583	360	76	50	6	50	18	50	0	0	0	0
	point584	584	360	76	50	6	50	18	50	0	0	0	0
	point559	559	360	76	50	6	50	18	50	0	0	0	0
	point561	561	360	76	50	6	50	18	50	0	0	0	0
	point562	562											
I5 SB offramp at Grapevine	point598	598	1370	76	50	6	50	18	50	0	0	0	0
	point592	592	1370	76	50	6	50	18	50	0	0	0	0
	point593	593	1370	76	50	6	50	18	50	0	0	0	0
	point594	594	1370	76	50	6	50	18	50	0	0	0	0
	point595	595	1370	76	50	6	50	18	50	0	0	0	0
	point596	596											
Street R Del Oro Dr to St T	point624	624	970	76	25	6	25	18	25	0	0	0	0
	point626	626	970	76	25	6	25	18	25	0	0	0	0
	point627	627	970	76	25	6	25	18	25	0	0	0	0
	point628	628											
Roadway185	point636	636	0	0	0	0	0	0	0	0	0	0	0
	point630	630											
Street T North	point638	638	0	0	0	0	0	0	0	0	0	0	0
	point632	632											
Roadway191	point640	640	0	0	0	0	0	0	0	0	0	0	0
	point642	642											
Street D Del Oro Dr to St S	point651	651	550	76	25	6	25	18	25	0	0	0	0
	point641	641											

Street S	point653	653	0	0	0	0	0	0	0	0	0	0	0
	point646	646	0	0	0	0	0	0	0	0	0	0	0
	point647	647											
Roadway194	point665	665	0	0	0	0	0	0	0	0	0	0	0
	point663	663	0	0	0	0	0	0	0	0	0	0	0
	point655	655											
Roadway200	point321	321	0	0	0	0	0	0	0	0	0	0	0
	point667	667	0	0	0	0	0	0	0	0	0	0	0
	point669	669	0	0	0	0	0	0	0	0	0	0	0
	point670	670	0	0	0	0	0	0	0	0	0	0	0
	point671	671	0	0	0	0	0	0	0	0	0	0	0
	point672	672	0	0	0	0	0	0	0	0	0	0	0
	point673	673	0	0	0	0	0	0	0	0	0	0	0
	point674	674	0	0	0	0	0	0	0	0	0	0	0
	point675	675											
Street H	point695	695	0	0	0	0	0	0	0	0	0	0	0
	point696	696											
Street Q	point140	140	140	76	30	6	30	18	30	0	0	0	0
	point142	142	140	76	30	6	30	18	30	0	0	0	0
	point143	143	140	76	30	6	30	18	30	0	0	0	0
	point144	144	140	76	30	6	30	18	30	0	0	0	0
	point145	145	140	76	30	6	30	18	30	0	0	0	0
	point146	146											
Street C S of St B	point136	136	860	76	30	6	30	18	30	0	0	0	0
	point833	833	860	76	30	6	30	18	30	0	0	0	0
	point784	784											
Edmnstn Pumpg Plnt Rd St D to St J	point167	167	230	76	30	6	30	18	30	0	0	0	0
	point159	159											
Roadway57	point183	183	0	0	0	0	0	0	0	0	0	0	0
	point177	177	0	0	0	0	0	0	0	0	0	0	0
	point178	178	0	0	0	0	0	0	0	0	0	0	0
	point179	179	0	0	0	0	0	0	0	0	0	0	0
	point180	180	0	0	0	0	0	0	0	0	0	0	0
	point181	181	0	0	0	0	0	0	0	0	0	0	0
	point184	184	0	0	0	0	0	0	0	0	0	0	0
	point186	186	0	0	0	0	0	0	0	0	0	0	0
	point187	187											

Roadway55	point699	699	0	0	0	0	0	0	0	0	0	0	0
	point170	170	0	0	0	0	0	0	0	0	0	0	0
	point171	171											
I5 NB offramp at Grapevine	point573	573	1070	76	50	6	50	18	50	0	0	0	0
	point560	560	1070	76	50	6	50	18	50	0	0	0	0
	point534	534	1070	76	50	6	50	18	50	0	0	0	0
	point536	536	1070	76	50	6	50	18	50	0	0	0	0
	point537	537											
Wheeler Ridge Rd	point364	364	880	76	45	6	45	18	45	0	0	0	0
	point363	363	880	76	45	6	45	18	45	0	0	0	0
	point361	361	880	76	45	6	45	18	45	0	0	0	0
	point374	374	880	76	45	6	45	18	45	0	0	0	0
	point382	382											
Del Oro Dr St R to St T	point637	637	2690	76	30	6	30	18	30	0	0	0	0
	point915	915	2690	76	30	6	30	18	30	0	0	0	0
	point366	366											
Roadway95	point704	704	0	0	0	0	0	0	0	0	0	0	0
	point306	306	0	0	0	0	0	0	0	0	0	0	0
	point307	307	0	0	0	0	0	0	0	0	0	0	0
	point299	299	0	0	0	0	0	0	0	0	0	0	0
	point310	310	0	0	0	0	0	0	0	0	0	0	0
	point312	312	0	0	0	0	0	0	0	0	0	0	0
	point313	313											
Street A St L to St N	point152	152	1050	76	25	6	25	18	25	0	0	0	0
	point164	164	1050	76	25	6	25	18	25	0	0	0	0
	point952	952	1050	76	25	6	25	18	25	0	0	0	0
	point165	165											
Street Q West	point707	707	140	76	30	6	30	18	30	0	0	0	0
	point148	148	140	76	30	6	30	18	30	0	0	0	0
	point149	149	140	76	30	6	30	18	30	0	0	0	0
	point141	141	140	76	30	6	30	18	30	0	0	0	0
	point150	150	140	76	30	6	30	18	30	0	0	0	0
	point151	151											
Street E	point709	709	0	0	0	0	0	0	0	0	0	0	0
	point253	253	0	0	0	0	0	0	0	0	0	0	0
	point254	254	0	0	0	0	0	0	0	0	0	0	0
	point255	255	0	0	0	0	0	0	0	0	0	0	0

	point256	256	0	0	0	0	0	0	0	0	0	0	0
	point257	257	0	0	0	0	0	0	0	0	0	0	0
	point249	249	0	0	0	0	0	0	0	0	0	0	0
	point258	258	0	0	0	0	0	0	0	0	0	0	0
	point260	260	0	0	0	0	0	0	0	0	0	0	0
	point261	261											
Roadway89	point711	711	0	0	0	0	0	0	0	0	0	0	0
	point293	293	0	0	0	0	0	0	0	0	0	0	0
	point294	294	0	0	0	0	0	0	0	0	0	0	0
	point295	295											
Roadway88	point698	698	0	0	0	0	0	0	0	0	0	0	0
	point287	287	0	0	0	0	0	0	0	0	0	0	0
	point289	289											
Street B East	point133	133	0	0	0	0	0	0	0	0	0	0	0
	point129	129											
I-5 SB - N of Laval Rd	point351	351	6690	76	70	6	70	18	70	0	0	0	0
	point864	864	6690	76	70	6	70	18	70	0	0	0	0
	point865	865	6690	76	70	6	70	18	70	0	0	0	0
	point866	866	6690	76	70	6	70	18	70	0	0	0	0
	point348	348											
Roadway195	point716	716	0	0	0	0	0	0	0	0	0	0	0
	point644	644											
Street D N of St A	point91	91	2990	76	30	6	30	18	30	0	0	0	0
	point734	734	2990	76	30	6	30	18	30	0	0	0	0
	point860	860	2990	76	30	6	30	18	30	0	0	0	0
	point861	861	2990	76	30	6	30	18	30	0	0	0	0
	point61	61											
Street J N of Edmnstn PumpPlnt Rd	point210	210	230	76	25	6	25	18	25	0	0	0	0
	point877	877	230	76	25	6	25	18	25	0	0	0	0
	point789	789											
Street M	point172	172	0	0	0	0	0	0	0	0	0	0	0
	point700	700											
Dennis McCarthy Dr	point426	426	710	76	25	6	25	18	25	0	0	0	0
	point418	418	710	76	25	6	25	18	25	0	0	0	0
	point419	419	710	76	25	6	25	18	25	0	0	0	0
	point420	420	710	76	25	6	25	18	25	0	0	0	0
	point399	399	710	76	25	6	25	18	25	0	0	0	0

	point401	401											
Laval Rd	point743	743	0	76	30	6	30	18	30	0	0	0	0
	point424	424	0	76	30	6	30	18	30	0	0	0	0
	point416	416											
Street T St R to St S	point747	747	430	76	25	6	25	18	25	0	0	0	0
	point922	922	430	76	25	6	25	18	25	0	0	0	0
	point648	648											
Roadway54-2	point749	749	0	0	0	0	0	0	0	0	0	0	0
	point175	175											
Street B St L to St N	point750	750	250	96	25	3	25	1	25	0	0	0	0
	point960	960	250	96	25	3	25	1	25	0	0	0	0
	point124	124											
Street N	point449	449	0	0	0	0	0	0	0	0	0	0	0
	point751	751	0	0	0	0	0	0	0	0	0	0	0
	point125	125	0	0	0	0	0	0	0	0	0	0	0
	point714	714	0	0	0	0	0	0	0	0	0	0	0
	point713	713	0	0	0	0	0	0	0	0	0	0	0
	point134	134	0	0	0	0	0	0	0	0	0	0	0
	point135	135											
Street F South	point271	271	0	0	0	0	0	0	0	0	0	0	0
	point266	266	0	0	0	0	0	0	0	0	0	0	0
	point267	267	0	0	0	0	0	0	0	0	0	0	0
	point259	259	0	0	0	0	0	0	0	0	0	0	0
	point689	689											
Street C S of St A	point753	753	2550	76	30	6	30	18	30	0	0	0	0
	point738	738	2550	76	30	6	30	18	30	0	0	0	0
	point830	830	2550	76	30	6	30	18	30	0	0	0	0
	point739	739	2550	76	30	6	30	18	30	0	0	0	0
	point787	787											
Street B South	point754	754	0	0	0	0	0	0	0	0	0	0	0
	point239	239	0	0	0	0	0	0	0	0	0	0	0
	point240	240	0	0	0	0	0	0	0	0	0	0	0
	point241	241	0	0	0	0	0	0	0	0	0	0	0
	point242	242	0	0	0	0	0	0	0	0	0	0	0
	point245	245	0	0	0	0	0	0	0	0	0	0	0
	point246	246	0	0	0	0	0	0	0	0	0	0	0
	point247	247	0	0	0	0	0	0	0	0	0	0	0

	point234	234											
Wheeler Ridge Rd-2	point755	755	1440	76	45	6	45	18	45	0	0	0	0
	point383	383	1440	76	45	6	45	18	45	0	0	0	0
	point393	393	1440	76	45	6	45	18	45	0	0	0	0
	point394	394	1440	76	45	6	45	18	45	0	0	0	0
	point386	386											
Laval Rd E-2	point756	756	1840	76	45	6	45	18	45	0	0	0	0
	point359	359	1840	76	45	6	45	18	45	0	0	0	0
	point360	360	1840	76	45	6	45	18	45	0	0	0	0
	point342	342											
Del Oro Dr-North	point759	759	2610	76	30	6	30	18	30	0	0	0	0
	point367	367	2610	76	30	6	30	18	30	0	0	0	0
	point368	368	2610	76	30	6	30	18	30	0	0	0	0
	point369	369	2610	76	30	6	30	18	30	0	0	0	0
	point370	370	2610	76	30	6	30	18	30	0	0	0	0
	point362	362											
Street D S of Del Oro Dr	point760	760	3130	76	30	6	30	18	30	0	0	0	0
	point878	878	3130	76	30	6	30	18	30	0	0	0	0
	point62	62	3130	76	30	6	30	18	30	0	0	0	0
	point63	63											
Street A St I St J	point761	761	2910	76	30	6	30	18	30	0	0	0	0
	point959	959	2910	76	30	6	30	18	30	0	0	0	0
	point86	86											
Street A St J to St L	point762	762	1850	76	30	6	30	18	30	0	0	0	0
	point87	87											
Street I-2	point764	764	80	96	25	3	25	1	25	0	0	0	0
	point763	763	80	96	25	3	25	1	25	0	0	0	0
	point875	875	80	96	25	3	25	1	25	0	0	0	0
	point876	876	80	96	25	3	25	1	25	0	0	0	0
	point874	874	80	96	25	3	25	1	25	0	0	0	0
	point304	304											
Street J S of St A	point765	765	0	0	0	0	0	0	0	0	0	0	0
	point216	216	0	0	0	0	0	0	0	0	0	0	0
	point217	217											
Street B-2	point766	766	0	0	0	0	0	0	0	0	0	0	0
	point776	776											
Street B St J to St L	point768	768	500	76	30	6	30	18	30	0	0	0	0

	point130	130	500	76	30	6	30	18	30	0	0	0	0
	point131	131											
Street B-2 St J to St L	point775	775	720	76	30	6	30	18	30	0	0	0	0
	point121	121											
Street B St I to St J	point777	777	720	76	30	6	30	18	30	0	0	0	0
	point769	769	720	76	30	6	30	18	30	0	0	0	0
	point895	895	720	76	30	6	30	18	30	0	0	0	0
	point773	773	720	76	30	6	30	18	30	0	0	0	0
	point774	774											
Edmnstn Pumping Plnt Rd- St J to St K	point779	779	430	76	30	6	30	18	30	0	0	0	0
	point160	160	430	76	30	6	30	18	30	0	0	0	0
	point894	894	430	76	30	6	30	18	30	0	0	0	0
	point161	161											
Edmonstn Pumping Plant Rd E of St K	point780	780	510	76	30	6	30	18	30	0	0	0	0
	point162	162	510	76	30	6	30	18	30	0	0	0	0
	point737	737	510	76	30	6	30	18	30	0	0	0	0
	point163	163											
Street D N of Edmnstn Pmp Plnt Rd	point783	783	220	76	30	6	30	18	30	0	0	0	0
	point841	841	220	76	30	6	30	18	30	0	0	0	0
	point111	111											
Street C N of St E	point786	786	430	76	30	6	30	18	30	0	0	0	0
	point879	879	430	76	30	6	30	18	30	0	0	0	0
	point137	137	430	76	30	6	30	18	30	0	0	0	0
	point138	138	430	76	30	6	30	18	30	0	0	0	0
	point139	139											
Street C N of St B	point788	788	1440	76	30	6	30	18	30	0	0	0	0
	point740	740	1440	76	30	6	30	18	30	0	0	0	0
	point71	71											
Street J S of St B	point790	790	660	76	25	6	25	18	25	0	0	0	0
	point211	211	660	76	25	6	25	18	25	0	0	0	0
	point212	212											
Street C St G to Tejon Ind Dr	point690	690	1340	76	30	6	30	18	30	0	0	0	0
	point691	691	1340	76	30	6	30	18	30	0	0	0	0
	point692	692	1340	76	30	6	30	18	30	0	0	0	0
	point829	829	1340	76	30	6	30	18	30	0	0	0	0
	point693	693	1340	76	30	6	30	18	30	0	0	0	0
	point694	694	1340	76	30	6	30	18	30	0	0	0	0

	point102	102	1340	76	30	6	30	18	30	0	0	0	0
	point104	104	1340	76	30	6	30	18	30	0	0	0	0
	point105	105	1340	76	30	6	30	18	30	0	0	0	0
	point793	793											
Tejon Industrial Dr-2	point795	795	1430	76	30	6	30	18	30	0	0	0	0
	point794	794	1430	76	30	6	30	18	30	0	0	0	0
	point745	745	1430	76	30	6	30	18	30	0	0	0	0
	point107	107	1430	76	30	6	30	18	30	0	0	0	0
	point112	112	1430	76	30	6	30	18	30	0	0	0	0
	point109	109	1430	76	30	6	30	18	30	0	0	0	0
	point429	429	1430	76	30	6	30	18	30	0	0	0	0
	point411	411	1430	76	30	6	30	18	30	0	0	0	0
	point413	413											
I-5 NB-N. of Laval Rd	point796	796	6730	76	70	6	70	18	70	0	0	0	0
	point345	345	6730	76	70	6	70	18	70	0	0	0	0
	point346	346											
I-5 SB-Laval Rd to Grapevine	point797	797	6140	76	70	6	70	18	70	0	0	0	0
	point349	349	6140	76	70	6	70	18	70	0	0	0	0
	point341	341	6140	76	70	6	70	18	70	0	0	0	0
	point17	17	6140	76	70	6	70	18	70	0	0	0	0
	point18	18	6140	76	70	6	70	18	70	0	0	0	0
	point725	725	6140	76	70	6	70	18	70	0	0	0	0
	point726	726	6140	76	70	6	70	18	70	0	0	0	0
	point729	729											
I-5 NB - Grapevine to Laval Rd	point798	798	6450	76	70	6	70	18	70	0	0	0	0
	point721	721	6450	76	70	6	70	18	70	0	0	0	0
	point722	722	6450	76	70	6	70	18	70	0	0	0	0
	point723	723	6450	76	70	6	70	18	70	0	0	0	0
	point724	724	6450	76	70	6	70	18	70	0	0	0	0
	point13	13	6450	76	70	6	70	18	70	0	0	0	0
	point14	14	6450	76	70	6	70	18	70	0	0	0	0
	point15	15	6450	76	70	6	70	18	70	0	0	0	0
	point344	344											
I-5 NB - S of Project	point1	1	6550	76	70	6	70	18	70	0	0	0	0
	point3	3	6550	76	70	6	70	18	70	0	0	0	0
	point4	4	6550	76	70	6	70	18	70	0	0	0	0
	point5	5	6550	76	70	6	70	18	70	0	0	0	0

	point6	6	6550	76	70	6	70	18	70	0	0	0	0
	point7	7	6550	76	70	6	70	18	70	0	0	0	0
	point8	8	6550	76	70	6	70	18	70	0	0	0	0
	point9	9	6550	76	70	6	70	18	70	0	0	0	0
	point791	791	6550	76	70	6	70	18	70	0	0	0	0
	point11	11	6550	76	70	6	70	18	70	0	0	0	0
	point12	12	6550	76	70	6	70	18	70	0	0	0	0
	point720	720	6550	76	70	6	70	18	70	0	0	0	0
	point719	719											
I-5 SB-S of Project	point799	799	5810	76	70	6	70	18	70	0	0	0	0
	point727	727	5810	76	70	6	70	18	70	0	0	0	0
	point728	728	5810	76	70	6	70	18	70	0	0	0	0
	point19	19	5810	76	70	6	70	18	70	0	0	0	0
	point842	842	5810	76	70	6	70	18	70	0	0	0	0
	point42	42	5810	76	70	6	70	18	70	0	0	0	0
	point792	792	5810	76	70	6	70	18	70	0	0	0	0
	point45	45	5810	76	70	6	70	18	70	0	0	0	0
	point46	46	5810	76	70	6	70	18	70	0	0	0	0
	point47	47	5810	76	70	6	70	18	70	0	0	0	0
	point48	48	5810	76	70	6	70	18	70	0	0	0	0
	point49	49	5810	76	70	6	70	18	70	0	0	0	0
	point50	50	5810	76	70	6	70	18	70	0	0	0	0
	point51	51	5810	76	70	6	70	18	70	0	0	0	0
	point43	43	5810	76	70	6	70	18	70	0	0	0	0
	point52	52	5810	76	70	6	70	18	70	0	0	0	0
	point53	53	5810	76	70	6	70	18	70	0	0	0	0
	point54	54											
Roadway305	point843	843	0	0	0	0	0	0	0	0	0	0	0
	point844	844	0	0	0	0	0	0	0	0	0	0	0
	point845	845	0	0	0	0	0	0	0	0	0	0	0
	point846	846	0	0	0	0	0	0	0	0	0	0	0
	point847	847	0	0	0	0	0	0	0	0	0	0	0
	point848	848	0	0	0	0	0	0	0	0	0	0	0
	point849	849	0	0	0	0	0	0	0	0	0	0	0
	point850	850	0	0	0	0	0	0	0	0	0	0	0
	point851	851	0	0	0	0	0	0	0	0	0	0	0
	point852	852	0	0	0	0	0	0	0	0	0	0	0

		point853	853											
Street D S of St A		point929	929	1570	76	30	6	30	18	30	0	0	0	0
		point862	862	1570	76	30	6	30	18	30	0	0	0	0
		point59	59											
Roadway329		point983	983	0	0	0	0	0	0	0	0	0	0	0
		point984	984	0	0	0	0	0	0	0	0	0	0	0
		point985	985	0	0	0	0	0	0	0	0	0	0	0
		point986	986	0	0	0	0	0	0	0	0	0	0	0
		point987	987	0	0	0	0	0	0	0	0	0	0	0
		point988	988	0	0	0	0	0	0	0	0	0	0	0
		point989	989	0	0	0	0	0	0	0	0	0	0	0
		point990	990	0	0	0	0	0	0	0	0	0	0	0
		point991	991											

Dudek **30 November 2015**
M Greene **TNM 2.5**

INPUT: RECEIVERS
PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cumtv w Proj w Mit**

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
I-5 Grapevine - 100'	8	1	37,150,536.0	12,691,664.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 200'	10	1	37,150,440.0	12,691,635.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 300'	12	1	37,150,340.0	12,691,607.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 400'	17	1	37,150,244.0	12,691,578.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 500'	19	1	37,150,148.0	12,691,550.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 600'	20	1	37,150,056.0	12,691,522.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 700'	26	1	37,149,956.0	12,691,494.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 800'	28	1	37,149,860.0	12,691,465.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 900'	31	1	37,149,764.0	12,691,437.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 1000'	33	1	37,149,668.0	12,691,407.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Grapevine - 1100'	34	1	37,149,572.0	12,691,382.0	1,490.00	5.00	0.00	65	10.0	8.0	Y
I-5 Laval - 100'	37	1	37,148,476.0	12,700,950.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 200'	39	1	37,148,572.0	12,700,979.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 300'	41	1	37,148,672.0	12,701,007.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 400'	44	1	37,148,768.0	12,701,036.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 500'	45	1	37,148,860.0	12,701,064.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 600'	46	1	37,148,952.0	12,701,090.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 700'	47	1	37,149,056.0	12,701,124.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 800'	49	1	37,149,152.0	12,701,156.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 900'	50	1	37,149,252.0	12,701,185.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 1000'	51	1	37,149,348.0	12,701,215.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 1100'	52	1	37,149,444.0	12,701,243.0	1,283.00	5.00	0.00	65	10.0	8.0	
I-5 Laval - 1200'	53	1	37,149,540.0	12,701,269.0	1,283.00	5.00	0.00	66	10.0	8.0	
I-5 N of Laval - 100'	55	1	37,145,680.0	12,711,297.0	1,166.00	5.00	0.00	65	10.0	8.0	

I-5 N of Laval - 200'	56	1	37,145,584.0	12,711,268.0	1,166.00	5.00	0.00	65	10.0	8.0	
I-5 N of Laval - 300'	57	1	37,145,484.0	12,711,240.0	1,166.00	5.00	0.00	65	10.0	8.0	
I-5 N of Laval - 400'	58	1	37,145,388.0	12,711,211.0	1,166.00	5.00	0.00	65	10.0	8.0	
I-5 N of Laval - 500'	59	1	37,145,292.0	12,711,183.0	1,166.00	5.00	0.00	65	10.0	8.0	
I-5 N. of Laval - 600'	62	1	37,145,200.0	12,711,153.0	1,166.00	5.00	0.00	65	10.0	8.0	
I-5 N. of Laval - 700'	63	1	37,145,104.0	12,711,125.0	1,166.00	5.00	0.00	65	10.0	8.0	
I-5 N. of Laval - 800'	64	1	37,145,004.0	12,711,097.0	1,166.00	5.00	0.00	65	10.0	8.0	
I-5 N. of Laval - 900'	65	1	37,144,912.0	12,711,070.0	1,166.00	5.00	0.00	65	10.0	8.0	
I-5 N. of Laval - 1000'	67	1	37,144,816.0	12,711,041.0	1,166.00	5.00	0.00	65	10.0	8.0	
I-5 N. of Laval - 1200'	68	1	37,144,628.0	12,710,984.0	1,166.00	5.00	0.00	65	10.0	8.0	
St A St D to St I- 50'	69	1	37,152,072.0	12,697,441.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 100'	70	1	37,152,072.0	12,697,491.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 150'	71	1	37,152,072.0	12,697,541.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 200'	83	1	37,152,072.0	12,697,591.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St D to St I- 250'	84	1	37,152,072.0	12,697,641.0	1,330.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 50'	85	1	37,154,572.0	12,696,877.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L -100'	86	1	37,154,572.0	12,696,927.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 150'	86	1	37,154,572.0	12,696,977.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 200'	87	1	37,154,572.0	12,697,027.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St J to St L - 250'	88	1	37,154,572.0	12,697,077.0	1,290.00	5.00	0.00	65	10.0	8.0	Y
St A St L to St N - 50'	89	1	37,156,396.0	12,696,851.0	1,290.00	5.00	0.00	65	10.0	8.0	
St A St L to St N - 100'	90	1	37,156,396.0	12,696,901.0	1,290.00	5.00	0.00	65	10.0	8.0	
St A St L to St N - 150'	91	1	37,156,396.0	12,696,951.0	1,290.00	5.00	0.00	65	10.0	8.0	
St A St L to St N - 200'	93	1	37,156,396.0	12,697,001.0	1,290.00	5.00	0.00	65	10.0	8.0	
St A St L to St N - 250'	94	1	37,156,396.0	12,697,051.0	1,290.00	5.00	0.00	65	10.0	8.0	
St A St I St J - 50'	95	1	37,153,624.0	12,697,147.0	1,295.00	5.00	0.00	65	10.0	8.0	
St A St I St J - 100'	96	1	37,153,652.0	12,697,188.0	1,295.00	5.00	0.00	65	10.0	8.0	
St A St I St J - 150'	97	1	37,153,684.0	12,697,229.0	1,295.00	5.00	0.00	65	10.0	8.0	
St A St I St J - 200'	99	1	37,153,712.0	12,697,270.0	1,295.00	5.00	0.00	65	10.0	8.0	
St A St I St J - 250'	100	1	37,153,740.0	12,697,311.0	1,295.00	5.00	0.00	65	10.0	8.0	
St B St D to St I - 100'	101	1	37,151,656.0	12,694,744.0	1,415.00	5.00	0.00	65	10.0	8.0	
St B St D to St I - 150'	102	1	37,151,656.0	12,694,794.0	1,415.00	5.00	0.00	65	10.0	8.0	
St B St D to St I - 200'	103	1	37,151,656.0	12,694,844.0	1,415.00	5.00	0.00	65	10.0	8.0	
St B St D to St I - 250'	105	1	37,151,656.0	12,694,894.0	1,415.00	5.00	0.00	65	10.0	8.0	
St B St L to St N - 50'	106	1	37,157,132.0	12,695,089.0	1,385.00	5.00	0.00	65	10.0	8.0	
St B St L to St N - 100'	107	1	37,157,104.0	12,695,130.0	1,385.00	5.00	0.00	65	10.0	8.0	
St B St L to St N - 150'	108	1	37,157,072.0	12,695,172.0	1,385.00	5.00	0.00	65	10.0	8.0	

St B St L to St N - 200'	109	1	37,157,044.0	12,695,213.0	1,385.00	5.00	0.00	65	10.0	8.0	
St B St L to St N - 250'	119	1	37,157,016.0	12,695,255.0	1,385.00	5.00	0.00	65	10.0	8.0	
St B St I to St J - 50'	120	1	37,153,304.0	12,694,746.0	1,406.00	5.00	0.00	65	10.0	8.0	
St B St I to St J - 100'	121	1	37,153,304.0	12,694,796.0	1,406.00	5.00	0.00	65	10.0	8.0	
St B St I to St J - 150'	122	1	37,153,304.0	12,694,846.0	1,406.00	5.00	0.00	65	10.0	8.0	
St B St I to St J - 200'	123	1	37,153,304.0	12,694,896.0	1,406.00	5.00	0.00	65	10.0	8.0	
St B St I to St J - 250'	124	1	37,153,304.0	12,694,946.0	1,406.00	5.00	0.00	65	10.0	8.0	
St B St J to St L - 50'	125	1	37,155,480.0	12,694,728.0	1,395.00	5.00	0.00	65	10.0	8.0	
St B St J to St L - 100'	126	1	37,155,480.0	12,694,778.0	1,395.00	5.00	0.00	65	10.0	8.0	
St B St J to St L - 150'	127	1	37,155,480.0	12,694,828.0	1,395.00	5.00	0.00	65	10.0	8.0	
St B St J to St L - 200'	129	1	37,155,480.0	12,694,878.0	1,395.00	5.00	0.00	65	10.0	8.0	
St B St J to St L - 250'	130	1	37,155,480.0	12,694,928.0	1,395.00	5.00	0.00	65	10.0	8.0	
St B-E St C to St E - 50'	131	1	37,146,424.0	12,691,413.0	1,560.00	5.00	0.00	65	10.0	8.0	
St B-E St C to St E - 100'	116	1	37,146,464.0	12,691,381.0	1,560.00	5.00	0.00	65	10.0	8.0	
St B-E St C to St E - 150'	132	1	37,146,500.0	12,691,348.0	1,560.00	5.00	0.00	65	10.0	8.0	
St B-E St C to St E - 200'	135	1	37,146,540.0	12,691,316.0	1,560.00	5.00	0.00	65	10.0	8.0	
St B-E St C to St E - 250'	138	1	37,146,576.0	12,691,283.0	1,560.00	5.00	0.00	65	10.0	8.0	
St C St G to Tejon Ind Dr - 50'	116	1	37,147,780.0	12,699,015.0	1,360.00	5.00	0.00	65	10.0	8.0	
St C St G to Tejon Ind Dr - 100'	139	1	37,147,732.0	12,698,988.0	1,360.00	5.00	0.00	65	10.0	8.0	
St C St G to Tejon Ind Dr - 150'	141	1	37,147,692.0	12,698,962.0	1,360.00	5.00	0.00	65	10.0	8.0	
St C St G to Tejon Ind Dr - 200'	143	1	37,147,648.0	12,698,937.0	1,360.00	5.00	0.00	65	10.0	8.0	
St C St G to Tejon Ind Dr - 250'	144	1	37,147,604.0	12,698,912.0	1,360.00	5.00	0.00	65	10.0	8.0	
St C S of St A - 200'	116	1	37,148,068.0	12,695,617.0	1,442.00	5.00	0.00	65	10.0	8.0	
St C S of St A - 250'	145	1	37,148,028.0	12,695,594.0	1,442.00	5.00	0.00	65	10.0	8.0	
St C S of St A - 300'	147	1	37,147,988.0	12,695,567.0	1,442.00	5.00	0.00	65	10.0	8.0	
St C S of St A - 350'	149	1	37,147,944.0	12,695,538.0	1,442.00	5.00	0.00	65	10.0	8.0	
St C S of St A - 400'	147	1	37,147,904.0	12,695,512.0	1,442.00	5.00	0.00	65	10.0	8.0	
St C N of St B - 250'	153	1	37,148,244.0	12,694,564.0	1,513.00	5.00	0.00	65	10.0	8.0	
St C N of St B - 300'	155	1	37,148,200.0	12,694,545.0	1,513.00	5.00	0.00	65	10.0	8.0	
St C N of St B - 350'	156	1	37,148,152.0	12,694,516.0	1,513.00	5.00	0.00	65	10.0	8.0	
St C N of St B - 400'	145	1	37,148,112.0	12,694,489.0	1,513.00	5.00	0.00	65	10.0	8.0	
St C N of St B - 450'	157	1	37,148,068.0	12,694,462.0	1,513.00	5.00	0.00	65	10.0	8.0	
St C S of St B - 50'	159	1	37,148,844.0	12,692,986.0	1,560.00	5.00	0.00	65	10.0	8.0	
St C S of St B - 100'	161	1	37,148,796.0	12,692,959.0	1,560.00	5.00	0.00	65	10.0	8.0	
St C S of St B - 150'	162	1	37,148,756.0	12,692,933.0	1,560.00	5.00	0.00	65	10.0	8.0	
St C S of St B - 200'	145	1	37,148,712.0	12,692,908.0	1,560.00	5.00	0.00	65	10.0	8.0	
St C S of St B - 250'	163	1	37,148,668.0	12,692,883.0	1,560.00	5.00	0.00	65	10.0	8.0	

St C N of St E - 50'	165	1	37,149,216.0	12,691,475.0	1,560.00	5.00	0.00	65	10.0	8.0	
St C N of St E - 100'	167	1	37,149,168.0	12,691,461.0	1,560.00	5.00	0.00	65	10.0	8.0	
St C N of St E - 150'	145	1	37,149,120.0	12,691,446.0	1,560.00	5.00	0.00	65	10.0	8.0	
St C N of St E - 200'	168	1	37,149,072.0	12,691,432.0	1,560.00	5.00	0.00	65	10.0	8.0	
St C N of St E - 250'	170	1	37,149,024.0	12,691,418.0	1,560.00	5.00	0.00	65	10.0	8.0	
St D N of St A - 50'	172	1	37,151,088.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	
St D N of St A - 100'	173	1	37,151,140.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	
St D N of St A - 150'	174	1	37,151,188.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	
St D N of St A - 200'	175	1	37,151,240.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	
St D N of St A - 250'	176	1	37,151,288.0	12,699,419.0	1,313.00	5.00	0.00	65	10.0	8.0	
St D S of Del Oro Dr - 50'	178	1	37,151,400.0	12,701,153.0	1,268.00	5.00	0.00	65	10.0	8.0	
St D S of Del Oro Dr - 100'	179	1	37,151,448.0	12,701,137.0	1,268.00	5.00	0.00	65	10.0	8.0	
St D S of Del Oro Dr - 150'	180	1	37,151,496.0	12,701,122.0	1,268.00	5.00	0.00	65	10.0	8.0	
St D S of Del Oro Dr - 200'	181	1	37,151,544.0	12,701,106.0	1,268.00	5.00	0.00	65	10.0	8.0	
St D S of Del Oro Dr - 250'	182	1	37,151,588.0	12,701,089.0	1,268.00	5.00	0.00	65	10.0	8.0	
St D Oro Dr to St S - 50'	187	1	37,152,396.0	12,702,656.0	1,240.00	5.00	0.00	65	10.0	8.0	
St D Oro Dr to St S - 100'	188	1	37,152,444.0	12,702,640.0	1,240.00	5.00	0.00	65	10.0	8.0	
St D Oro Dr to St S - 150'	189	1	37,152,492.0	12,702,625.0	1,240.00	5.00	0.00	65	10.0	8.0	
St D Oro Dr to St S - 200'	190	1	37,152,540.0	12,702,609.0	1,240.00	5.00	0.00	65	10.0	8.0	
St D Oro Dr to St S - 250'	191	1	37,152,588.0	12,702,593.0	1,240.00	5.00	0.00	65	10.0	8.0	
St D S of St B - 50'	193	1	37,151,364.0	12,693,679.0	1,440.00	5.00	0.00	65	10.0	8.0	
St D S of St B - 100'	194	1	37,151,412.0	12,693,689.0	1,440.00	5.00	0.00	65	10.0	8.0	
St D S of St B - 150'	145	1	37,151,460.0	12,693,706.0	1,440.00	5.00	0.00	65	10.0	8.0	
St D S of St B - 200'	201	1	37,151,508.0	12,693,721.0	1,440.00	5.00	0.00	65	10.0	8.0	
St D S of St B - 250'	203	1	37,151,552.0	12,693,738.0	1,440.00	5.00	0.00	65	10.0	8.0	
St D N of EdstnPmpPlnt Rd - 50'	205	1	37,151,764.0	12,692,138.0	1,480.00	5.00	0.00	65	10.0	8.0	
St D N of EdstnPmpPlnt Rd - 100'	206	1	37,151,808.0	12,692,148.0	1,480.00	5.00	0.00	65	10.0	8.0	
St D N of EdstnPmpPlnt Rd - 150'	207	1	37,151,864.0	12,692,166.0	1,480.00	5.00	0.00	65	10.0	8.0	
St D N of EdstnPmpPlnt Rd - 200'	208	1	37,151,912.0	12,692,180.0	1,480.00	5.00	0.00	65	10.0	8.0	
St D N of EdstnPmpPlnt Rd - 250'	209	1	37,151,956.0	12,692,193.0	1,480.00	5.00	0.00	65	10.0	8.0	
St D S of St A - 50'	211	1	37,151,096.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	
St D S of St A - 100'	212	1	37,151,148.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	
St D S of St A - 150'	203	1	37,151,196.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	
St D S of St A - 200'	213	1	37,151,248.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	
St D S of St A - 250'	215	1	37,151,296.0	12,696,592.0	1,375.00	5.00	0.00	65	10.0	8.0	
St D N of St B - 50'	217	1	37,151,108.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	
St D N of St B - 100'	218	1	37,151,156.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	

St D N of St B - 150'	219	1	37,151,208.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	
St D N of St B - 200'	220	1	37,151,256.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	
St D N of St B - 250'	221	1	37,151,308.0	12,695,313.0	1,405.00	5.00	0.00	65	10.0	8.0	
St E St C to St B - 50'	223	1	37,148,596.0	12,690,984.0	1,560.00	5.00	0.00	65	10.0	8.0	
St E St C to St B - 100'	224	1	37,148,632.0	12,691,019.0	1,560.00	5.00	0.00	65	10.0	8.0	
St E St C to St B - 150'	225	1	37,148,668.0	12,691,053.0	1,560.00	5.00	0.00	65	10.0	8.0	
St E St C to St B - 200'	226	1	37,148,704.0	12,691,086.0	1,560.00	5.00	0.00	65	10.0	8.0	
St E St C to St B - 250'	227	1	37,148,740.0	12,691,123.0	1,560.00	5.00	0.00	65	10.0	8.0	
St I St A to St B - 50'	229	1	37,152,812.0	12,696,979.0	1,398.00	5.00	0.00	65	10.0	8.0	
St I St A to St B - 100'	230	1	37,152,860.0	12,696,963.0	1,330.00	5.00	0.00	65	10.0	8.0	
St I St A to St B - 150'	231	1	37,152,908.0	12,696,948.0	1,330.00	5.00	0.00	65	10.0	8.0	
St I St A to St B - 200'	232	1	37,152,956.0	12,696,932.0	1,330.00	5.00	0.00	65	10.0	8.0	
St I St A to St B - 250'	233	1	37,153,004.0	12,696,916.0	1,330.00	5.00	0.00	65	10.0	8.0	
St J St A to St B - 50'	235	1	37,154,336.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	
St J St A to St B - 100'	236	1	37,154,388.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	
St J St A to St B - 150'	221	1	37,154,436.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	
St J St A to St B - 200'	237	1	37,154,488.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	
St J St A to St B - 250'	239	1	37,154,536.0	12,695,323.0	1,358.00	5.00	0.00	65	10.0	8.0	
St J S of St B - 50'	241	1	37,154,340.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	
St J S of St B - 100'	242	1	37,154,392.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	
St J S of St B - 150'	243	1	37,154,440.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	
St J S of St B - 200'	244	1	37,154,492.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	
St J S of St B - 250'	245	1	37,154,540.0	12,694,075.0	1,410.00	5.00	0.00	65	10.0	8.0	
St J N of EdmstnPmpPlnt Rd - 50'	247	1	37,153,860.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	
St J N of EdmstnPmpPlnt Rd - 100'	248	1	37,153,912.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	
St J N of EdmstnPmpPlnt Rd - 150'	249	1	37,153,960.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	
St J N of EdmstnPmpPlnt Rd - 200'	250	1	37,154,012.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	
St J N of EdmstnPmpPlnt Rd - 250'	251	1	37,154,060.0	12,691,790.0	1,463.00	5.00	0.00	65	10.0	8.0	
St L St A to St B 50'	253	1	37,155,484.0	12,695,684.0	1,340.00	5.00	0.00	65	10.0	8.0	
St L St A to St B 100'	254	1	37,155,436.0	12,695,657.0	1,340.00	5.00	0.00	65	10.0	8.0	
St L St A to St B 150'	255	1	37,155,396.0	12,695,631.0	1,340.00	5.00	0.00	65	10.0	8.0	
St L St A to St B 200'	256	1	37,155,352.0	12,695,606.0	1,340.00	5.00	0.00	65	10.0	8.0	
St L St A to St B 250'	257	1	37,155,308.0	12,695,581.0	1,340.00	5.00	0.00	65	10.0	8.0	
St R Del Oro Dr to St T- 50'	259	1	37,153,756.0	12,704,563.0	1,180.00	5.00	0.00	65	10.0	8.0	
St R Del Oro Dr to St T- 100'	260	1	37,153,756.0	12,704,613.0	1,180.00	5.00	0.00	65	10.0	8.0	
St R Del Oro Dr to St T- 150'	261	1	37,153,756.0	12,704,663.0	1,180.00	5.00	0.00	65	10.0	8.0	
St R Del Oro Dr to St T- 200'	262	1	37,153,756.0	12,704,713.0	1,180.00	5.00	0.00	65	10.0	8.0	

St R Del Oro Dr to St T- 250'	263	1	37,153,756.0	12,704,763.0	1,180.00	5.00	0.00	65	10.0	8.0	
St L St B to St M - 50'	265	1	37,156,512.0	12,693,827.0	1,370.00	5.00	0.00	65	10.0	8.0	
St L St B to St M - 100'	266	1	37,156,468.0	12,693,802.0	1,370.00	5.00	0.00	65	10.0	8.0	
St L St B to St M - 150'	267	1	37,156,428.0	12,693,776.0	1,370.00	5.00	0.00	65	10.0	8.0	
St L St B to St M - 200'	268	1	37,156,384.0	12,693,751.0	1,370.00	5.00	0.00	65	10.0	8.0	
St L St B to St M - 250'	269	1	37,156,340.0	12,693,726.0	1,370.00	5.00	0.00	65	10.0	8.0	
St T St R to St S- 50'	271	1	37,152,592.0	12,703,721.0	1,210.00	5.00	0.00	65	10.0	8.0	
St T St R to St S- 100'	273	1	37,152,640.0	12,703,721.0	1,210.00	5.00	0.00	65	10.0	8.0	
St T St R to St S- 150'	275	1	37,152,692.0	12,703,721.0	1,210.00	5.00	0.00	65	10.0	8.0	
St T St R to St S- 200'	276	1	37,152,740.0	12,703,721.0	1,210.00	5.00	0.00	66	10.0	8.0	
St T St R to St S- 250'	277	1	37,152,792.0	12,703,721.0	1,210.00	5.00	0.00	66	10.0	8.0	
Edmn St D to St J - 50'	281	1	37,152,976.0	12,691,041.0	1,485.00	5.00	0.00	66	10.0	8.0	
Edmn St D to St J - 100'	285	1	37,152,992.0	12,691,088.0	1,485.00	5.00	0.00	66	10.0	8.0	
Edmn St D to St J - 150'	286	1	37,153,012.0	12,691,135.0	1,485.00	5.00	0.00	66	10.0	8.0	
Edmn St D to St J - 200'	281	1	37,153,028.0	12,691,182.0	1,485.00	5.00	0.00	66	10.0	8.0	
Edmn St D to St J - 250'	287	1	37,153,044.0	12,691,229.0	1,485.00	5.00	0.00	66	10.0	8.0	
Edmn St J to St K - 50'	288	1	37,155,072.0	12,690,730.0	1,435.00	5.00	0.00	66	10.0	8.0	
Edmn St J to St K - 100'	290	1	37,155,072.0	12,690,780.0	1,435.00	5.00	0.00	66	10.0	8.0	
Edmn St J to St K - 150'	291	1	37,155,072.0	12,690,830.0	1,435.00	5.00	0.00	66	10.0	8.0	
Edmn St J to St K - 200'	293	1	37,155,072.0	12,690,880.0	1,435.00	5.00	0.00	66	10.0	8.0	
Edmn St J to St K - 250'	281	1	37,155,072.0	12,690,930.0	1,435.00	5.00	0.00	66	10.0	8.0	
Edmn E of St K - 50'	294	1	37,157,608.0	12,690,642.0	1,400.00	5.00	0.00	66	10.0	8.0	
Edmn E of St K - 100'	295	1	37,157,608.0	12,690,692.0	1,400.00	5.00	0.00	66	10.0	8.0	
Edmn E of St K - 150'	296	1	37,157,608.0	12,690,742.0	1,400.00	5.00	0.00	66	10.0	8.0	
Edmn E of St K - 200'	298	1	37,157,608.0	12,690,792.0	1,400.00	5.00	0.00	66	10.0	8.0	
Edmn E of St K - 250'	299	1	37,157,608.0	12,690,842.0	1,400.00	5.00	0.00	66	10.0	8.0	
Del Oro Dr St R to St T - 50'	300	1	37,151,368.0	12,703,534.0	1,225.00	5.00	0.00	66	10.0	8.0	
Del Oro Dr St R to St T - 100'	304	1	37,151,412.0	12,703,555.0	1,225.00	5.00	0.00	66	10.0	8.0	
Del Oro Dr St R to St T - 150'	305	1	37,151,460.0	12,703,577.0	1,225.00	5.00	0.00	66	10.0	8.0	
Del Oro Dr St R to St T - 200'	306	1	37,151,504.0	12,703,598.0	1,225.00	5.00	0.00	66	10.0	8.0	
Del Oro Dr St R to St T - 250'	314	1	37,151,552.0	12,703,598.0	1,225.00	5.00	0.00	66	10.0	8.0	
Farmhouse S. of Project	315	1	37,151,464.0	12,688,662.0	1,620.00	5.00	0.00	66	10.0	8.0	
Ramada Limited	316	1	37,150,324.0	12,690,333.0	1,535.00	5.00	0.00	66	10.0	8.0	
Best Western	317	1	37,145,996.0	12,708,367.0	1,175.00	5.00	0.00	66	10.0	8.0	
Microtel Inn & Suites	320	1	37,148,404.0	12,709,171.0	1,120.00	5.00	0.00	66	10.0	8.0	

Dudek 30 November 2015
M Greene TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: P/N 7667
RUN: Grapevine Project - Cumtv w Proj w Mit

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	Top Width	Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Y	Z	Height at Point	Segment Seg Ht Incre-ment	Perturbs #Up	#Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier4	W	0.00	99.99	0.00				0.00	point3	3	37,151,204.0	12,697,430.0	1,360.00	10.00	0.00	0	0		
									point4	4	37,152,072.0	12,697,430.0	1,330.00	10.00	0.00	0	0		
									point5	5	37,152,936.0	12,697,430.0	1,300.00	10.00					
Barrier5	W	0.00	99.99	0.00				0.00	point6	6	37,154,284.0	12,696,862.0	1,290.00	8.00	0.00	0	0		
									point7	7	37,154,808.0	12,696,863.0	1,290.00	8.00					
Barrier9	W	0.00	99.99	0.00				0.00	point11	11	37,149,948.0	12,694,154.0	1,431.08	10.00	2.00	5	0		
									point12	12	37,150,424.0	12,692,237.0	1,476.36	10.00	2.00	5	0		
									point13	13	37,150,536.0	12,691,740.0	1,489.48	10.00	2.00	5	0		
									point14	14	37,150,652.0	12,691,242.0	1,502.60	10.00	2.00	5	0		
									point15	15	37,150,792.0	12,690,677.0	1,525.60	10.00	2.00	5	0		
									point16	16	37,150,804.0	12,690,068.0	1,548.50	10.00	2.00	5	0		
									point17	17	37,150,764.0	12,689,201.0	1,604.30	10.00					

Dudek — **30 November 2015**
M Greene — **TNM 2.5**
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: **P/N 7667**
RUN: **Grapevine Project - Cumtv w Proj w Mit**
BARRIER DESIGN: **INPUT HEIGHTS**
ATMOSPHERICS: **68 deg F, 50% RH**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
I-5 Grapevine - 100'	8	1	0.0	83.7	65	83.7	10	Snd Lvl	71.7	12.0	8	4.0
I-5 Grapevine - 200'	10	1	0.0	77.8	65	77.8	10	Snd Lvl	71.7	6.1	8	-1.9
I-5 Grapevine - 300'	12	1	0.0	74.7	65	74.7	10	Snd Lvl	69.1	5.6	8	-2.4
I-5 Grapevine - 400'	17	1	0.0	71.4	65	71.4	10	Snd Lvl	67.0	4.4	8	-3.6
I-5 Grapevine - 500'	19	1	0.0	68.8	65	68.8	10	Snd Lvl	65.4	3.4	8	-4.6
I-5 Grapevine - 600'	20	1	0.0	66.9	65	66.9	10	Snd Lvl	64.0	2.9	8	-5.1
I-5 Grapevine - 700'	26	1	0.0	65.4	65	65.4	10	Snd Lvl	62.8	2.6	8	-5.4
I-5 Grapevine - 800'	28	1	0.0	63.9	65	63.9	10	----	61.8	2.1	8	-5.9
I-5 Grapevine - 900'	31	1	0.0	62.9	65	62.9	10	----	61.0	1.9	8	-6.1
I-5 Grapevine - 1000'	33	1	0.0	62.2	65	62.2	10	----	60.4	1.8	8	-6.2
I-5 Grapevine - 1100'	34	1	0.0	61.8	65	61.8	10	----	60.0	1.8	8	-6.2
I-5 Laval - 100'	37	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 200'	39	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 300'	41	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 400'	44	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 500'	45	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 600'	46	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 700'	47	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 800'	49	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 900'	50	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 1000'	51	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 1100'	52	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 Laval - 1200'	53	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
I-5 N of Laval - 100'	55	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 N of Laval - 200'	56	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0

I-5 N of Laval - 300'	57	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 N of Laval - 400'	58	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 N of Laval - 500'	59	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 N. of Laval - 600'	62	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 N. of Laval - 700'	63	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 N. of Laval - 800'	64	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 N. of Laval - 900'	65	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 N. of Laval - 1000'	67	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
I-5 N. of Laval - 1200'	68	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St A St D to St I- 50'	69	1	0.0	63.6	65	63.6	10	----	63.6	0.0	8	-8.0
St A St D to St I- 100'	70	1	0.0	62.9	65	62.9	10	----	62.9	0.0	8	-8.0
St A St D to St I- 150'	71	1	0.0	64.8	65	64.8	10	----	64.8	0.0	8	-8.0
St A St D to St I- 200'	83	1	0.0	63.5	65	63.5	10	----	63.5	0.0	8	-8.0
St A St D to St I- 250'	84	1	0.0	62.4	65	62.4	10	----	62.4	0.0	8	-8.0
St A St J to St L - 50'	85	1	0.0	64.0	65	64.0	10	----	64.0	0.0	8	-8.0
St A St J to St L -100'	86	1	0.0	64.2	65	64.2	10	----	64.2	0.0	8	-8.0
St A St J to St L - 150'	86	1	0.0	62.6	65	62.6	10	----	62.6	0.0	8	-8.0
St A St J to St L - 200'	87	1	0.0	61.2	65	61.2	10	----	61.2	0.0	8	-8.0
St A St J to St L - 250'	88	1	0.0	59.8	65	59.8	10	----	59.8	0.0	8	-8.0
St A St L to St N - 50'	89	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St A St L to St N - 100'	90	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St A St L to St N - 150'	91	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St A St L to St N - 200'	93	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St A St L to St N - 250'	94	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St A St I St J - 50'	95	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St A St I St J - 100'	96	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St A St I St J - 150'	97	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St A St I St J - 200'	99	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St A St I St J - 250'	100	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St D to St I - 100'	101	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St D to St I - 150'	102	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St D to St I - 200'	103	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St D to St I - 250'	105	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St L to St N - 50'	106	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St L to St N - 100'	107	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St L to St N - 150'	108	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St L to St N - 200'	109	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St L to St N - 250'	119	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St I to St J - 50'	120	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St I to St J - 100'	121	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St I to St J - 150'	122	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St I to St J - 200'	123	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0

St B St I to St J - 250'	124	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St J to St L - 50'	125	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St J to St L - 100'	126	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St J to St L - 150'	127	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St J to St L - 200'	129	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B St J to St L - 250'	130	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B-E St C to St E - 50'	131	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B-E St C to St E - 100'	116	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B-E St C to St E - 150'	132	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B-E St C to St E - 200'	135	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St B-E St C to St E - 250'	138	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C St G to Tejon Ind Dr - 50'	116	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C St G to Tejon Ind Dr - 100'	139	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C St G to Tejon Ind Dr - 150'	141	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C St G to Tejon Ind Dr - 200'	143	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C St G to Tejon Ind Dr - 250'	144	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C S of St A - 200'	116	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C S of St A - 250'	145	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C S of St A - 300'	147	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C S of St A - 350'	149	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C S of St A - 400'	147	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C N of St B - 250'	153	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C N of St B - 300'	155	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C N of St B - 350'	156	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C N of St B - 400'	145	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C N of St B - 450'	157	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C S of St B - 50'	159	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C S of St B - 100'	161	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C S of St B - 150'	162	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C S of St B - 200'	145	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C S of St B - 250'	163	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C N of St E - 50'	165	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C N of St E - 100'	167	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C N of St E - 150'	145	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C N of St E - 200'	168	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St C N of St E - 250'	170	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of St A - 50'	172	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of St A - 100'	173	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of St A - 150'	174	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of St A - 200'	175	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of St A - 250'	176	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of Del Oro Dr - 50'	178	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0

St D S of Del Oro Dr - 100'	179	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of Del Oro Dr - 150'	180	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of Del Oro Dr - 200'	181	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of Del Oro Dr - 250'	182	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D Oro Dr to St S - 50'	187	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D Oro Dr to St S - 100'	188	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D Oro Dr to St S - 150'	189	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D Oro Dr to St S - 200'	190	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D Oro Dr to St S - 250'	191	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of St B - 50'	193	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of St B - 100'	194	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of St B - 150'	145	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of St B - 200'	201	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of St B - 250'	203	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of EdstnPmpPlnt Rd - 50'	205	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of EdstnPmpPlnt Rd - 100'	206	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of EdstnPmpPlnt Rd - 150'	207	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of EdstnPmpPlnt Rd - 200'	208	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of EdstnPmpPlnt Rd - 250'	209	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of St A - 50'	211	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of St A - 100'	212	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of St A - 150'	203	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of St A - 200'	213	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D S of St A - 250'	215	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of St B - 50'	217	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of St B - 100'	218	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of St B - 150'	219	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of St B - 200'	220	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St D N of St B - 250'	221	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St E St C to St B - 50'	223	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St E St C to St B - 100'	224	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St E St C to St B - 150'	225	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St E St C to St B - 200'	226	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St E St C to St B - 250'	227	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St I St A to St B - 50'	229	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St I St A to St B - 100'	230	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St I St A to St B - 150'	231	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St I St A to St B - 200'	232	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St I St A to St B - 250'	233	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J St A to St B - 50'	235	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J St A to St B - 100'	236	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J St A to St B - 150'	221	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0

St J St A to St B - 200'	237	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J St A to St B - 250'	239	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J S of St B - 50'	241	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J S of St B - 100'	242	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J S of St B - 150'	243	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J S of St B - 200'	244	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J S of St B - 250'	245	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J N of EdmstnPmpPlnt Rd - 50'	247	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J N of EdmstnPmpPlnt Rd - 100'	248	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J N of EdmstnPmpPlnt Rd - 150'	249	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J N of EdmstnPmpPlnt Rd - 200'	250	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St J N of EdmstnPmpPlnt Rd - 250'	251	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St L St A to St B 50'	253	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St L St A to St B 100'	254	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St L St A to St B 150'	255	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St L St A to St B 200'	256	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St L St A to St B 250'	257	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St R Del Oro Dr to St T- 50'	259	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St R Del Oro Dr to St T- 100'	260	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St R Del Oro Dr to St T- 150'	261	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St R Del Oro Dr to St T- 200'	262	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St R Del Oro Dr to St T- 250'	263	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St L St B to St M - 50'	265	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St L St B to St M - 100'	266	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St L St B to St M - 150'	267	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St L St B to St M - 200'	268	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St L St B to St M - 250'	269	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St T St R to St S- 50'	271	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St T St R to St S- 100'	273	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St T St R to St S- 150'	275	1	0.0	0.0	65	0.0	10	inactive	0.0	0.0	8	0.0
St T St R to St S- 200'	276	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
St T St R to St S- 250'	277	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn St D to St J - 50'	281	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn St D to St J - 100'	285	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn St D to St J - 150'	286	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn St D to St J - 200'	281	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn St D to St J - 250'	287	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn St J to St K - 50'	288	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn St J to St K - 100'	290	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn St J to St K - 150'	291	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn St J to St K - 200'	293	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn St J to St K - 250'	281	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0

Edmn E of St K - 50'	294	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn E of St K - 100'	295	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn E of St K - 150'	296	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn E of St K - 200'	298	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Edmn E of St K - 250'	299	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Del Oro Dr St R to St T - 50'	300	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Del Oro Dr St R to St T - 100'	304	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Del Oro Dr St R to St T - 150'	305	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Del Oro Dr St R to St T - 200'	306	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Del Oro Dr St R to St T - 250'	314	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Farmhouse S. of Project	315	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Ramada Limited	316	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Best Western	317	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Microtel Inn & Suites	320	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	207	0.0	0.2	12.0
All Impacted	7	2.6	5.3	12.0
All that meet NR Goal	1	12.0	12.0	12.0

Appendix T

Transportation Impact Study Technical Report

TRANSPORTATION IMPACT STUDY TECHNICAL REPORT

for the
Grapevine Specific and Community Plan Project

APRIL 1, 2016

TABLE OF CONTENTS

Section **Page No.**

APPENDICES

INTENTIONALLY LEFT BLANK

LIST OF FIGURES

LIST OF TABLES

Acronym/Abbreviation	Definition
ACS	American Community Survey
ALUCP	Airport Land Use Compatibility Plan
AWSC	All-Way Stop-Control
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CHP	California Highway Patrol
CMP	Congestion Management Program
CTC	California Transportation Commission
CVEF	Commercial Vehicle Enforcement Facility
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTIP	Federal Transportation Improvement Plan
GET	Golden Empire Transit District
GHG	Greenhouse Gases
HCM	Highway Capacity Manual
HDM	Highway Design Manual
I-5	Interstate 5
ITE	Institute of Transportation Engineers
Kern COG	Kern Council of Governments
LEHD	Longitudinal Employer-Household Dynamics
LID	Low Impact Development
LOS	Level of Service
MXD	Mixed-Use Development
PSR-PDS	Project Study Report-Project Development Support
RTP	Regional Transportation Plan
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
SB 375	Senate Bill 375
SB 743	Senate Bill 743
SCAG	Southern California Association of Governments
SHOPP	State Highway Operations and Protection Program
SR 58	State Route 58
SR 99	State Route 99
SR 138	State Route 138
SR 166	State Route 166
SR 184	State Route 184
SR 223	State Route 223

Acronym/Abbreviation	Definition
SSSC	Side-Street Stop-Control
STIP	State Transportation Improvement Program
TAZ	Traffic Analysis Zone
TCR	Transportation Concept Report
TDF	Travel Demand Forecasting
TDM	Transportation Demand Management
TMA	Transportation Management Association
TRC	Tejon Ranchcorp
TRCC	Tejon Ranch Commerce Center
USGS	United States Geological Survey
UTM	Universal Transverse Mercator

EXECUTIVE SUMMARY

This report documents the results of the roadway, bicycle/pedestrian facilities, and transit facilities/services impact analysis for the Grapevine project. Section 1 of this report describes the project location and proposed transportation facilities. Section 2 describes the existing transportation facilities in the project or study area existing vehicular traffic conditions. Section 3 summarizes applicable federal, state, regional, and local transportation regulations. Section 4 evaluates potential project transportation impacts with reference to the California Environmental Quality Act (CEQA) thresholds of significance implemented by Kern County and identifies mitigation measures that reduce potential significant impacts to less than significant levels.

ES.1 Project Description

The proposed Grapevine project is located in the west-central portion of the approximately 270,000-acre Tejon Ranch currently held in private ownership by Tejon Ranchcorp. The project site is south of the existing Tejon Ranch Commerce Center (TRCC) and extends to the east and west of the existing Grapevine interchange on I-5 (see Figure ES-1, Regional Location, and Figure ES-2, Vicinity Map).

The Grapevine project includes 8,010-acres designed as a series of village centers, each composed of a mix of neighborhood-serving retail and office uses, schools, parks, and community services. The project will complement economic development occurring within the adjacent TRCC by providing 12,000 residential units of varying density and type in close proximity with employment generating land uses. The Grapevine Specific Plan allows for up to 2,000 additional residential units up to a total of 14,000 units provided that other land uses, such as commercial, office and other business activities, are reduced in accordance with specific trip equivalency ratios to fully offset any potential traffic volume increase. Under existing conditions, no housing is located near TRCC, and the Grapevine project would reduce the number and length of automotive and other work-related trips in the project area. The project includes 5,100,000 square feet of commercial and industrial development, most of which will be located within walking or biking distance from proposed residential units.

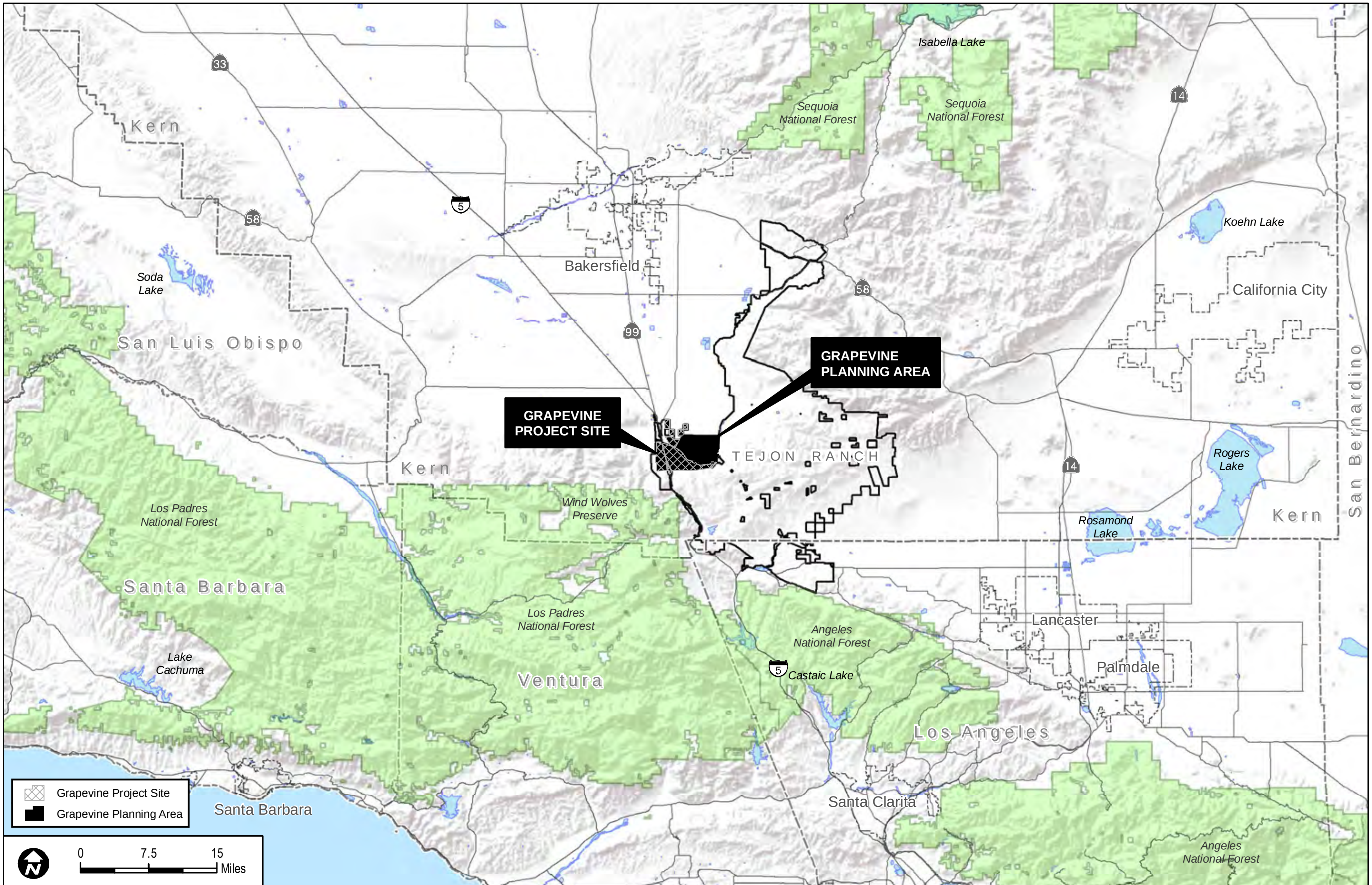
A total of 157 acres of the Specific Plan area has been set aside for schools, and 96 acres for parks, which will be located adjacent to schools and will serve as school recreation yards and playfields during school hours in a joint-use fashion. Other public facilities, including a fire station, a sheriff substation, and transit facilities/park-and-rides, and water and wastewater treatment facilities are proposed in the project. Outside of the village centers, the project includes a mix of lower-density residential, office, research and development, retail, and light industrial/warehouse uses. Additional service/industrial uses are located in the northern portion of the project. Approximately 40% of the project area will be designated as an Exclusive Agriculture zone accommodate ongoing resource, grazing, and open space uses while also allowing nonagricultural uses and activities that are compatible with agriculture. Table ES-1 summarizes the proposed project development and land use.

Table ES-1
Grapevine Project Development Summary

Land Use Type	Residential and Commercial Development	Percentage of Specific Plan	Area
Residential community and employment center	12,000 residential units[1] 5.1 million square feet of commercial and industrial space (1.2 million square feet of retail, 2.45 million square feet of office/research and development, 1.45 million square feet of industrial/warehouse)	60%	4,778 acres
Grazing and open space as the predominant use[2]	0 residential units[3] 0 square feet of commercial and industrial space	40%	3,232 acres

Notes: [1]Up to 2,000 additional residential units may be allowed through a reduction of commercial/industrial square footage based on vehicle trip equivalency ratios identified in Table 2-3 of the Grapevine Specific Plan.
[2]No industrial uses other than agriculture-related processing are allowed. Incidental recreation and agriculture-supporting commercial uses are also allowed. A complete list of permitted uses is provided in the Grapevine Special Plan.
[3]Existing residential units in Exclusive Agriculture may be retained.
Source: Grapevine Specific Plan – Table 1-4

The project is planned as a residential community and employment center featuring a series of compact neighborhoods linked by streets, bicycle and pedestrian trails that provide convenient access to grocery and drugstores, professional services, schools, and parks. The circulation network will be primarily composed of two- and four-lane arterials, collector streets, and local streets (including lanes and alleys) organized in a grid-like pattern. Primary access to the Grapevine project will be from I-5.

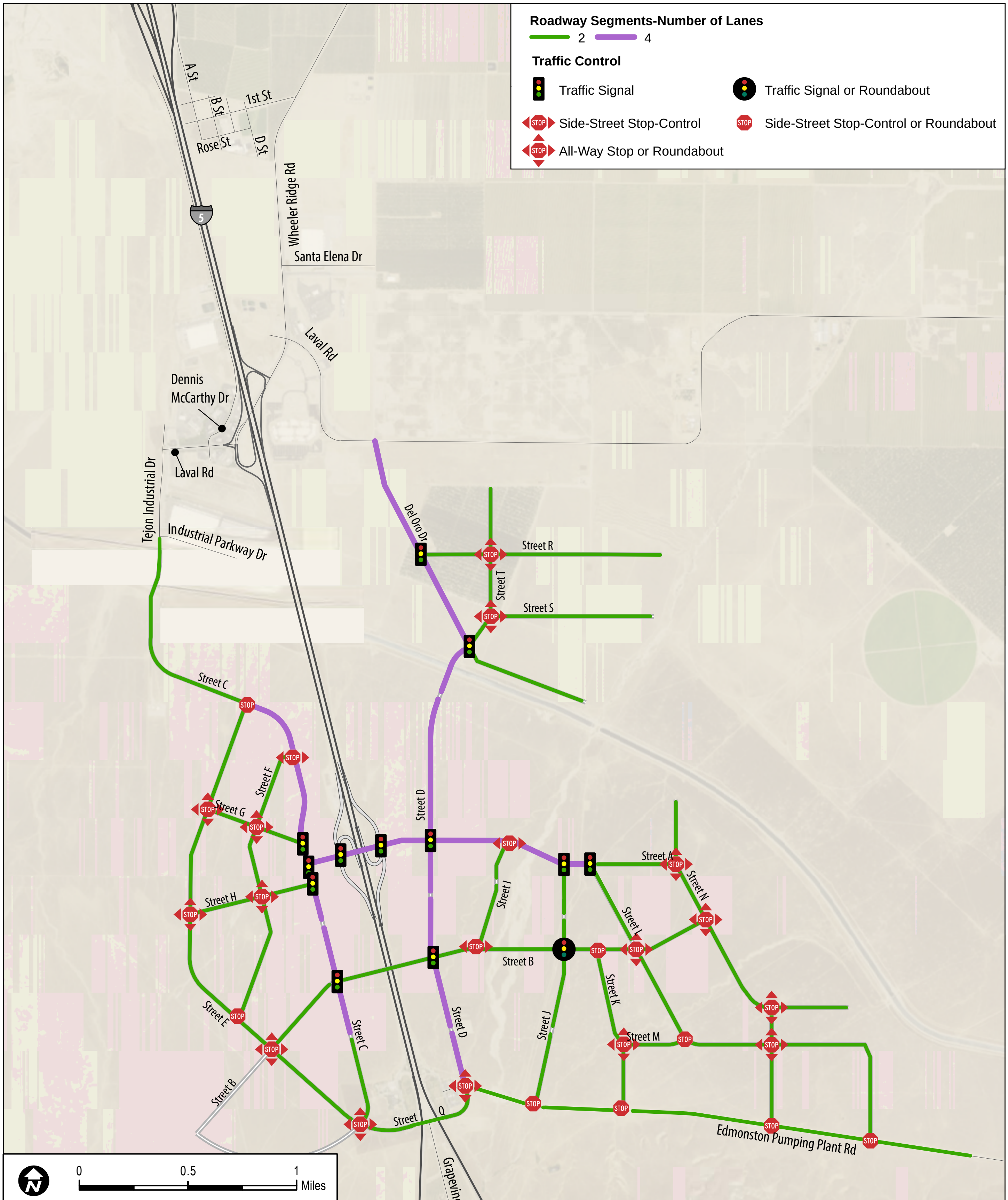


SOURCES: McIntosh & Associates 2013; TRC 2013a

FIGURE ES -1

Regional Location

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

FIGURE ES-2
Project Roadway Network

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

Initial project development ("Phase 1") would occur by using either the existing Laval Road /I-5 interchange ("Interim A"), or the Laval interchange and the existing Grapevine Road I-5 interchanges provided certain operational enhancements were completed with Caltrans approval ("Interim B"), for interim access until the expanded and relocated I-5 / Grapevine interchange is constructed.

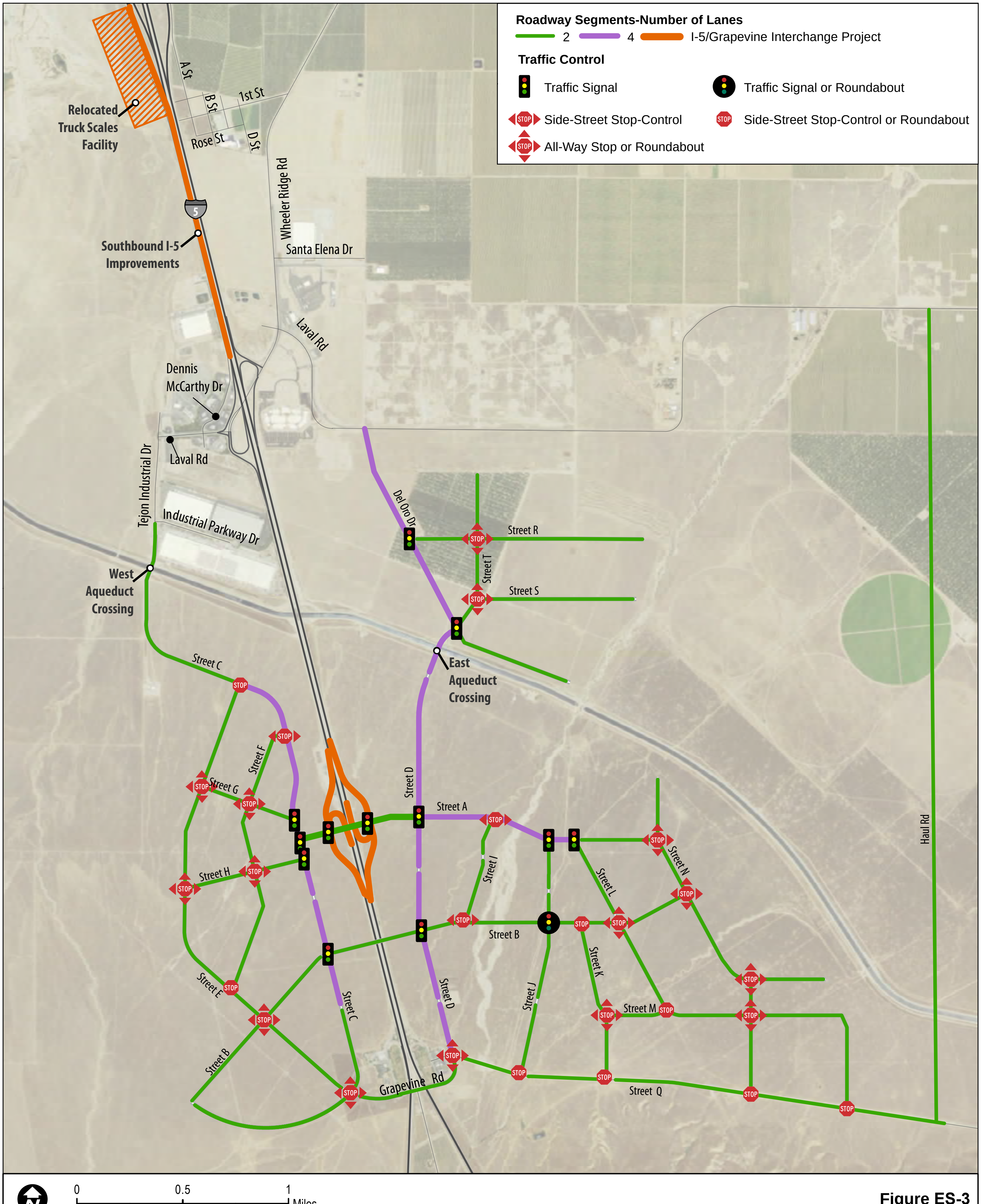
Interim A would use the existing interchange Laval Road /I-5 interchange. As shown in Figure ES-3, Interim A would allow for Phase 1 development in project Planning Areas 6 and 3 with construction of an arterial roadway and aqueduct crossing east of I-5. Approximately 2,200 homes and 1,326,000 square feet (sf) of commercial uses could be developed before projected traffic volumes would cause the Laval interchange to operate below Level of Service (LOS) D and queuing requirements, the applicable performance standard for the interchange.

As shown in Figure ES-4, if Caltrans approves certain operational enhancements to the existing I-5 / Grapevine interchange for interim project use, both the existing Laval Road and Grapevine interchanges could be used for Phase 1 access. Under Interim B, Phase 1 development would occur in project Planning Areas, 6, 3, 4, and 1 and include locations west of I-5. Approximately 6,000 homes and 2,100,000 sf of commercial uses could be developed before projected traffic volume would cause either interchange to operate below LOS D and queuing requirements.

Prior to the construction of the expanded and relocated I-5 / Grapevine interchange, a traffic monitoring program will be implemented and traffic studies will be required with each application for a tentative tract map or parcel map to evaluate existing interchange LOS levels and freeway ramp queuing. The monitoring program and traffic studies will assess the extent to which interchange operations are approaching levels that would exceed applicable LOS or queuing standards. The expanded and relocated I-5 / Grapevine interchange will be constructed before interim access to the project area through an existing interchange would cause an exceedance of LOS or queuing requirements.

The preferred location of the expanded and relocated I-5 / Grapevine interchange ("Variant 1"), and the proposed project roadway system, are shown on Figure ES-5. The expanded and relocated interchange would be constructed approximately one mile north of the existing I-5 / Grapevine interchange and will connect with planned Street A. An existing California Commercial Vehicle Enforcement Facility (CVEF) would be moved north to the west side of the junction of I-5 and SR 99 on land owned by Tejon Ranchcorp. Access and bypass ramps would be constructed to connect the relocated CVEF with I-5 and SR 99, and an additional truck on-ramp would be constructed from the relocated CVEF to I-5 resulting in a southbound auxiliary lane between the CVEF and the I-5 / Laval Road interchange to accommodate truck movement. Other improvements include metering the I-5 / Laval Road interchange on-ramps, improving an existing agricultural road (the "Haul Road") east of the Specific Plan area from the existing

Edmonston Pumping Plant Road north to Laval Road to route utility and quarry truck traffic from activities around the planned development, and two crossings of the California Aqueduct east and west of I-5. If necessary, the expanded and relocated I-5 / Grapevine interchange could also be constructed approximately 0.5 miles south of the preferred location (Variant 2). The CVEF would remain in its existing location, and braided ramps would be constructed west of I-5 to accommodate truck movement to and from the existing CVEF. Other improvements would be substantially the same as in Variant 1 (see Figure ES-6).

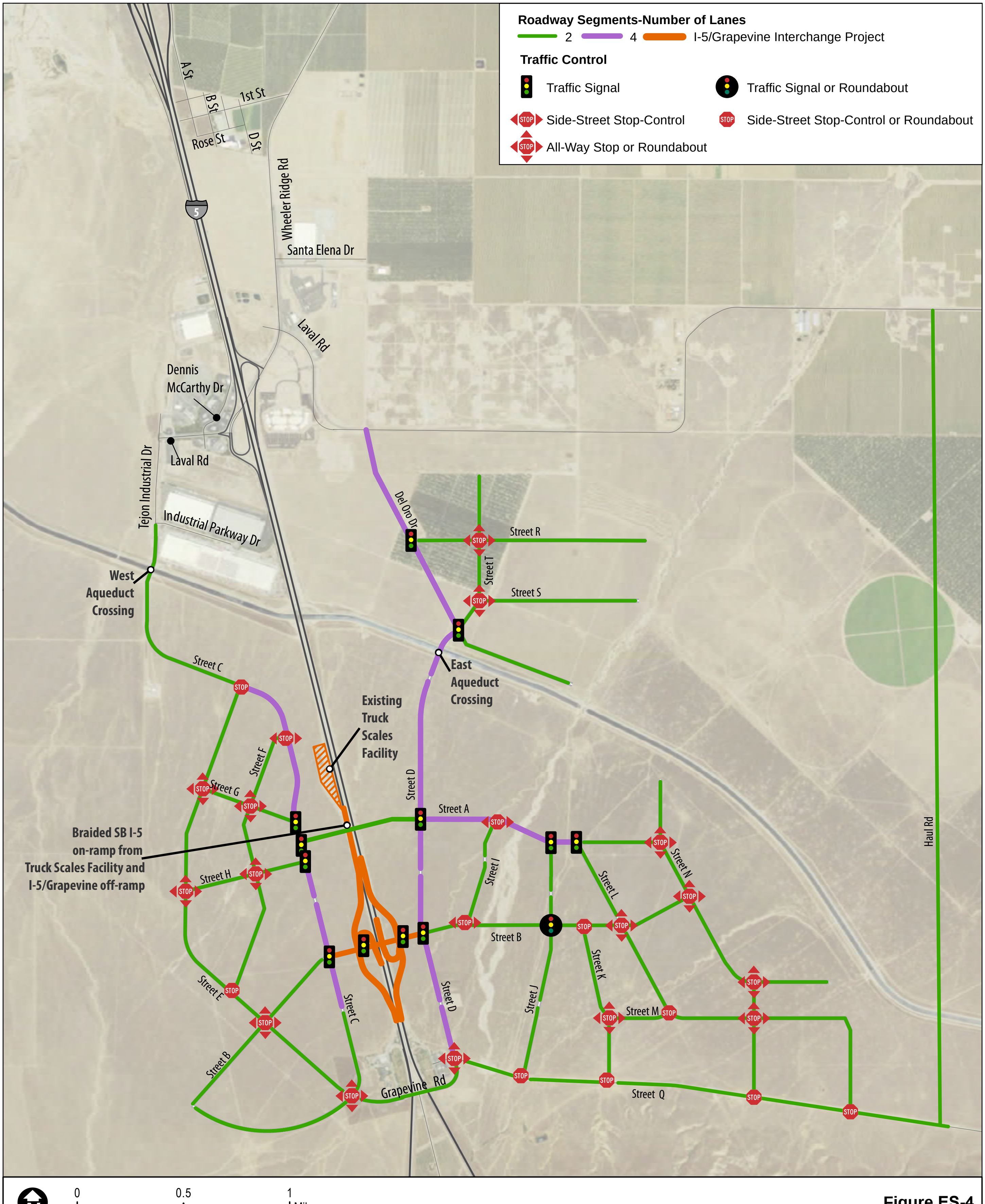


SOURCES: USGS, ESRI

Figure ES-3

Project Roadway Network - Variant 1

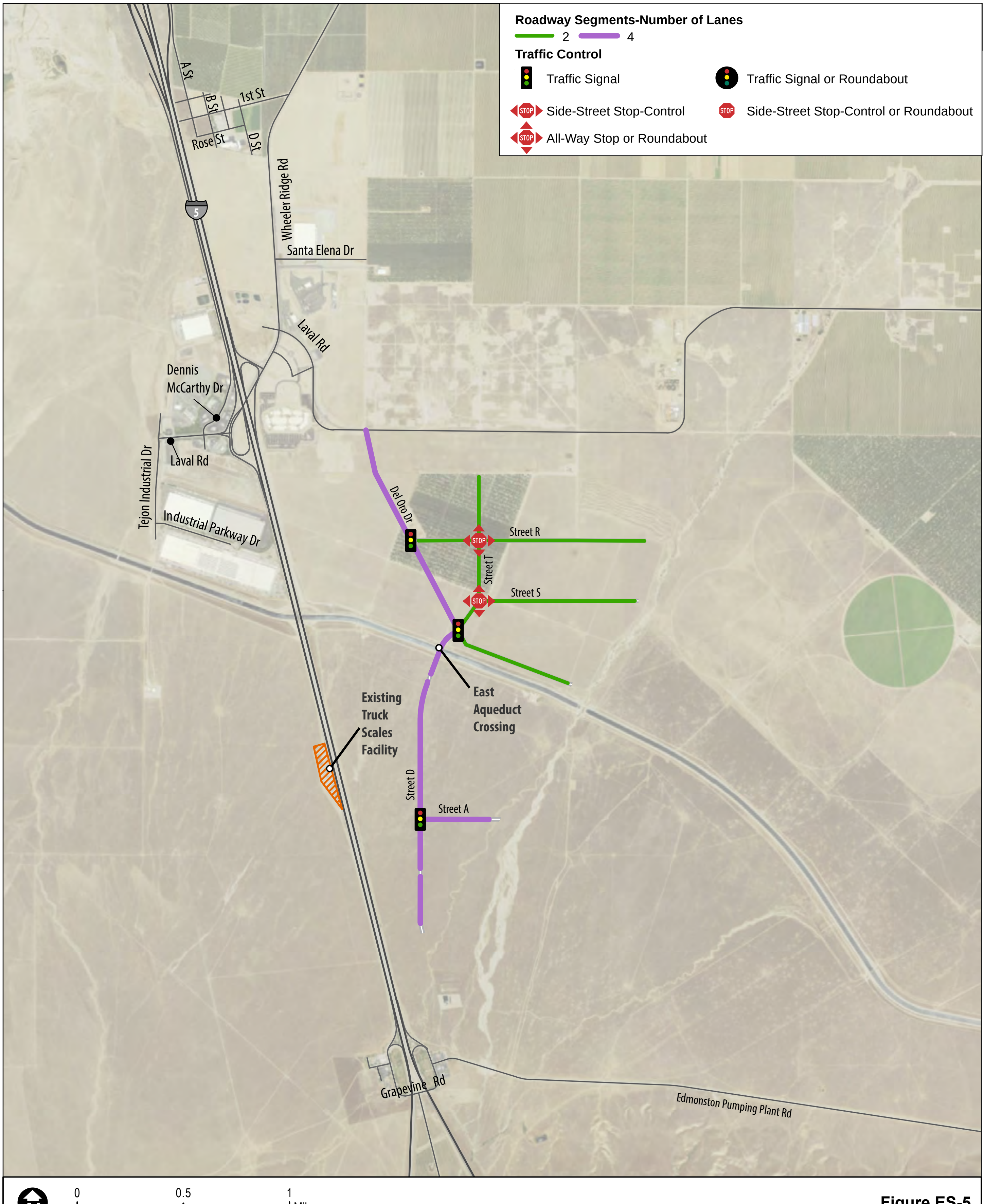
INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

Figure ES-4
Project Roadway Network - Variant 2

INTENTIONALLY LEFT BLANK



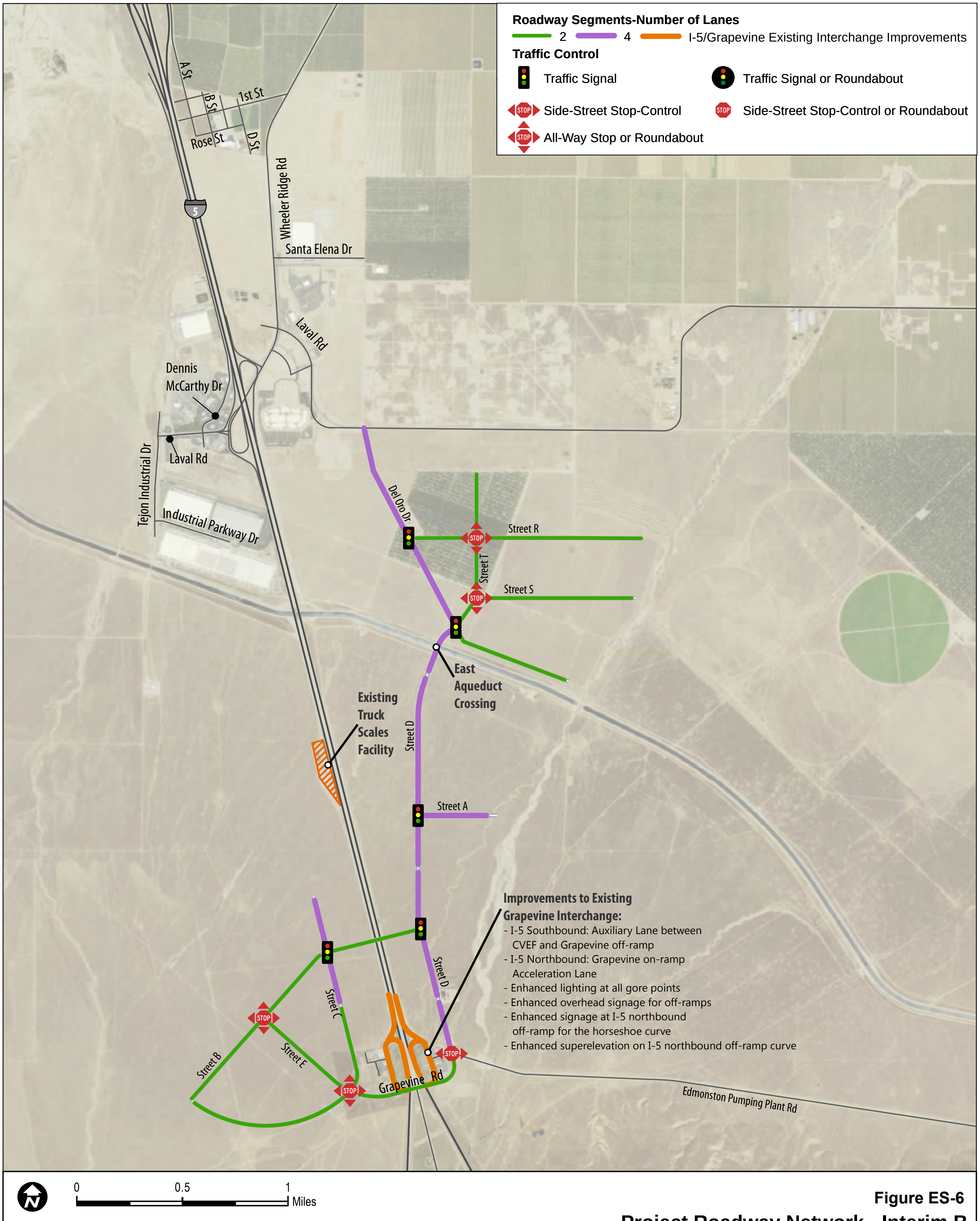
SOURCES: USGS, ESRI

Figure ES-5

Project Roadway Network - Interim A

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

Figure ES-6
Project Roadway Network - Interim B

INTENTIONALLY LEFT BLANK

Traffic conditions will be monitored biennially, and traffic studies will be submitted with project tract or parcel map applications to the County, to ensure that applicable performance standards are being achieved. A Transportation Management Association will be established and funded prior to first occupancy to implement transportation demand management measures for the project area that encourage multimodal transit, pedestrian, cycling and other non-automotive movement.

ES.2 Project Multi-Mode Transportation System

The Grapevine Specific Plan is been designed to implement smart growth policies and encourage efficient multi-modal movements in accordance with the smart growth and multimodal performance provisions of Kern County General Plan Section 1.10.8, Policy 49, implementation measure CC, as amended. The project area is divided into six Sub Areas, each of which includes a village center with a mix of neighborhood-serving retail and office uses, schools, parks, and community services. The village centers are included in Village Mixed Use (VMU) Districts and will be dense mixed-use centers with compact, walkable neighborhoods that support multiple forms of transportation and reduce single-occupancy vehicle trips. Walking and bicycling facilities will be provided throughout the project area, and particularly within ¼-mile and ½-mile radii of each village center. Transit stops in higher-density, cycling and pedestrian-friendly village centers will also be provided to encourage non-automotive trips to more distant locations. The project will provide housing in close proximity with existing and planned employment land uses, including the adjacent TRCC, that will further support multi-modal movement and reduce work-related automotive trips.

The Grapevine project is also consistent with the approved Kern Council of Governments (Kern COG Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS), which designates the project and adjacent locations, including TRCC, as a "Planned Transit Priority Area" and a "Strategic Employment Center." The RTP/SCS designations identify the project area as an activity node around which future transit, vanpooling services, and mixed-use development patterns would be planned to support forecasted development patterns within the KernCOG planning region. The RTP/SCS supports a land use pattern and corresponding transportation network that encourages the location of housing near jobs and transportation facilities designed to reduce regional passenger vehicle travel and the resulting reduction in air emissions. The proposed project's walkable, mixed-use land use and circulation elements, the creation of diverse housing options in close proximity with employment-generating land uses, and the integration of multi-modal transit and other sustainable development are consistent with the land use designations for the project area in the RTP/SCS.

The Grapevine project multimodal circulation goals, policies and implementation measures include the following:

- A comprehensive, integrated and multi-modal circulation system that accommodates the type, location, and extent of vehicular and non-vehicular facilities and embraces all aspects of design, including functionality, economic efficiency, connectivity between Sub Areas and the surrounding region, and alternative modes of transportation.
- A circulation system that emphasizes the concepts of sustainable mixed-use land use patterns, walkable neighborhoods, narrow pedestrian-scale streets, non-vehicular facilities, and aesthetic quality that provide enhancements that offset any impediments that they may create for vehicular movement.
- A circulation system that increases transit accessibility through a comprehensive network of pedestrian, bicycle and transit routes that connect transit hubs, residential areas, and major employment and activity centers.
- Establish a roadway hierarchy that provides appropriate levels of service for the intended use of each roadway classification, achieves a highly interconnected system, and supports mobility for all modes of transportation (automobiles, bicycles, walking, and transit use).
- Establish a road network that includes linkages to surrounding bicycle and trail routes (both existing and proposed), in accordance with the Kern Council of Government's Regional Transportation Plan/Sustainable Communities Strategy and Kern County Bicycle Master Plan and Complete Streets Recommendations – Final Report (October 2012).
- Allow for a diverse compliment of permitted uses to create a full service and complete mixed-use community that provides housing, retail, service, and employment opportunities, to reduce external trips generated by the project, shorten trips between land uses, and provide opportunities to utilize alternative modes of transportation.
- Encourage pedestrian and bicycle circulation within higher use activity nodes such as the Village Mixed Use centers and Mixed Use commercial areas, as well as areas surrounding schools and parks, through the use of trails and safe routes to school.
- Require pedestrian and bicycle-friendly connections between neighborhoods, village centers, schools, and parks.
- Establish flexible design standards for arterial and collector streets that place emphasis on walkability, bikeability, and alternative modes of transportation by providing reduced crossing widths, minimum 4-foot wide clear sidewalks, street bulb-outs, shade trees, street furniture, and other features, while still accommodating vehicular travel and allowing for emergency and service vehicle access.

- Multi-purpose paths suitable for bicyclists, scooters and pedestrians shall connect village centers to residential and commercial neighborhoods, and open space areas.
- Provide a comprehensive bicycle network that includes a network of protected bike lanes, cycle tracks, or off-street bike trails, and bike parking for non-residential and residential uses near transit.
- Require the integration of local amenities to discourage reliance on single-occupancy peak hour automobile use into each neighborhood.
- Provide a range of transit, bicycle, and pedestrian amenities, such as secure street parking, drinking fountains, public restrooms, shaded streets, paths, bikeways, and street furniture.
- Proactively encourage the use of alternative forms of transportation as a means to improve public health and reduce local and regional greenhouse gas emissions.
- Establish two transit facilities on the east and west sides of the Grapevine Road/I-5 interchange to serve as transit hubs, and ensure that these hubs are visible from and spaced appropriately to the freeway off-ramps; provide secure parking for bicycles and adequate vehicular parking; provide attractive transit amenities; and are well connected to the local community through well-defined linkages to the existing and planned trail system.
- Ensure that public transit services provide service at appropriate intervals to major destinations outside the community, including TRCC, Arvin, and Bakersfield to the north and east; to the mountain communities and Tejon Mountain Village to the south; and to Shafter and other communities to the west.
- Coordinate the location of potential transit connections and connections to intercity services where appropriate with Kern Transit, Golden Empire Transit, and Arvin.
- Coordinate the design and location of multi-use trails with transit facilities to ensure that each mode supports the other and is able to provide first mile/last mile connections from transit facilities to ultimate destinations.
- Implement “complete streets” that incorporate the following design measures:
  - Well-defined Class I, II, or III bike paths.
  - Bicycle storage racks in the commercial and recreational centers and multi-family residential areas.
  - Street parking within ¼ mile of village centers, diagonal or parallel, to act as a traffic-calming tool.
  - Wayfinding to trails, key destinations, parking garages, loading areas, etc.

  - Street furniture, including benches, trash receptacles, bike racks, drinking fountains, etc.
  - Transit stops and shelters, coordinated with bikeways and trails.
  - Reduced pedestrian crossing street widths.
  - Street bulb-outs/curb extensions at key intersections.
  - Sidewalks that provide adequate widths depending on the type of street.
  - Parkways and planting strips that enhance the pedestrian experience and meet goals for sustainability performance and long-term durability.
  - Safe routes to schools and parks.
  - Shade trees adequately spaced 25-30 feet on center.
- Provide flexible design and siting standards to facilitate innovative development, including compact neighborhood design that promotes walkability.

Pedestrian Facilities

The project includes road standards for "complete streets" to provide multiple modes of transportation, and sustainable landscape features such as storm water management through low-impact development (LID). The I-5 interchange will also be designed in accordance with Caltrans complete streets requirements. The project road standards include safe and universally accessible pedestrian travel routes that are an integral part of the transportation system. Along village center streets, the pedestrian zone features wide sidewalks, landscaping, and areas for street furniture, which create an interesting and enjoyable environment for walking between the diverse set of residential, retail, employment, and service uses included in the project. Streets outside the village centers will include sidewalks separated from adjacent street traffic by a tree lane that provide a buffer from vehicular traffic and shade during warmer periods. These pedestrian facilities will encourage walking and reduce automotive use in the village centers and other project locations.

Biking Facilities

The Grapevine project road standards will support bicycling, including the following facilities:

- Wide bike lanes on most arterial and collector street;
- Buffered bike lanes featuring a striped buffer between the bike lane and adjacent parking or vehicle travel lane;
- Cycle tracks that physically separate bicyclists from adjacent vehicles with a raised buffer, such as a landscaped strip; and

- Separation of bicycle/pedestrian trails from adjacent vehicle traffic by a tree lane or other landscaping.

The project also includes a comprehensive multi-purpose trail network along creeks and the California Aqueduct crossings throughout the project site. This trail network will support both recreational and transportation-related walking and cycling within the project area.

Transit Facilities

The proposed project will include transit services that will be implemented over time. During initial development, transit service will primarily be provided by Kern Transit in response to demand and may be coordinated with the support of the TMA) that will be created for the project (see below). Other demand-based transportation services may include car-sharing services, vanpools, ride-share matching through the TMA, or private transportation network services (e.g., Uber, Lyft, etc.).

At buildout, the proposed project will include two transit hubs to provide convenient, centralized access for local and regional transit service. Local transit would provide service within the project area and to TRCC, Regional transit service would connect the project with Arvin, Bakersfield, Shafter, Frazier Park, and Tejon Mountain Village. Park and ride lots will be provided to facilitate ride sharing and transit use. The project’s comprehensive public transportation network and the density and diversity of project land uses will discourage single-occupancy vehicle travel, reduce emissions, and foster transit consistent with the smart growth provisions of the Kern County General Plan and the “Planned Transit Priority Area” and “Strategic Employment Center” designations for the project area in the approved Kern COG RTP/SCS.

Transportation Demand Management Measures

A Transportation Management Association will be formed and funded prior to the first occupancy to implement transportation demand management (TDM) measures and other transportation programs in a phased manner as development occurs within the project area. The project TMA will focus on encouraging multimodal, non-automotive movement to and from employment centers in TRCC, local and regional transit use, and pedestrian and biking movement, including:

(a) coordinating transit schedules to align with employer work schedules;

(b) providing discounted transit passes;

(c) organizing ridesharing, bike-share or car-share programs;

(d) TMA-sponsored shuttle/vanpool services, in collaboration with employers, to serve major employment centers; and

(e) commute trip reduction program including that includes such measures as: (1) vanpool service; (2) preferential carpool parking; (3) end of trip facilities for bicyclists; (4) encouraging flexible work schedules/telecommuting; (5) funding a transportation coordinator for the project area; and (6) conducting marketing campaigns to encourage non-automotive modes for commuting and other movement requirements.

ES.3 Analysis Overview

To evaluate the potential effects of the proposed project, this study analyzes transportation and traffic conditions for (1) existing conditions, (2) existing plus project conditions, and (3) cumulative without project and cumulative plus conditions. The cumulative analysis also includes an evaluation of potential Phase 1 traffic conditions based on the Interim B scenario by interpolating cumulative and interim project growth to the approximate year (e.g., 2025 assuming full project buildout in 2040) when one of the interim use interchanges would fall below LOS D. The analysis focuses on midweek peak hours because the project is more likely to cause transportation impacts to the transportation system during these periods.

This study analyzes traffic conditions using Level of Service (LOS) as the primary measure of operational performance. Vehicle LOS is a qualitative description of traffic flow from the perspective of motorists. Consistent with Kern County Standards for Traffic Engineering, the LOS analysis is based on the current (2010) Highway Capacity Manual (HCM) published by the Transportation Research Board of the National Academies of Science. For Caltrans freeway and road segments located south of the project area in Los Angeles County and north of the junction of I-5 and State Route (SR) 99, a volume to capacity analysis was used based on Southern California Association of Governments (SCAG) 2035 RTP/SCS projections for Los Angeles County and the 2040 Kern COG RTP/SCS projections in Kern County. Potential freeway interchange ramp queuing was also evaluated under existing plus project, interim cumulative and cumulative conditions.

Project buildout trip generation was estimated using the Kern COG travel demand forecasting (TDF) model and validated and calibrated by using trip generation rates developed by the Institute of Traffic Engineers (ITE) in *Trip Generation 9th Edition* (ITE, 2012). Table ES-2 summarizes the estimated daily, a.m. peak hour, and p.m. peak hour traffic volumes for project buildout using the ITE methodology. After calibrating the Kern COG TDF model, the ITE results are substantially the same as the trip generation outputs from the Kern COG TDF model.

Table ES-2
ITE Trip Generation Estimate – Proposed Project

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	*In*	*Out*	*Total*	*In*	*Out*	
Residential									
Residential	8,400 DUs	210	6,300	1,575	4,725	8,400	5,292	3,108	79,968
Village Center Residential	3,600 DUs	220	1,836	367	1,469	2,232	1,451	781	23,940
Non-Residential									
Village Center Commercial - Retail[1]	450 ksf	820[1]	432	268	164	1,670	802	868	19,215
Village Center Commercial - Office[1]	350 ksf	710[1]	546	480	66	522	89	433	3,861
Freeway Commercial	750 ksf	820	720	446	274	2,783	1,336	1,447	32,025
Office/Research & Development	2,100 ksf	710	3,276	2,883	393	3,129	532	2,597	23,163
Light Industrial/Warehouse[2]	1,450 ksf	130/ 150[2]	813	660	153	848	187	661	7,533
Schools & Parks									
Elementary Schools	3,520 students	520	1,584	871	713	528	259	269	4,541
Middle Schools	1,760 students	522	950	523	427	282	138	144	2,851
High Schools	2,454 students	530	1,055	717	338	319	150	169	4,196
Parks[3]	132 acres	411	-	-	-	-	-	-	249
Total			17,512	8,790	8,723	20,713	10,236	10,477	201,542

Notes: DUs = dwelling units; ksf = thousand square feet
Trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition*
[1]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[2]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
[3]City Park land use (ITE Code 411) in ITE's *Trip Generation Manual* only includes daily trip information.
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

The distribution of project trips, including internal trips that occur within the project area and TRCC, and external trips to other locations to the north and south of the project area, was estimated by using the Kern COG TDF model and validated through an internalization analysis using a wide range of national transportation research and demographic data sources.

At full buildout of the Grapevine project, the Kern COG TDF model predicts that 73% of a.m. peak hour project trips and 72% of p.m. peak hour project trips will be internalized within the project area, including the Grapevine project and TRCC. This result is consistent with the objective of providing housing in close proximity with employment-generating land uses at

TRCC and that are planned within the project area. The projected trip internalization rates were validated by using U.S. Census commuting data, cell phone and GPS data, and national research travel data from the National Cooperative Highway Research Program (NCHRP) in consultation with Kern County and Caltrans. At the request of Caltrans, a sensitivity analysis was performed assuming a buildout internalization rate lower than projected (see Appendix N). The project traffic mitigation and monitoring program will confirm that traffic volumes are consistent with projections as development occurs over time or identify additional measures that may be required to address higher than projected traffic levels. The Phase 1 (Interim B) analysis also used a lower internalization rate (46%) to provide a conservative assessment of potential interim conditions.

The 2040 Kern COG TDF model was used to assign project-related trips to local roadways and freeways and Caltrans facilities to the north and south of the project area. Table ES-3 shows project trip origins and destinations under cumulative plus project conditions.

Table ES-3
Project Buildout Trip Distribution Estimate –
Cumulative Plus Project Conditions (2040)

Origin/Destination	Trip Distribution Estimate	
	A.M. Peak Hour	*P.M. Peak Hour*
Project Area	73%	72%
North of Grapevine	19%	19%
West Bakersfield via I-5	2%	2%
North of Bakersfield via I-5	1%	1%
Bakersfield Metropolitan Area via SR 99	11%	11%
North of Bakersfield via SR 99	1%	1%
Arvin-Lamont Area	3%	3%
Eastern Kern County via SR 58	1%	1%
South of Grapevine	8%	9%
Southern Kern County (Frazier Park/Tejon Mountain Village)	1%	1%
Antelope Valley Area (Lancaster/Palmdale/Centennial)	3%	3%
Santa Clarita Valley Area	2%	2%
Los Angeles Basin/Orange County/Inland Empire	2%	3%

Source: Fehr & Peers, 2015.

ES.4 Impact Analysis and Mitigation Summary

The Kern County CEQA Implementation Document and Kern County Environmental Checklist thresholds were used to evaluate potentially significant traffic and transportation impacts. Certain thresholds were further refined during consultations with Caltrans and Kern County to reflect applicable roadway and circulation performance standards and recent Kern County General Plan amendments pertaining to multimodal transit and smart growth communities. The following sections summarize potential project impacts under each CEQA analysis threshold and mitigation measures, where applicable, that reduce potentially significant impacts to less than significant levels.

Threshold 1: Would the project conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

A. Kern County intersections and roadways

Potential impacts to Kern County intersections and roadways were evaluated by using the operational analysis methodologies in the Caltrans Highway Capacity Manual (HCM) under existing plus project and cumulative plus project conditions. All intersections would operate at or above LOS D in all scenarios except for the new intersection that would be located immediately east of the expanded and relocated I-5 / Grapevine interchange. In interchange Variant 1, the Street A/Street D intersection would operate at LOS E during the p.m. peak hour under existing plus project conditions and LOS F during the p.m. peak hour under cumulative plus project conditions. The Street A/Street I intersection would operate at LOS F during the p.m. peak hour under existing plus project conditions. In Interchange Variant 2, the expanded and relocated interchange would connect with planned Street B, and the Street B / Street D intersection and Street B / Street I intersections would be expected to operate below LOS D during p.m. peak hours based on the results of the Variant 1 analysis.

The Kern County General Plan Land Use and Circulation Element provides that development proposed as part of a community plan or specific plan which utilizes smart growth policies that encourage efficient multi-modal movements is allowed the flexibility to assess traffic and safety impacts through other means than LOS. The project has been designed to encourage efficient multi-modal movement consistent with the General Plan amendments, including by allowing intersections to operate below LOS D, and is not required to implement mitigation measures for roadways or intersections that would operate below LOS D at buildout. The following mitigation measures ensure that multi-model movement measures will be implemented by the project consistent with the General Plan amendments:

MM-X.1 Implement Multi-Modal Project Transportation Measures for On-site Circulation System.

a. In preparation of each tract map submittal package, the Master Developer shall implement the multimodal transportation and project design measures in the Specific Plan, including: (a) the development of housing near the Tejon Ranch Commerce Center to create a jobs/housing balance that reduces external vehicle trips; (b) locating housing, retail, service, and employment in close proximity to reduce the number and length of vehicle trips; (c) extending existing regional transit to serve the project and constructing park and ride lots to facilitate ride sharing and transit use to reduce local and freeway vehicle traffic; and (d) locating Village Centers approximately ½ mile apart with a comprehensive network of pedestrian, bicycle and transit routes that connect transit hubs, residential areas and major employment and activity centers to encourage walking and cycling.

b. In preparation of each tract map submittal package, the Master Developer shall implement the arterial, collector, local street design, and pedestrian, biking and multi-use trail standards in the Specific Plan, including design standards that reduce vehicular speeds by narrowing street widths, minimize pedestrian, cycling and other collision risks by separating and buffering non-vehicular from vehicular movement with special paving, pockets of on-street loading and parking, wider bike lanes, buffered bike lanes, and multi-use trails. All roadways and movement facilities within the project must be approved by and meet or exceed applicable standards adopted by Caltrans and Kern County.

c. Prior to the issuance of the first occupancy permit, a Transportation Management Association shall be formed and funded to implement transportation demand management measures that reduce vehicle trips and encourage multi-model movement in a phased manner as development occurs within the project area, including such measures as: (a) coordinating transit schedules to align with employer work schedules; (b) providing discounted transit passes; (c) organizing ridesharing, bike-share or car-share programs; and (d) Transportation Management Association-sponsored shuttle/vanpool services, in collaboration with employers, to serve major employment centers. The Transportation Management Association shall also implement a commute trip reduction program including that includes such measures as: (a) vanpool service; (b) preferential carpool parking; (c) end of trip facilities for bicyclists; (d) encouraging flexible work schedules/telecommuting; (e) funding a transportation coordinator for the project area; and (f) conducting marketing campaigns to encourage non-automotive modes for commuting and other movement requirements.

d. In the preparation of each tract map submittal package, the Master Developer shall reserve sufficient rights of way at intersections within the Grapevine Specific Plan development that could fall below Level of Service D under cumulative plus project conditions to implement additional improvements that would maintain LOS D at these locations as shown in Figures 6 and 7. A traffic study shall be conducted by a master developer and submitted to the Kern County Planning Department prior to the issuance of the 10,000th occupancy permit for the project to determine the level of service at the intersections. If the study determines that any such intersection is operating within LOS E or LOS F, the Master Developer and the County as part of biennial monitoring will review whether intersection performance is consistent with County criteria, and at such time, County and Master Developer may determine that expansion of intersection is required to ensure the ongoing functioning of the intersection.

With these mitigation measures, potential project impacts to Kern County intersections and roadways will be less than significant.

B. I-5 interchanges that provide project access

Potential impacts to Kern County intersections and roadways were evaluated by using the operational analysis methodologies in the Caltrans HCM under interim cumulative (Interim B), existing plus project and cumulative plus project conditions. As discussed above, the existing I-5 / Laval Road interchange will be used for access to the first phase of the project ("Interim A") and the existing I-5 / Grapevine interchange could also be used for access following the completion of certain operational enhancements approved by Caltrans ("Interim B"). Both existing interchanges would operate at LOS D or better and no freeway ramp queuing would occur under interim cumulative conditions.

Interim A or Interim B would not provide sufficient capacity to meet project demand during latter development phases without exceeding LOS D at an interchange or causing off-ramp queuing on the freeway. A expanded and relocated I-5 / Grapevine interchange must be constructed to meet full buildout demand in accordance with the preferred Variant 1 or Variant 2. Impacts from the exceedance of LOS D and queuing requirements at any existing interchange serving the project, the expanded and relocated interchange after construction, or at the I-5 / Laval Road interchange would potentially be significant without mitigation. The following mitigation measures are required to reduce these potential impacts to less than significant levels:

MM X.2 Interstate 5 Interchange Improvements for Project Access.

a. The Master Developer shall complete operational enhancements, as approved by Caltrans, at the existing I-5 / Grapevine interchange as depicted in Figure 31, prior to occupancy of project development that would use the existing I-5 / Grapevine interchange.

b. The Master Developer shall implement a biennial traffic monitoring program at the existing I-5 / Laval Road interchange and, following the completion of operational enhancements approved by Caltrans at the existing I-5 / Grapevine interchange to monitor level of service and queuing conditions. The biennial traffic monitoring program shall be initiated within one year from the first occupancy of any project residential, commercial or industrial development and will continue until an expanded and relocated I-5 / Grapevine interchange with sufficient capacity to meet full buildout project access demand has been constructed. The interchange ramps and intersections shall operate within Level of Service D, and no off-ramp queues will extend onto the freeway, at either location.

c. Prior to the construction of an expanded and relocated I-5 / Grapevine interchange with sufficient capacity to meet full buildout project access demand, a traffic evaluation study will be submitted with each project tract map or parcel map application to the Kern County Planning Department. The study will include an evaluation of the level of service and queuing conditions at any existing I-5 interchange that serves the project at the time that the application is submitted.

d. The Master Developer shall, upon approval, work with Caltrans and secure Caltrans approval for an expanded and relocated I-5 / Grapevine interchange that will have sufficient capacity to meet full buildout project access demand, such as Variants 1 or 2. At such time as the biennial traffic monitoring program or a traffic evaluation study required by Mitigation Measure-X.2b or Mitigation Measure-X.2c determines that a 10% increase in traffic utilization would cause an interchange ramp or intersection to operate below Level of Service D or off-ramp queuing that extends onto the freeway, the Master Developer shall cause construction of the expanded and relocated interchange approved by Caltrans to commence and shall work with Caltrans to timely complete the expanded and relocated interchange.

e. The Master Developer shall reserve sufficient rights of way to construct a 6-lane overpass at the expanded and relocated interchange as shown in Figure 3. A traffic study shall be conducted by the Master Developer and submitted to Caltrans prior to the issuance of the 10,000th occupancy permit for the project to determine the level of service at the expanded and relocated interchange. If the study determines that the interchange is operating at or below 10% of the lower range of Level of Service D, the Master Developer shall cause construction as approved by Caltrans to commence, and shall work with Caltrans to complete the expansion of the overpass from 4 to 6 lanes.

f. A traffic study shall be conducted by the Master Developer and submitted to Caltrans prior to the issuance of the 10,000th occupancy permit for the project, and in the preparation of each tract map submittal package thereafter, to determine the a.m. and p.m. internalization rates for project-related trips. If any such study determines that the internalization rates are more than 10% below projected levels, Caltrans and the Master Developer will jointly review the study and, if required, shall identify and implement additional transportation demand management or other measures as necessary to ensure that Caltrans facilities serving the project operate within applicable level of service standards..

With the implementation of these mitigation measures, potential project impacts to I-5 interchanges that serve the project would be less than significant.

C. SR-99 from the junction with I-5 to Bakersfield

Potential impacts to SR-99 north of the I-5 junction were evaluated by calculating the volume to capacity ratios of segments and ramps under cumulative no project and cumulative with project conditions based on the KernCOG RTP/SCS volume projections for 2040. The LOS performance threshold for these freeway segments is LOS D. All freeway and ramps on SR-99 freeway segments north of the I-5 junction through Bakersfield would operate at LOS D under cumulative plus project conditions. Potential project impacts to SR-99 north of the junction with I-5 would be less than significant and no mitigation is required.

D. Freeways and Roadways in Los Angeles County, including I-5, SR-138, SR-14 and SR-126

Potential impacts to freeways and roadways south of the project in Los Angeles County, including I-5, SR-138, SR-14 and SR-126 were evaluated by calculating the volume to capacity ratios of roadway segments and ramps under cumulative no project and cumulative with project conditions based on the SCAG RTP/SCS volume projections for 2035. The LOS performance threshold for the freeway segments is LOS D in rural areas north of Castaic and Lancaster, and LOS E within the urbanized areas of Santa Clarita, Palmdale, and Lancaster. The results show that the project would contribute to cumulative LOS exceedances at the following locations:

<u>I-5 Northbound:</u>

- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – PM peak hour

<u>SR-138 Eastbound:</u>

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

<u>SR-138 Westbound:</u>

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

As discussed in Threshold 2, the project will also contribute to p.m. peak hour cumulative impacts from Fort Tejon Road to the existing Grapevine / I-5 interchange.

The following mitigation measure is required to reduce these potential impacts to less than significant levels:

MM X.3. **Highway Improvement Fair Share Contributions.** The Master Developer shall either: (i) execute a traffic impact mitigation agreement with Caltrans that identifies project funding that will be paid to Caltrans to mitigate the project's incremental contribution to I-5 cumulative impacts to the Grapevine Grade in Kern County and Los Angeles County and cumulative impacts to SR-138 in Los Angeles County; or (ii) provide for mitigation funding equal to the fair share of the project's incremental contribution for I-5 cumulative impacts to the Grapevine Grade in Kern County and Los Angeles County and to cumulative impacts to SR-138 in Los Angeles County, including fair share funding for the following projects:

a. Kern COG RTP/SCS improvement projects on SR-58 between I-5 and I-15;

b. Strengthening and widening the inside and outside shoulders of I-5 between the Fort Tejon and Grapevine Road interchanges and State Route 138 to Lake Hughes Road interchange;

c. Other intelligent transportation systems (ITS) on freight corridors in Kern and Los Angeles counties that currently exist and/or that may become available in the future;

d. A northbound auxiliary lane from Lake Hughes Road to Parker Road; and

e. The Caltrans SR-138 Northwest Corridor Improvement Project.

The project shall also implement transportation demand measures in accordance with Mitigation Measure MM-X1c and shall implement monitoring in accordance with Mitigation Measure MM-X2f.

With the implementation MM-X.3, potential incremental project impacts to I-5 and SR-138 would be less than significant.

Threshold 2: Would the project conflict with an applicable congestion management program, including, but not limited to LOS standards and travel demand measures, or other standards established by the County congestion management agency for designated roads or highways?

Potential impacts to the Grapevine Grade (I-5 from the existing Grapevine Road/I-5 interchange to the Ft. Tejon Road/I-5 interchange) were analyzed using the operational analysis methodologies in the Caltrans HCM under interim cumulative, cumulative without project and cumulative plus project conditions. The Grapevine Grade extends for approximately 5 miles and consists of two outside truck/auto lanes and two inside auto lanes in the northbound and southbound directions with an approximate 6% upgrade from north to south.

No impacts would occur to the Grapevine Grade under interim or existing plus project conditions. Under cumulative plus project conditions, all lanes in both directions would operate at or above the applicable LOS D performance standard during the a.m. peak hour and no impacts would occur. During the p.m. peak hour, the project would increase the density for LOS E conditions within the two inside northbound auto lanes and increase the density for LOS F conditions in the two northbound and southbound truck/auto lanes. The impacts would be significant without mitigation.

MM-X.3 requires that, by agreement with Caltrans or by other appropriate method, the project will provide fair share funding for offsite Caltrans facility improvements within the Grapevine Grade segment of I-5 that will result in acceptable p.m. peak hour LOS performance in the northbound auto and northbound and southbound truck/auto lanes under cumulative plus project conditions. With the implementation MM-X.3, potential incremental project impacts to the Grapevine Grade would be less than significant.

Threshold 3: Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

The project is not located within an area subject to the Kern County Airport Land Use Compatibility Plan and would not significantly impact infrequently used military training flight paths over the site or the use of an adjacent unimproved landing strip (listed as the "Tejon Ag Airport" on aeronautical charts). Potential project impacts from a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks, would be less than significant and no mitigation is required.

Threshold 4: Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

All roadways and movement facilities within the project must meet or exceed applicable Caltrans and Kern County safety and performance standards for vehicular and transit operations, cyclists, and pedestrians applicable to the Specific Plan area. Caltrans and Kern County design approval will be required as applicable prior to construction. The Specific Plan includes design standards for arterials and collectors that emphasize pedestrian safety and compatibility by providing reduced crossing widths, street bulb-outs, and space for shade trees and street furniture. Project roads are optimized for slow traffic safety and compatibility (e.g., looking for parking or destinations, watching for pedestrians), cycling, and pedestrian crossings, while also accommodating larger vehicles. The local street network will incorporate public rights-of-way designed for pedestrian use and compatible vehicles and bicycle use. Local streets will incorporate narrower design to limit vehicular access and vehicle speeds and will include shared public ways with special paving, pockets of on-street loading and parking, and other constructed amenities to encourage pedestrian and cycling use. The severity of potential collisions will be reduced by providing narrower vehicle travel lanes and pedestrians will be further protected by reduced intersection crossing widths. Wider bike lanes, buffered bike lanes, and multi-use trails will be constructed to provide more space between vehicles and cyclists, reduce potential vehicle-bicycle collisions and improve bicycle user safety. During construction, heavy vehicles would access the site and could cause temporary road closures, movement facility (e.g., roadway) damage, or other hazards to bicyclists, pedestrians or vehicular and transit movement.

MM-X.2a reduces potential hazard impacts at the existing Grapevine/I-5 interchange to less than significant levels. MM-X.1a requires the implementation of the multi-modal transportation, section of the Specific Plan, including measures that will encourage safe non-automotive walking, cycling and transit movement. MM-X.1b, which requires implementation of the arterial, collector, local street design, and pedestrian, biking and multi-use trail safety and other standards in the Specific Plan. MM-X.1a and MM-X.1b reduce vehicular speeds by narrowing street widths, minimize pedestrian, cycling and other collision risks by separating and buffering non-vehicular from vehicular movement with special paving, pockets of on-street loading and parking, wider bike lanes, buffered bike lanes, and multi-use trails. The following mitigation measures further reduce potential project design or compatibility hazard impacts during construction and operations

MM X.4 **Safety Design – Construction.** A Construction Traffic Management Plan shall be submitted with each application for a project tract or parcel map to ensure that safe operating conditions are maintained on local roadways, freeway facilities and for all pedestrian, cycling, trail and transit facilities. At a minimum, the plan shall include: (a) the number and arrival and departure timing of construction truck and equipment trips; (b) the time and day of construction related street closures; (c) the circulation pattern that will be implemented to ensure compatibility with and the safety of other movement activities; (d) identification of detour routes and a signing plan for street closures; (e) the maintenance of safe and efficient emergency vehicle access routes; (f) manual traffic controls when necessary for safety or compatibility; (g) advance warning and posted signage concerning street closures; and (h) provisions for pedestrian and bicycle safety. The Construction Traffic Management Plan shall be subject to the review and approval of the Kern County Department of Public Works in consultation with Caltrans, as applicable. A copy of the plan shall be submitted to local emergency response agencies including, and transit providers as directed by Kern County, and to Caltrans. These agencies shall be notified at least 30 days before the commencement of construction that would partially or fully obstruct public roadways.

MM X.5. **Safety Design - Operations.** The Master Developer shall implement MM X.1(b), requiring the completion of the arterial, collector, local street design, and pedestrian, biking and multi-use trail standards in the Specific Plan, including design standards that reduce vehicular speeds by narrowing street widths, minimize pedestrian, cycling and other collision risks by separating and buffering non-vehicular from vehicular movement with special paving, pockets of on-street loading and parking, wider bike lanes, buffered bike lanes, and multi-use trails. All roadways and movement facilities within the project must be approved by and meet or exceed applicable standards adopted by Caltrans and Kern County.

With these mitigation measures, potential hazards related to design features or incompatible uses will be minimized, and potential project impacts would be less than significant.

Threshold 5: Would the project result in inadequate emergency access?

At buildout, the project will include fire stations, a sheriff substation, and medical facilities that are sufficient to serve the project area, and sufficient emergency access will be provided within the project roadway network in accordance with Kern County requirements. During construction certain roadways may be temporarily closed, and planned project emergency services may not be available during earlier development phases. These conditions could affect the adequacy of emergency services during construction.

MM-X.4 requires the development of a construction traffic management plan approved by Kern County with each tract or parcel map application. The plan must include measures that will maintain safe and efficient emergency vehicle access routes during construction. The adequacy of emergency access will be confirmed by the County in conjunction with the review and approval of the construction traffic management prior to the commencement of construction. With MM-X.4, potential project construction period emergency access impacts will be less than significant.

Threshold 6: Would the project conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

The project Specific Plan incorporates smart growth policies consistent with the General Plan, including: (a) walkable mixed-use development supported by neighborhood commercial uses; (b) the provision of employment uses and proximity to existing employment opportunities; (c) alternative transportation modes; and (d) provision of pedestrian and bicycle trails and facilities. As discussed in the Land Use section of this EIR, potential project impacts from inconsistency with Kern County General Plan policies, goals and implementation measures related to public transit, bicycle, or pedestrian facilities would be less than significant. The project area is identified in the approved 2014 RTP/SCS as a "Planned Transit Priority Area" and a "Strategic Employment Center" and is intended to be an activity node around which future transit, vanpooling services, and mixed-use development patterns would be planned to be support forecasted development patterns. The Specific Plan provides for walkable, mixed-use land use and circulation patterns and the integration of transit and other sustainable development designs to ensure that the proposed project is consistent with the policies and programs of the 2014 RTP/SCS. As discussed in the Land Use section of this EIR, potential project impacts from inconsistency with the approved RTP/SCS for the project area related to public transit, bicycle, or pedestrian facilities would be less than significant.

MM-X.1a requires the implementation of the multimodal transportation and project design measures in the Specific Plan. MM-X.1b requires implementation of the arterial, collector, local street design, and pedestrian, biking and multi-use trail standards in the Specific Plan. MM-X.1c requires the formation and funding of a Transportation Management Association (TMA) to implement transportation demand management measures that reduce vehicle trips and encourage multi-model movement within the project area. MM-X.5 requires the implementation of Specific Plan design standards related to pedestrian, cycling and transit movement safety. With the implementation of MM-X.1a, MM-X.1b, MM-X.1c and MM X.5, potential project impacts related to conflicts with such policies, plans, or programs will be less than significant.

1 INTRODUCTION

This report documents the results of the roadway, bicycle/pedestrian facilities, and transit facilities/services impact analysis for the Grapevine project. Section 1 of this report describes the project location and proposed transportation facilities. Section 2 describes the existing transportation facilities in the project or study area existing vehicular traffic conditions. Section 3 summarizes applicable federal, state, regional, and local transportation regulations. Section 4 evaluates potential project transportation impacts with reference to the California Environmental Quality Act (CEQA) thresholds of significance implemented by Kern County and identifies mitigation measures that reduce potential significant impacts to less than significant levels.

Fehr & Peers consulted with the Kern County Public Works Department, Kern County Planning Department, and Caltrans during the preparation of this report. Appendices A-M provide technical calculations and documentation that support the transportation impact analysis.

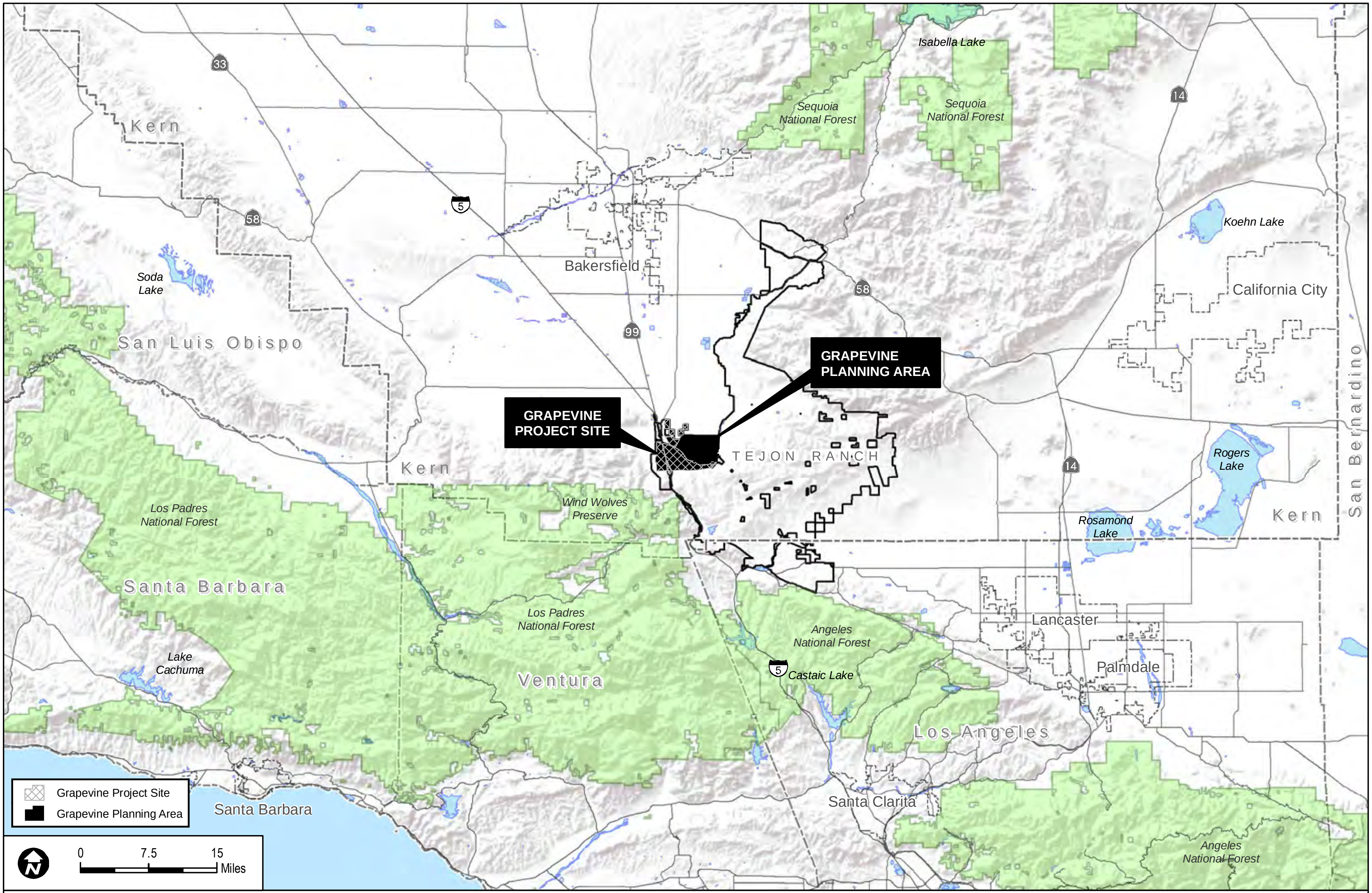
1.1 Project Location

The proposed Grapevine project is located in the west-central portion of Tejon Ranch (the Ranch). The approximately 270,000-acre Ranch is currently held in private ownership by Tejon Ranchcorp. The Ranch includes a large portion of the Tehachapi Mountains as well as smaller portions of the San Joaquin and Antelope Valleys. Generally, the Ranch extends from State Route 58 (SR-58) on the northern side to SR-138 on the southern side. Interstate 5 (I-5) and the California Aqueduct bisect the project site. The project site is south of the Tejon Ranch Commerce Center (TRCC) and extends to the east and west of the existing Grapevine interchange on I-5 (see Figure 1, Regional Location, and Figure 2, Vicinity Map).

The 8,010-acre project site is within the 15,644-acre Grapevine Planning Area identified in the Tejon Ranch Land Use and Conservation Agreement, a landmark agreement reached in 2008 with leading environmental organizations (including the Sierra Club, Natural Resources Defense Council, California Audubon Society, Endangered Habitats League, and Planning and Conservation League) to permanently preserve over 90% of Tejon Ranch as open space and limit development to designated areas near existing infrastructure, including I-5 (Tejon Ranch 2008).

The Tehachapi Mountains and Tejon Ranch conservation lands are located immediately to the south, east, and west of the portion of the project site east of I-5; the Tejon Ranch Tecuya Creek Conservation Easement is to the west; and the TRCC is to the north. The Los Padres National Forest is located south and west of the portion of the project site located west of I-5, as is the Wind Wolves Preserve conservation area. The Pastoria Energy Facility, Griffith Sand and Gravel Mine, and Edmonston Pumping Station are all located several miles east of the project area. The nearest populated communities other than near TRCC are the unincorporated communities of Lebec, Frazier Park, Wheeler Ridge, and Mettler. The project site is approximately eight miles north of the County of Los Angeles jurisdictional boundary.

INTENTIONALLY LEFT BLANK

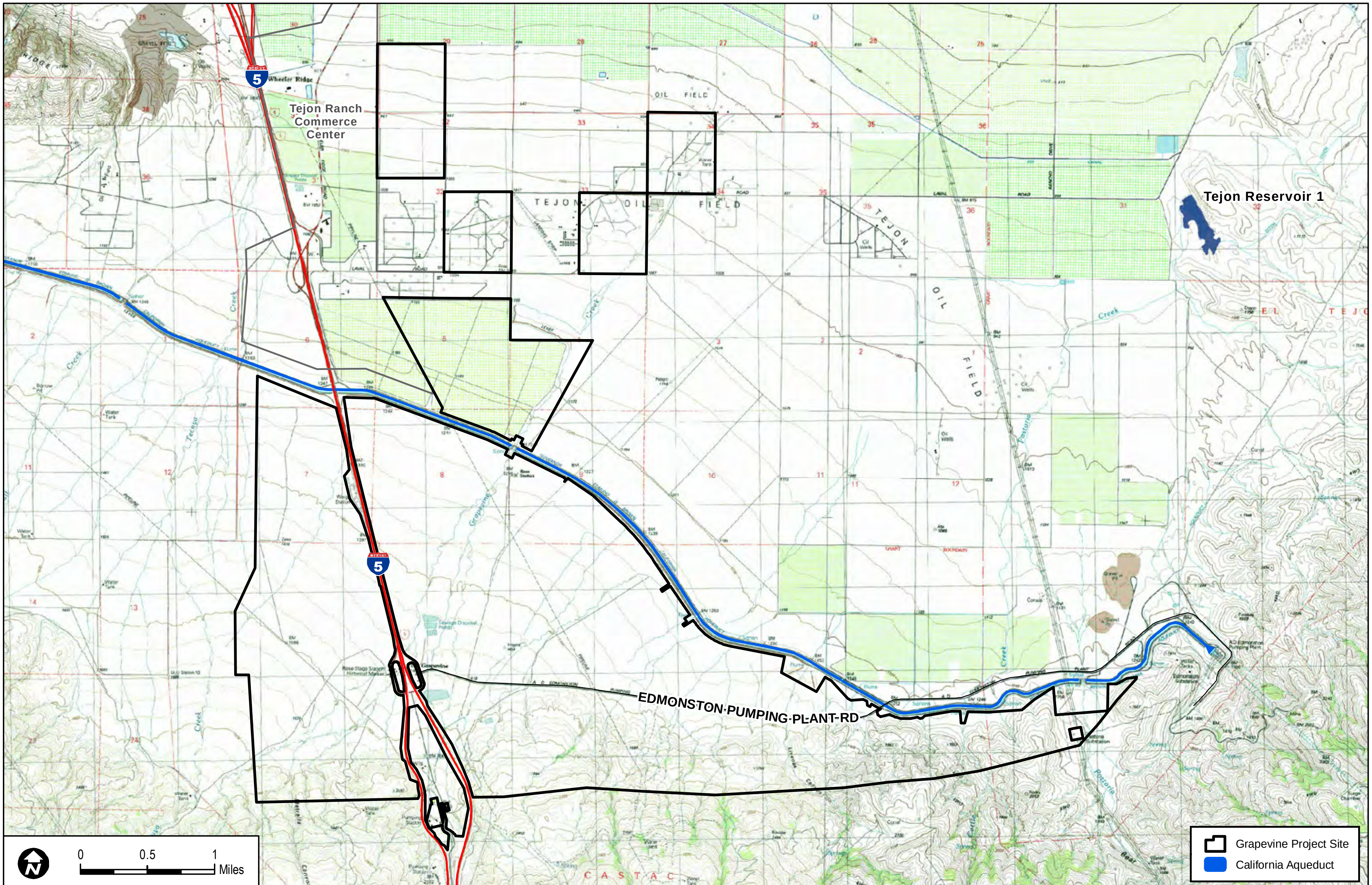


SOURCES: McIntosh & Associates 2013; TRC 2013a

FIGURE 1

Regional Location

INTENTIONALLY LEFT BLANK



SOURCES: McIntosh & Associates 2013; TRC 2013b

FIGURE 2

Vicinity Map

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

1.2 Project Description

The Grapevine project includes 8,010-acres designed as a series of village centers, each composed of a mix of neighborhood-serving retail and office uses, schools, parks, and community services. The project will complement economic development occurring within the adjacent TRCC development by providing 12,000 residential units of varying density and type in close proximity with employment generating land uses. The Grapevine Specific Plan allows for up to 2,000 additional residential units up to a total of 14,000 units provided that other land uses, such as commercial, office and other business activities, are reduced in accordance with specific trip equivalency ratios to fully offset any potential traffic volume increase (Specific Plan Table 2-3, see Appendix O. Under existing conditions, no housing is located near TRCC, and the Grapevine project would reduce the number and length of automotive and other work-related trips in the project area. The project includes 5,100,000 square feet of commercial and industrial development, most of which will be located within walking or biking distance from proposed residential units.

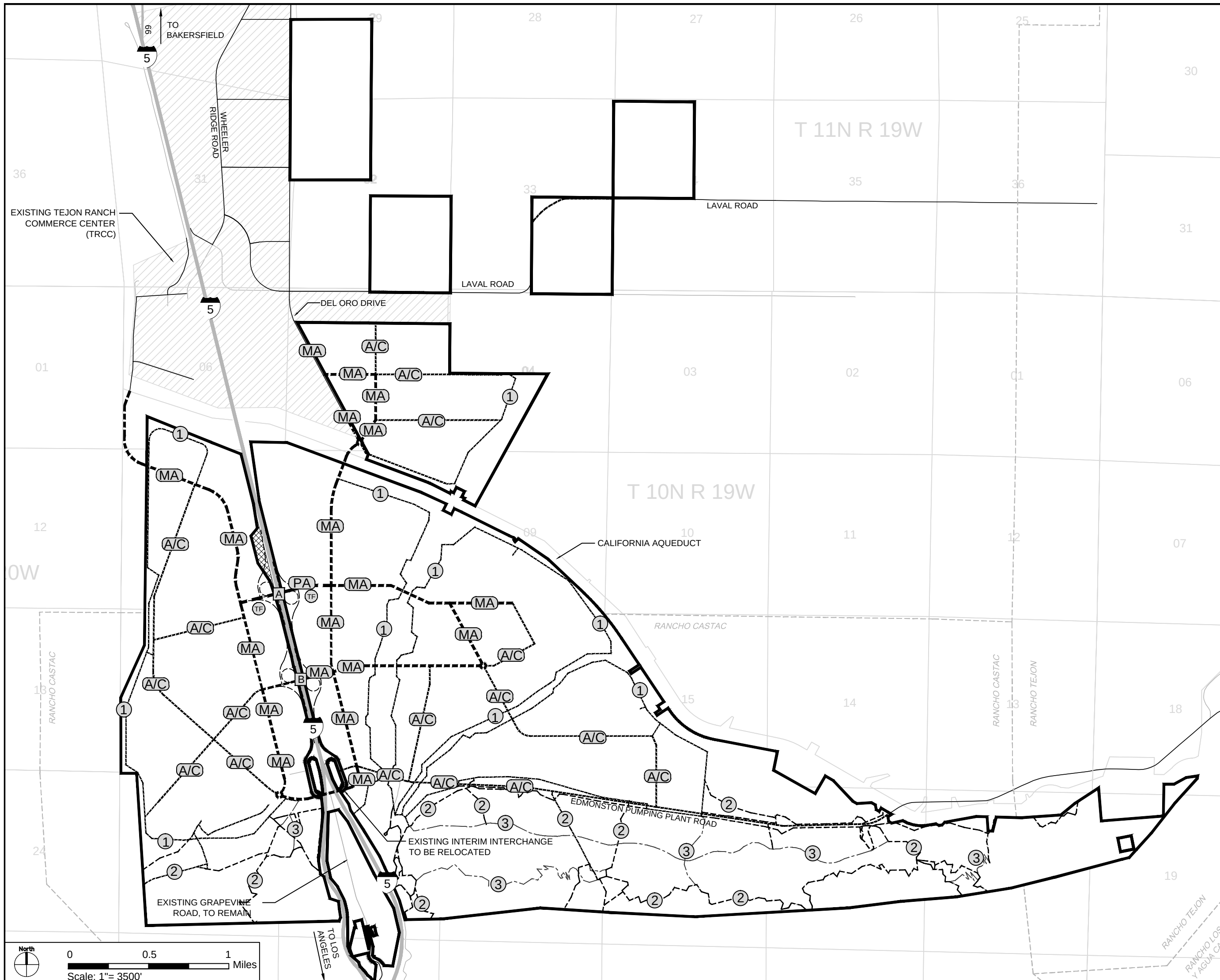
A total of 157 acres of the Specific Plan area has been set aside for schools, and 96 acres for parks, which will be located adjacent to schools and will serve as school recreation yards and playfields during school hours in a joint-use fashion. Other public facilities, including a fire station, sheriff substation, transit facility/park-and-ride, and water and wastewater treatment facilities are proposed in the project. Outside of the village centers, the project includes a mix of lower-density residential, office, research and development, retail, and light industrial/warehouse uses. Additional service/industrial uses are located in the northern portion of the project. Approximately 40% of the Plan Area will be designated as an Exclusive Agriculture zone accommodate ongoing resource, grazing, and open space uses while also allowing nonagricultural uses and activities that are compatible with agriculture. Table 1 summarizes the proposed project development and land use.

Table 1
Grapevine Project Development Summary

Land Use Type	Residential and Commercial Development	Percentage of Specific Plan	Area
Residential community and employment center	12,000 residential units[1] 5.1 million square feet of commercial and industrial space (1.2 million square feet of retail, 2.45 million square feet of office/research and development, 1.45 million square feet of industrial/warehouse)	60%	4,778 acres
Grazing and open space as the predominant use[2]	0 residential units[3] 0 square feet of commercial and industrial space	40%	3,232 acres

Notes: [1]Up to 2,000 additional residential units may be allowed through a reduction of commercial/industrial square footage based on vehicle trip equivalency ratios identified in Table 2-3 of the Grapevine Specific Plan.
[2]No industrial uses other than agriculture-related processing are allowed. Incidental recreation and agriculture-supporting commercial uses are also allowed. A complete list of permitted uses is provided in the Grapevine Special Plan.
[3]Existing residential units in Exclusive Agriculture may be retained.
Source: Grapevine Specific Plan – Table 1-4

The project is planned as a residential community and employment center featuring a series of compact neighborhoods linked by streets, bicycle and pedestrian trails that provide convenient access to grocery and drugstores, professional services, schools, and parks. The circulation network will be primarily composed of two- and four-lane arterials, collector streets, and local streets (including lanes and alleys) organized in a grid-like pattern. Primary regional vehicular access to the Grapevine Specific Plan Area will be from I-5. Figure 3 shows the project's Circulation Plan (Exhibit 3-1 in the Grapevine Specific Plan), which identifies the project's arterial and collector streets, bikeways, and bicycle and pedestrian trails.



LEGEND

- Freeway
- Primary Arterial with Class I Bike Path
- Major Arterial/Collector with Class I Bike Path
- Minor Arterial/Collector with Class II Bike Lane
- Multipurpose Trails
- Unpaved Existing Trails
- Unpaved Trails
- Existing Off-Site Roads
- Relocated Interchange (Conceptual Location)
  - A Option A
  - B Option B
- Specific Plan Boundary
- Existing Weigh Station
  Proposed to be relocated and the land acquired for the Grapevine Project
- Township & Range & Section
- Transit Facility

NOTES:

FINAL ROAD ALIGNMENT TO BE DETERMINED AT THE TENTATIVE TRACT MAP STAGE BUT WILL SUBSTANTIALLY CONFORM TO THOSE ILLUSTRATED ON THIS SHEET.

SEE SPECIAL PLAN ROADWAY AND OFF-ROADWAY STREET SECTIONS FOR DESIGN OPTIONS.

TRAFFIC IMPACT ASSESSMENT SHALL DETERMINE FINAL ROADWAY OPTION SELECTION AND LANE REQUIREMENTS.

COLLECTOR STREETS EDMONSTON PUMPING PLANT ROAD AND LAVAL ROAD ARE EXISTING, TO REMAIN.

ALL ROADS WITHIN THE SPECIFIC PLAN WILL BE DEVELOPED IN ACCORDANCE WITH SPECIAL PLAN STANDARDS, WITH THE EXCEPTION OF LAVAL ROAD.

EXHIBIT 3-1

Backbone Circulation Plan

GRAPEVINE SPECIFIC PLAN

Figure 3

Project Circulation Plan

INTENTIONALLY LEFT BLANK

Initial project development ("Phase 1") would occur by using either the existing Laval Road /I-5 interchange ("Interim A"), or the Laval interchange and the existing Grapevine Road I-5 interchanges provided certain operational enhancements are completed with Caltrans approval ("Interim B"). The interim Phase 1 access facilities would be used until applicable LOS levels or queuing requirements would be exceeded by additional traffic volumes and construction of the expanded and relocated I-5 / Grapevine interchange would be required.

As shown in Figure 4, Interim A would allow for Phase 1 development in project Planning Areas 6 and 3 east of I-5. A portion of the eastern north/south arterial would be constructed south from Laval Road and connect with 2-lane roadways to the east. The California Aqueduct overcrossing to the east of I-5 would be constructed to extend the arterial approximately 0.5 mile south of the intersection with planned Street A. There would be no connection with or access to the project through the existing I-5 / Grapevine interchange in Interim A. Approximately 2,200 homes and 1,326,000 square feet (sf) of commercial uses could be developed before projected traffic volumes would cause the Laval interchange to operate below Level of Service D or queuing requirements, the applicable performance standard for the interchange.

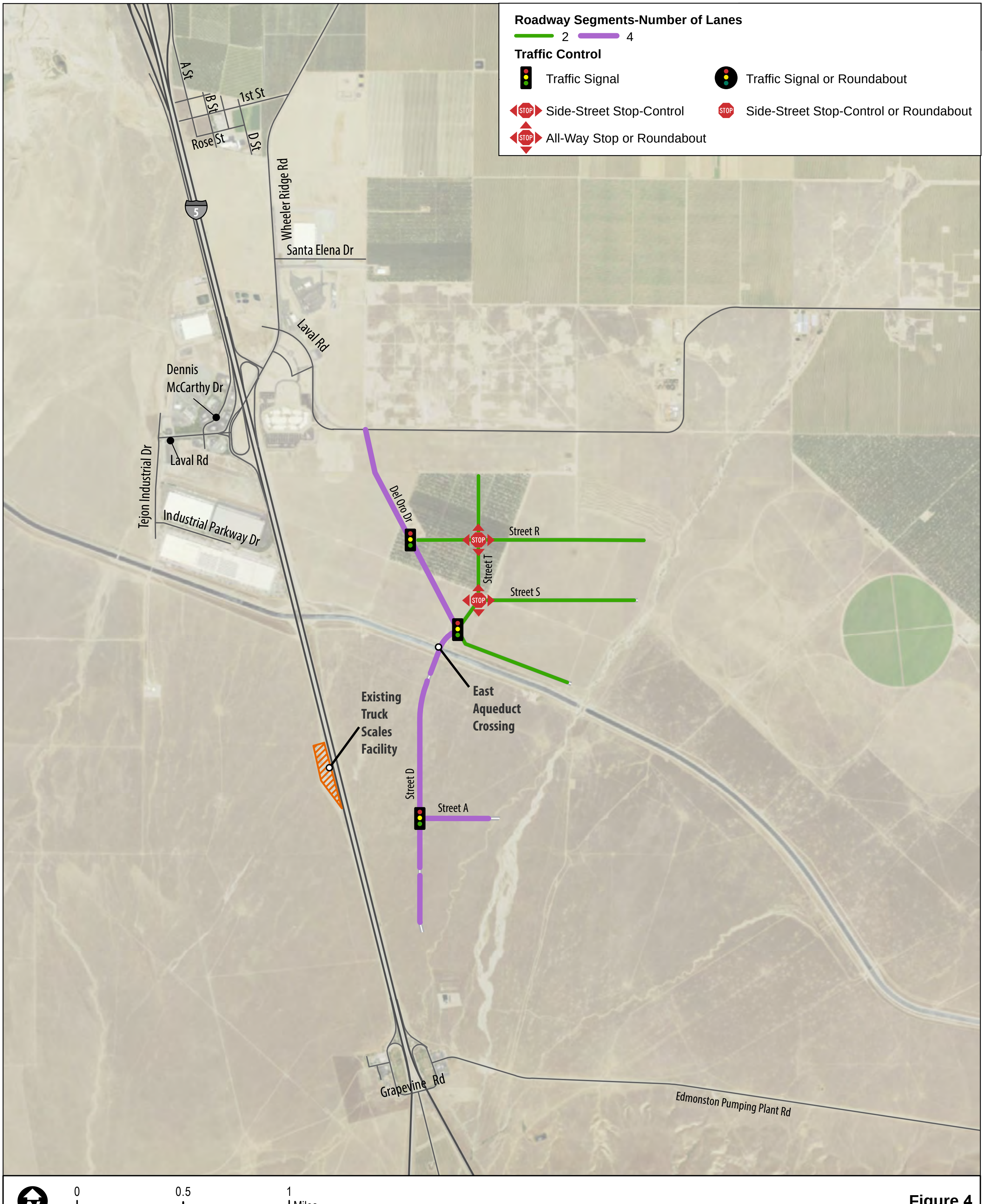
Subject to Caltrans approval, certain operational enhancements could be made to the existing I-5 / Grapevine interchange to provide additional Phase 1 access to the Grapevine Specific Plan Area ("Interim B") including:

- I-5 auxiliary lane between CVEF and southbound Grapevine off ramp;
- I-5 northbound on-ramp acceleration lane;
- enhanced lighting on all gores;
- enhanced overhead signage on I-5 for both northbound and southbound off-ramps;
- enhanced signage on northbound off ramp horseshoe curve; and
- enhanced super elevation rate on northbound off ramp horseshoe curve.

As shown in Figure 5, if the existing I-5 / Grapevine interchange is enhanced for interim project use, the eastern arterial (planned Street D) would be extended to existing Grapevine Road and development would occur west of I-5 in the southern portion of the project area. Phase 1 development would occur in project Planning Areas, 6, 3, 4, and approximately 6,000 homes and 2,100,000 sf of commercial uses before projected traffic volume would cause either interchange to operate below LOS D or queuing requirements.

Prior to the construction of the expanded and relocated I-5 / Grapevine interchange, a traffic monitoring program will be implemented and traffic studies will be required with each application for a tentative tract map or parcel map to evaluate existing interchange LOS levels and on-freeway queuing. The monitoring program and traffic studies will assess the extent to which interchange operations are approaching levels that would exceed applicable LOS or queuing standards. The expanded and relocated I-5 / Grapevine interchange will be constructed before interim project traffic through an existing interchange causes an exceedance of LOS or queuing thresholds.

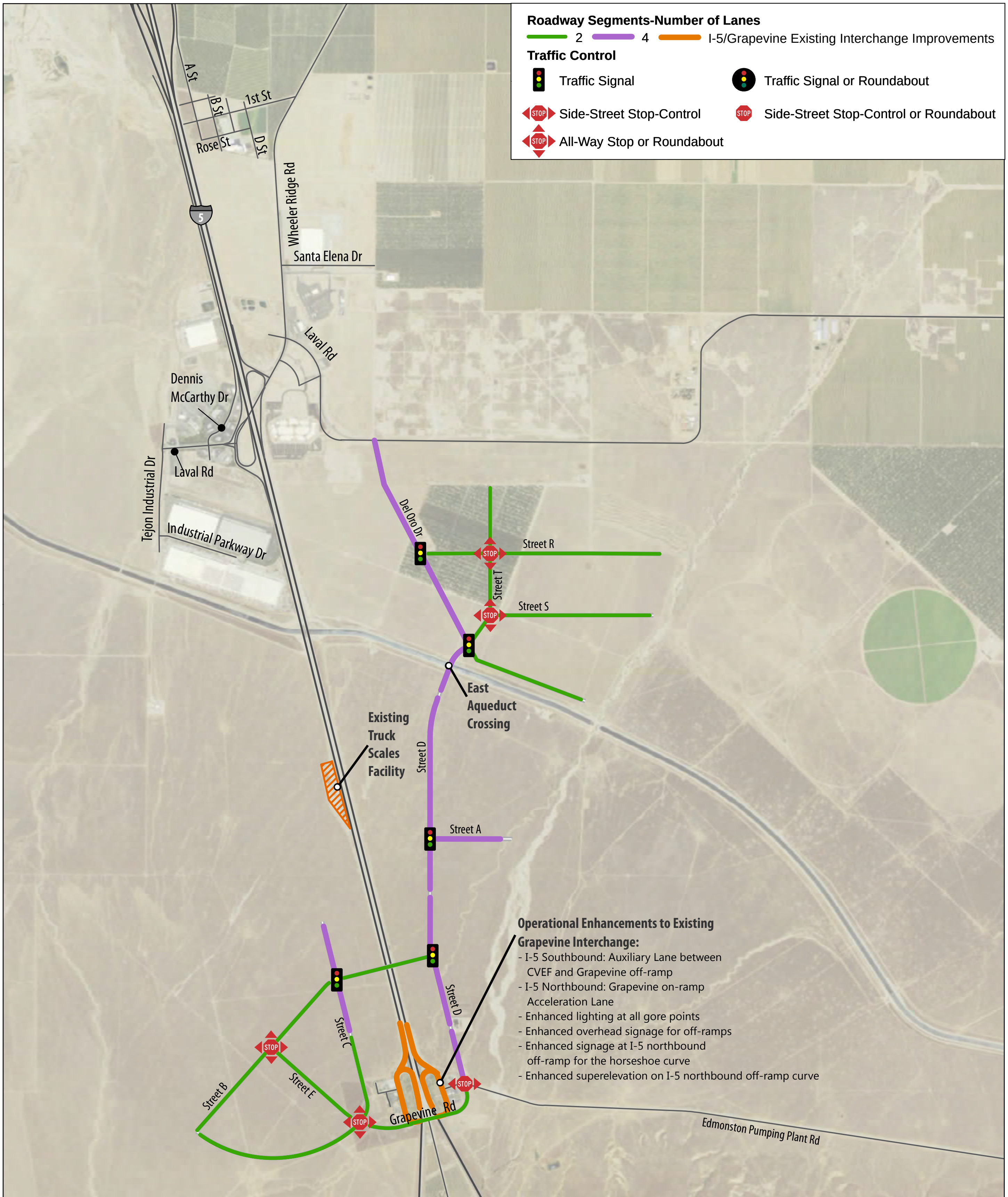
INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

Figure 4
Project Roadway Network - Interim A

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

Figure 5

Project Roadway Network - Interim B

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

The preferred location of the expanded and relocated I-5 / Grapevine interchange ("Variant 1"), and the proposed project roadway system, are shown on Figure 6. The expanded and relocated interchange would be constructed approximately one mile north of the existing I-5 / Grapevine interchange and will connect with planned Street A. Sufficient right of way will be reserved to facilitate a 6-lane overpass at the interchange if required. A 2-lane overpass connecting portions of the project that are located east and west of I-5 will be constructed at planned Street B about 0.5 mile south of the interchange. The existing Grapevine Road underpass at I-5 will be maintained, and freeway access at the existing interchange will be closed. Four-lane arterials will be constructed east (planned Street D) and west (planned Street C) of I-5 and will extend north/south approximately parallel with the freeway. Two new overcrossings of the California Aqueduct will be constructed east and west of I-5 to extend the arterials north to the existing I-5 / Laval Road interchange and TRCC. A network of 2-lane minor arterials and collectors will be constructed generally to the east and west of the Grapevine Specific Plan area north/south arterials.

An existing California Commercial Vehicle Enforcement Facility (CVEF) is operated by the California Highway Patrol at the approximate location of the expanded and relocated I-5 / Grapevine interchange in Variant 1. The CVEF is located on the west side of I-5 and only serves trucks on I-5 southbound. To facilitate interchange construction and to improve the capacity and operation of the facility, the CVEF would be relocated north to the west side of the I-5 / SR 99 junction on land owned by Tejon Ranchcorp. Access and bypass ramps would be constructed to connect the relocated CVEF with I-5 and SR 99, and an additional truck on-ramp would be constructed from the relocated CVEF to I-5 resulting in a southbound auxiliary lane to the I-5 / Laval Road interchange to accommodate truck movement. An existing agricultural road (the "Haul Road") east of the Specific Plan Area will be improved from the existing Edmonston Pumping Plant Road north to Laval Road. The Haul Road will route utility and quarry truck traffic from activities outside of the Grapevine Specific Plan Area around the planned development.

If necessary, the expanded and relocated I-5 / Grapevine interchange could also be constructed approximately 0.5 miles south of the preferred location and would connect with planned B Street ("Variant 2"). As shown in Figure 7, the 2-lane I-5 overpass in Variant 1 would be located approximately 0.5 miles north at the planned Street A in Variant 2. Sufficient rights of way would be reserved at the interchange in Variant 2 to facilitate a 6-lane overpass if required. The CVEF would remain in its existing location, and a braided CVEF on-ramp would be constructed in conjunction with the new southbound off-ramp to accommodate truck movement south from the existing CVEF to the new I-5 interchange. The locations and design of other Grapevine Specific Plan local and regional roadway improvements would be substantially the same as in Variant 1. This includes Grapevine Specific Plan area arterials, collector streets and local streets, the two California Aqueduct overcrossings, the Haul Road, the Grapevine Road underpass, and closure of freeway access at the existing I-5 / Grapevine interchange.

Traffic conditions will be monitored biennially, and traffic studies will be submitted with project tract or parcel map applications to the County, to ensure that applicable performance standards are being achieved. A Transportation Management Association will be established and funded prior to first occupancy to implement transportation demand management measures for the project area that encourage multimodal transit, pedestrian, cycling and other non-automotive movement.

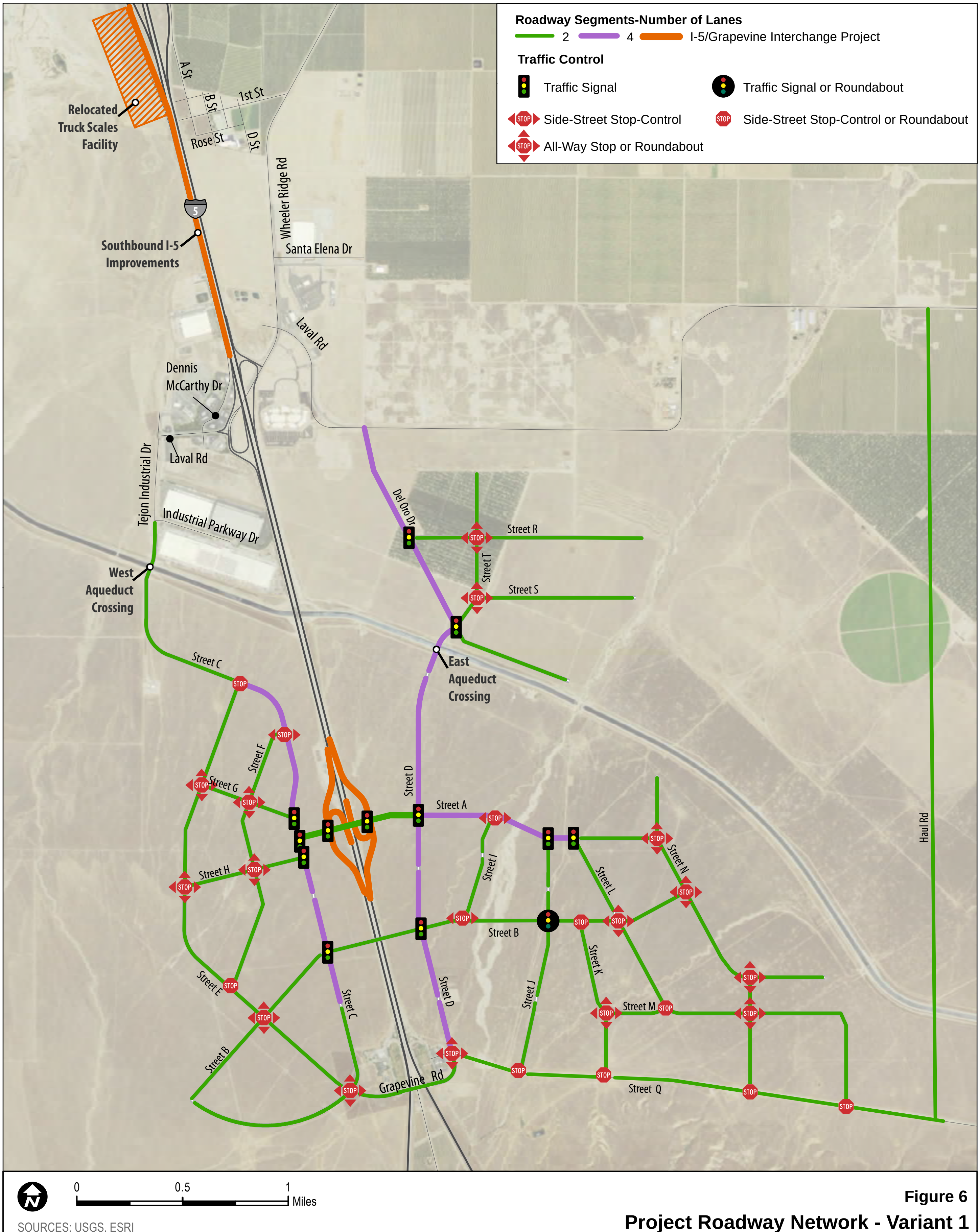
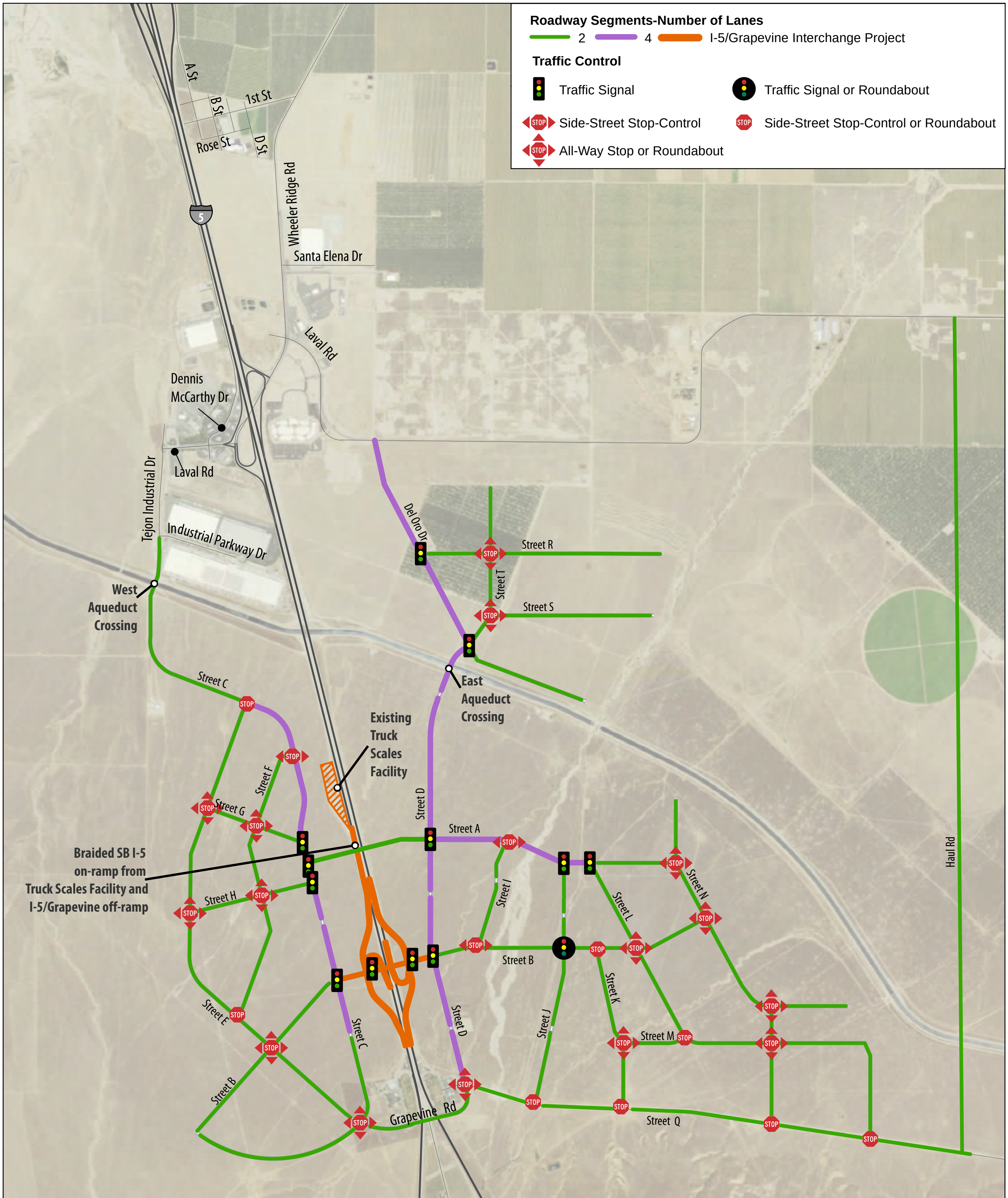


Figure 6

Project Roadway Network - Variant 1

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

Figure 7
Project Roadway Network - Variant 2

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

1.3 Project Multi-Modal Transportation System

The Grapevine Specific Plan has been designed to implement smart growth policies and encourage efficient multi-modal movements in accordance with the smart growth and multimodal performance provisions of Kern County General Plan Land Use, Conservation and Open Space Element Section 1.10.8, Policy 49, implementation measure CC, as amended. The project area is divided into six Sub Areas, each of which includes a village center with a mix of neighborhood-serving retail and office uses, schools, parks, and community services (see Figure 8). The village centers are included in Village Mixed Use (VMU) Districts and will be dense mixed-use centers with compact, walkable neighborhoods that support multiple forms of transportation and reduce single-occupancy vehicle trips (see Figure 9). Walking and bicycling will be encouraged throughout the project area, and particularly within ¼-mile and ½-mile radii of each village center. Transit stops in higher-density, cycling and pedestrian-friendly village centers will also be provided to encourage non-automotive trips to more distant locations. The project will provide housing in close proximity with existing and planned employment land uses, including the adjacent TRCC, that will further encourage multi-modal movement and reduce work-related automotive trips.

The Grapevine project is also consistent with the approved Kern Council of Governments (Kern COG) Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS), which designates the project and adjacent locations, including TRCC, as a “Planned Transit Priority Area” and a “Strategic Employment Center.” The RTP/SCS designations identify the project area as an activity node around which future transit, vanpooling services, and mixed-use development patterns would be planned to support forecasted development patterns within the KernCOG planning region. The RTP/SCS supports a land use pattern and corresponding transportation network that encourages the location of housing near jobs and transportation facilities designed to reduce regional passenger vehicle travel and the resulting reduction in air emissions. The proposed project’s walkable, mixed-use land use and circulation elements, the creation of diverse housing options in close proximity with employment-generating land uses, and the integration of multi-modal transit and other sustainable development are consistent with the land use designations for the project area in the RTP/SCS.

INTENTIONALLY LEFT BLANK

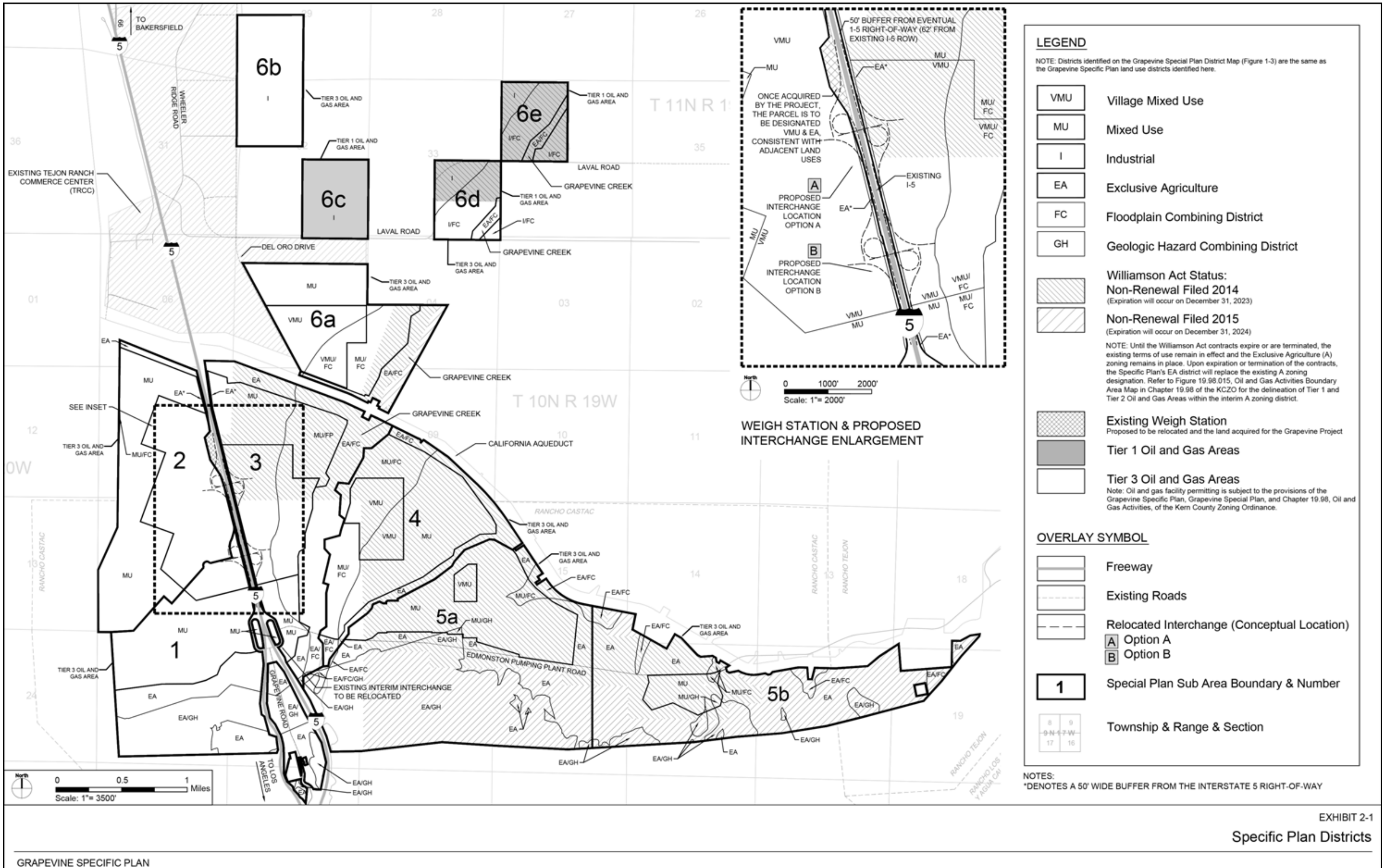


Figure 8
Specific Plan Districts

INTENTIONALLY LEFT BLANK

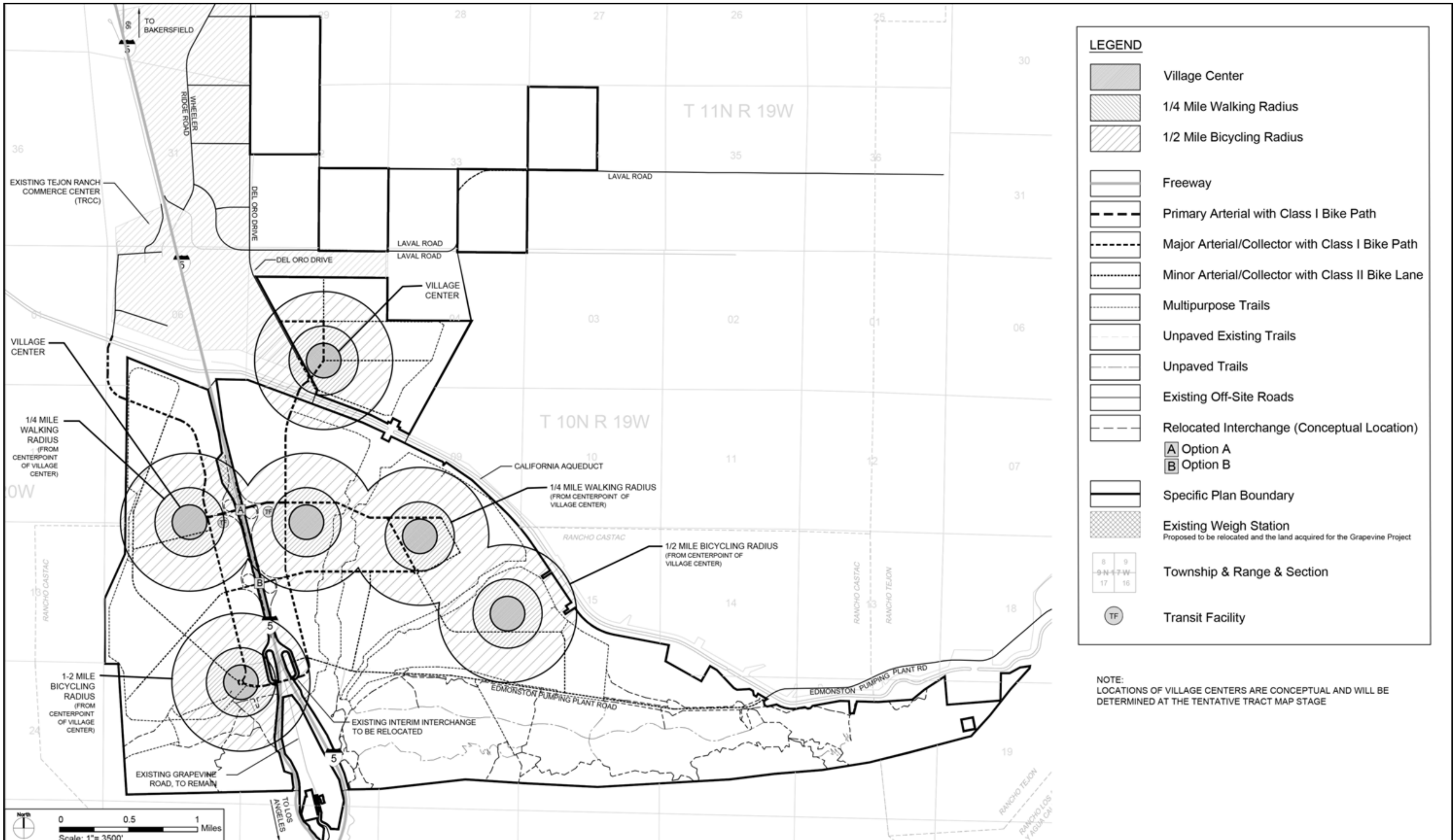


EXHIBIT 2-2

Village Center and District Multi-Modal Connectivity

GRAPEVINE SPECIFIC PLAN

Figure 9

Village Center and District Multi-Modal Connectivity

INTENTIONALLY LEFT BLANK

The Grapevine project multimodal circulation goals, policies and implementation measures include the following:

- A comprehensive, integrated and multi-modal circulation system that accommodates the type, location, and extent of vehicular and non-vehicular facilities and embraces all aspects of design, including functionality, economic efficiency, connectivity between Sub Areas and the surrounding region, and alternative modes of transportation.
- A circulation system that emphasizes the concepts of sustainable mixed-use land use patterns, walkable neighborhoods, narrow pedestrian-scale streets, non-vehicular facilities, and aesthetic quality that provide enhancements that offset any impediments that they may create for vehicular movement.
- A circulation system that increases transit accessibility through a comprehensive network of pedestrian, bicycle and transit routes that connect transit hubs, residential areas, and major employment and activity centers.
- Establish a roadway hierarchy that provides appropriate levels of service for the intended use of each roadway classification, achieves a highly interconnected system, and supports mobility for all modes of transportation (automobiles, bicycles, walking, and transit use).
- Establish a road network that includes linkages to surrounding bicycle and trail routes (both existing and proposed), in accordance with the Kern Council of Government's Regional Transportation Plan/Sustainable Communities Strategy and Kern County Bicycle Master Plan and Complete Streets Recommendations – Final Report (October 2012).
- Allow for a diverse compliment of permitted uses to create a full service and complete mixed-use community that provides housing, retail, service, and employment opportunities, to reduce external trips generated by the project, shorten trips between land uses, and provide opportunities to utilize alternative modes of transportation.
- Encourage pedestrian and bicycle circulation within higher use activity nodes such as the Village Mixed Use centers and Mixed Use commercial areas, as well as areas surrounding schools and parks, through the use of trails and safe routes to school.
- Require pedestrian and bicycle-friendly connections between neighborhoods, village centers, schools, and parks.
- Establish flexible design standards for arterial and collector streets that place emphasis on walkability, bikeability, and alternative modes of transportation by providing reduced crossing widths, minimum 4-foot wide clear sidewalks, street bulb-outs, shade trees, street furniture, and other features, while still accommodating vehicular travel and allowing for emergency and service vehicle access.

- Multi-purpose paths suitable for bicyclists, scooters and pedestrians shall connect village centers to residential and commercial neighborhoods, and open space areas.
- Provide a comprehensive bicycle network that includes a network of protected bike lanes, cycle tracks, or off-street bike trails, and bike parking for non-residential and residential uses near transit.
- Require the integration of local amenities to discourage reliance on single-occupancy peak hour automobile use into each neighborhood.
- Provide a range of transit, bicycle, and pedestrian amenities, such as secure street parking, drinking fountains, public restrooms, shaded streets, paths, bikeways, and street furniture.
- Proactively encourage the use of alternative forms of transportation as a means to improve public health and reduce local and regional greenhouse gas emissions.
- Establish two transit facilities on the east and west sides of the Grapevine Road/I-5 interchange to serve as transit hubs, and ensure that these hubs are visible from and spaced appropriately to the freeway off-ramps; provide secure parking for bicycles and adequate vehicular parking; provide attractive transit amenities; and are well connected to the local community through well-defined linkages to the existing and planned trail system.
- Ensure that public transit services provide service at appropriate intervals to major destinations outside the community, including TRCC, Arvin, and Bakersfield to the north and east; to the mountain communities and Tejon Mountain Village to the south; and to Shafter and other communities to the west.
- Coordinate the location of potential transit connections and connections to intercity services where appropriate with Kern Transit, Golden Empire Transit, and Arvin.
- Coordinate the design and location of multi-use trails with transit facilities to ensure that each mode supports the other and is able to provide first mile/last mile connections from transit facilities to ultimate destinations.
- Implement “complete streets” that incorporate the following design measures:
  - Well-defined Class I, II, or III bike paths.
  - Bicycle storage racks in the commercial and recreational centers and multi-family residential areas.
  - Street parking within ¼ mile of village centers, diagonal or parallel, to act as a traffic-calming tool.
  - Wayfinding to trails, key destinations, parking garages, loading areas, etc.

- Street furniture, including benches, trash receptacles, bike racks, drinking fountains, etc.
- Transit stops and shelters, coordinated with bikeways and trails.
- Reduced pedestrian crossing street widths.
- Street bulb-outs/curb extensions at key intersections.
- Sidewalks that provide adequate widths depending on the type of street.
- Parkways and planting strips that enhance the pedestrian experience and meet goals for sustainability performance and long-term durability.
- Safe routes to schools and parks.
- Shade trees adequately spaced 25-30 feet on center.

- Provide flexible design and siting standards to facilitate innovative development, including compact neighborhood design that promotes walkability.

The proposed project circulation system consists of both vehicular and non-vehicular facilities, including roads, multi-purpose trails, and transit facilities. The project's Circulation Plan (Exhibit 3-1 in the Grapevine Specific Plan) has been designed to maximize the use of existing roadways and access points. As shown in Figure 3, the Circulation Plan includes arterial and collector streets, bikeways, and bicycle and pedestrian trails. Proposed project pedestrian, cycling, transit and transportation demand management measures are discussed in the following sections in more detail.

1.3.1 Pedestrian and Biking Facilities

The project includes road standards for "complete streets" to provide multiple modes of transportation, and sustainable landscape features such as storm water management through low-impact development (LID). Representative complete street cross-sections in the project Special Plan are included in Figures 10A, 10B, 10C, 10D, 10E, and 10F. Pedestrian and bicycle facilities associated with the project complete street designs are described in more detail below.

Pedestrian Facilities

The project road standards include safe and universally accessible pedestrian travel routes that are an integral part of the transportation system. Along village center streets, the pedestrian zone features wide sidewalks, landscaping, and areas for street furniture, which create an interesting and enjoyable environment for walking between the diverse set of residential, retail, employment, and service uses included in the project (see Figure 10F). Streets outside the village centers will include sidewalks separated from adjacent street traffic by a tree lane that provide a buffer from vehicular traffic and shade during warmer periods. These pedestrian facilities will encourage walking and reduce automotive use in the village centers and other project locations.

Bicycle Facilities

The Grapevine project road standards will support bicycling, including the following facilities:

- Wide bike lanes on most arterial and collector streets (see Figures 10C and 10D);
- Buffered bike lanes featuring a striped buffer between the bike lane and adjacent parking or vehicle travel lane (see Figures 10C and 10D);
- Cycle tracks that physically separate bicyclists from adjacent vehicles with a raised buffer, such as a landscaped strip (see Figure 10F); and
- Separation of bicycle/pedestrian trails from adjacent vehicle traffic by a tree lane or other landscaping (see Figure 10F).

PALETTE APPROACH TO CREATING STREETS

ALL STREET SECTIONS ARE COMPRISED OF TWO COMPONENTS:

ROADWAY SECTIONS
CONDITIONS THAT OCCUR WITHIN THE CURB LINES OF THE STREET. SEE FIGURES 3-5 THROUGH 3-8 FOR ALL POSSIBLE ROADWAY SECTIONS.

OFF-ROADWAY SECTIONS
CONDITIONS OUTSIDE OF THE ROADWAY SECTION, BETWEEN THE CURB LINE AND THE RIGHT-OF-WAY LINE AND/OR EASEMENT. SEE FIGURE 3-9 FOR ALL POSSIBLE OFF-ROADWAY SECTIONS.

EACH STREET TYPE HAS A STANDARD CONDITION, ALONG WITH A PALETTE OF OPTIONS AND ALTERNATIVES THAT MAY BE SELECTED. ANY OFF-ROADWAY SECTION OPTION MAY BE PAIRED WITH ANY ROADWAY SECTION, BASED ON SURROUNDING LAND USES AND CHARACTER TO FIT ITS CONTEXT AND NEED.

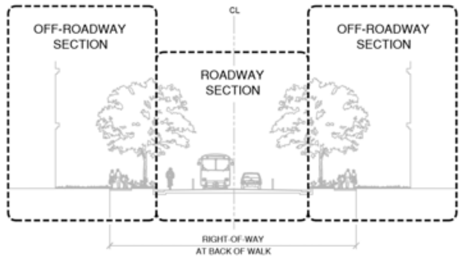
OFF-ROADWAY SECTION FLEXIBILITY

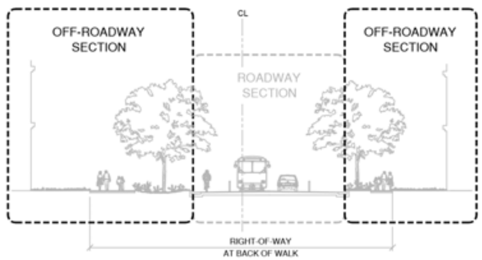
THE OPTIONS SHOWN IN THIS EXHIBIT REFLECT THE ALTERNATIVES FOR CONDITIONS OUTSIDE OF THE ROADWAY SECTION.

NOT ALL STREETS WILL HAVE THE SAME OFF-ROADWAY CONDITION ON BOTH SIDES. DETERMINATION OF OFF-ROADWAY SECTION TO BE USED FOR EACH STREET CONDITION SHALL BE MADE DURING THE FINAL DESIGN TO FIT CONTEXT.

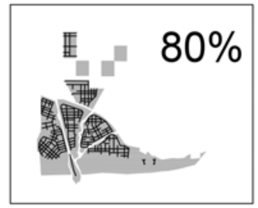
STREET SECTION FIGURES

FIGURE 3-4	PALETTE APPROACH & STREET TYPES
FIGURE 3-5	TYPE 1 | LOCAL STREET, ALLEY, & LANE SECTIONS
FIGURE 3-6	TYPE 2 | MINOR ARTERIAL/COLLECTOR SECTIONS
FIGURE 3-7	TYPE 3 | MAJOR ARTERIAL/COLLECTOR SECTIONS
FIGURE 3-8	TYPE 4 | FREEWAY CONNECTION SECTIONS
FIGURE 3-9	OFF-ROADWAY SECTIONS



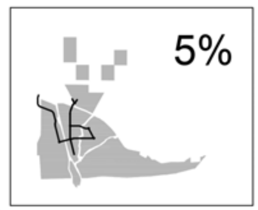


STREET TYPES & APPROXIMATE PERCENTAGE OF PROPOSED STREETS (LINEAL)

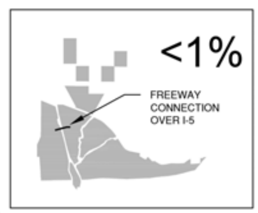


1 LOCAL STREETS

2 MINOR ARTERIALS/COLLECTORS



3 MAJOR ARTERIALS/COLLECTORS



4 FREEWAY CONNECTION

NOTES

Notes apply to all street sections

1. SEE FIGURE 3-9 FOR OFF-ROADWAY SECTION INFORMATION. SEE FIGURES 3-5 THROUGH 3-8 FOR ROADWAY SECTION INFORMATION.
2. PUBLIC RIGHT-OF-WAY IS LOCATED AT THE BACK OF WALK. RIGHTS-OF-WAY VARY DEPENDING ON SELECTED COMBINATION OF ROADWAY AND OFF-ROADWAY OPTIONS.
3. TRAFFIC IMPACT ASSESSMENT, IN BALANCE WITH COMMUNITY-SUPPORTIVE GOALS SUCH AS WALKABILITY, SHALL DETERMINE FINAL ROADWAY OPTION SELECTION AND LANE REQUIREMENTS.
4. WHERE LEFT TURN MOVEMENTS ARE UNNECESSARY, A MEDIAN MAY BE PLACED IN THE CENTRAL SECTIONS. MEDIAN WIDTHS MAY VARY WITH THE APPROVAL OF THE PLANNING DIRECTOR.
5. BIKE PROTECTION MAY INCLUDE, BUT IS NOT LIMITED TO: TUBULAR MARKERS, RAISED MEDIANS/CURBS, MOVABLE PLANTERS, AND STRIPING.
6. SIDEWALK AND PED/BIKE MULTI-USE TRAIL WIDTHS MAY INCREASE IN AREAS OF HIGH INTENSITY PEDESTRIAN OR BICYCLE USE.
7. MINOR ARTERIALS/COLLECTORS AND LOCAL STREETS MAY BE CROSS-SLOPED OR CROWNED, TO BEST FIT GRADING CONDITIONS AT FINAL DESIGN.
8. TREE LANES, LANDSCAPED AREAS, AND MEDIANS MAY BE USED FOR BIORETENTION, OR OTHER APPLICABLE LOW IMPACT DEVELOPMENT PRACTICES.
9. LOCAL STREETS MAY HAVE VERTICAL OR ROLLED CURBS.
10. ALTERNATIVE PAVING MATERIALS, SUCH AS DECOMPOSED GRANITE, MAY BE USED FOR SIDEWALK OR BIKE PATHS WHERE SUFFICIENT HARDSCAPE SURFACE IS PROVIDED ELSEWHERE.
11. CIRCULATION PLAN AND STREET SECTIONS ARE BASED UPON FULL BUILD OUT. DEPENDING UPON PROJECTED TRAFFIC VOLUMES AND CURRENT PROJECT DEVELOPMENT, STREETS MAY BE CONSTRUCTED IN PHASES.
12. DIMENSIONS SHOWN ARE TYPICAL.

FIGURE 3-4

Palette Approach & Street Types

Figure 10A

Grapevine Street Sections -

Palette Approach & Street Types

INTENTIONALLY LEFT BLANK

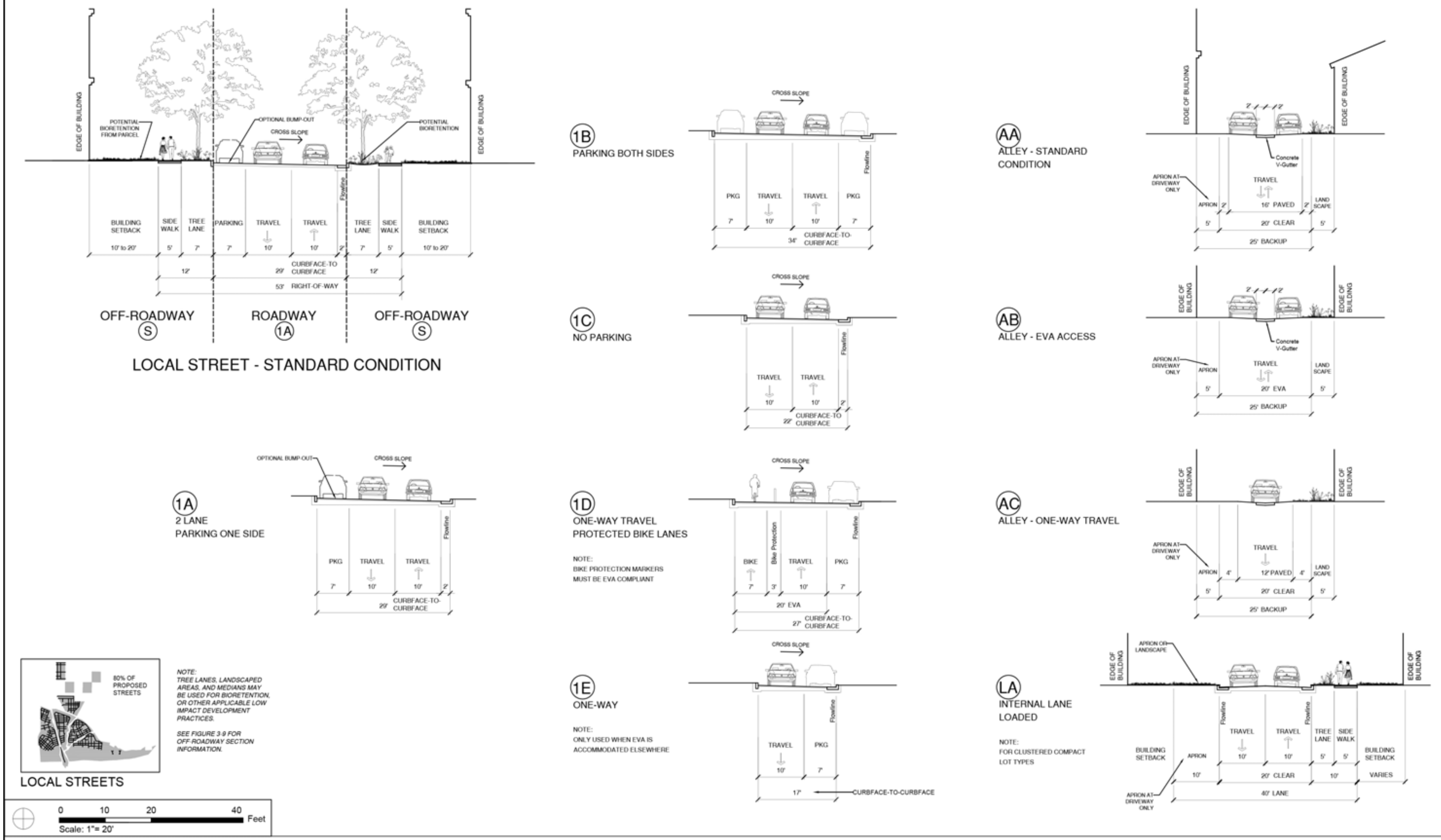


FIGURE 3-5

Types 1 A L | Local Street, Alley, and Lane Sections

GRAPEVINE SPECIAL PLAN

Figure 10B

Grapevine Street Sections - Local Streets

INTENTIONALLY LEFT BLANK

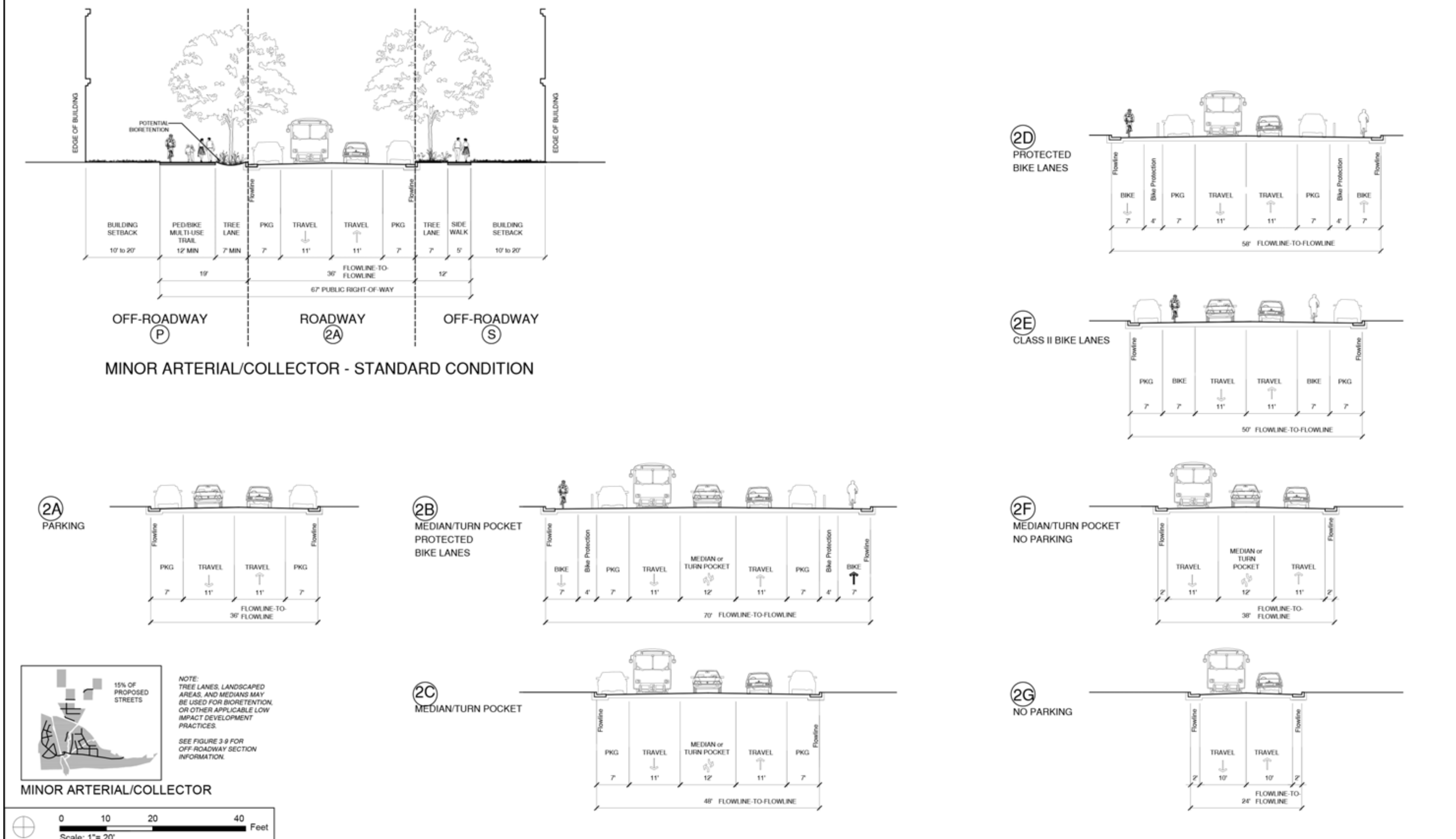


FIGURE 3-6

Type ② | Minor Arterial/Collector Sections

GRAPEVINE SPECIAL PLAN

Figure 10C
Grapevine Street Sections -
Minor Arterial/Collector Streets

INTENTIONALLY LEFT BLANK

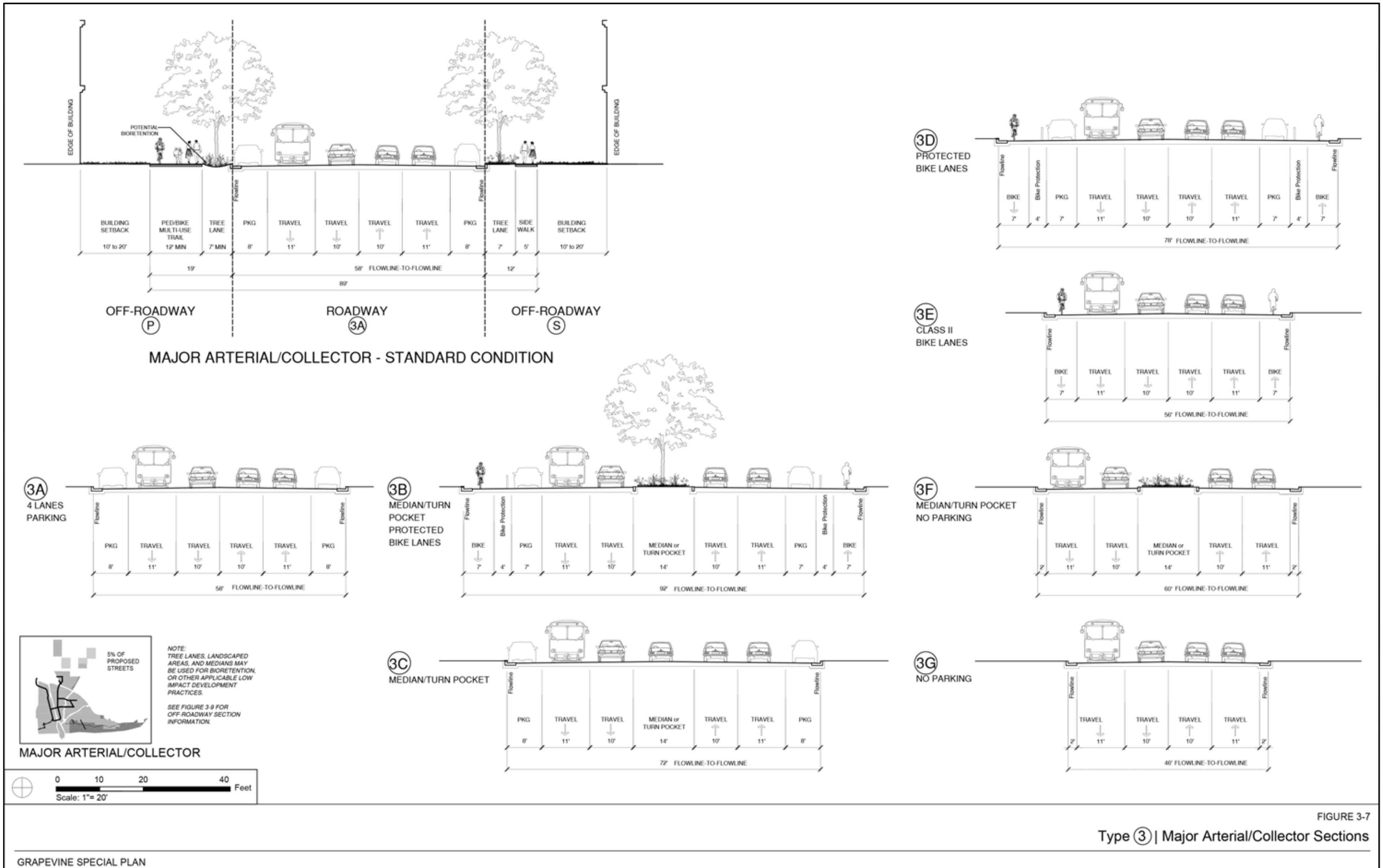
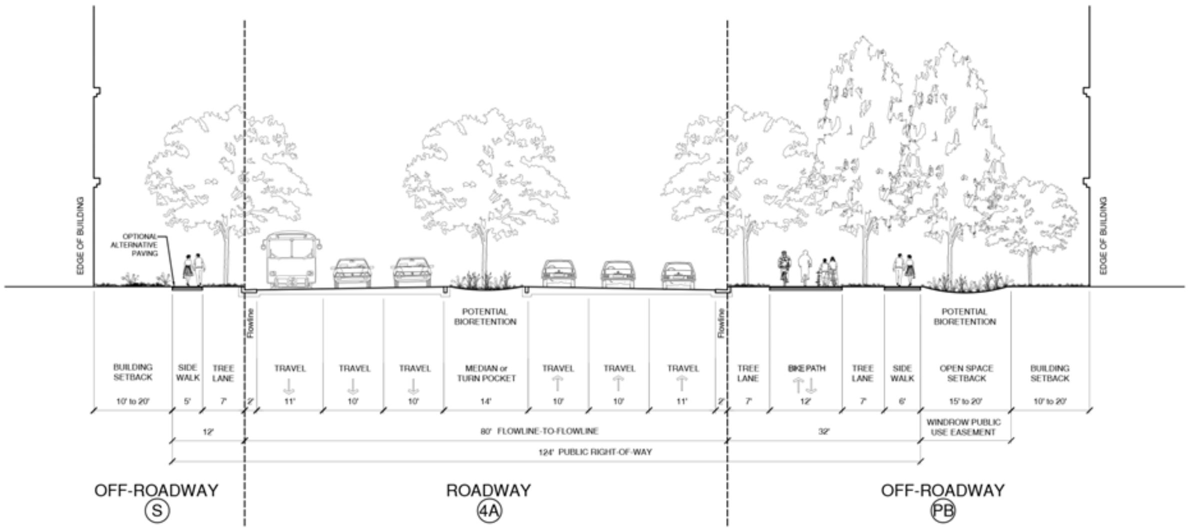
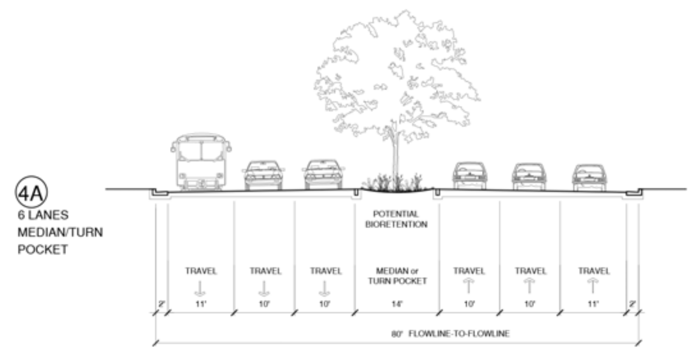


Figure 10D
Grapevine Street Sections -
Major Arterial/Collector Streets

INTENTIONALLY LEFT BLANK



FREEWAY CONNECTION - STANDARD CONDITION



FREEWAY CONNECTION

NOTE:
TREE LANES, LANDSCAPED AREAS, AND MEDIANS MAY BE USED FOR BIORETENTION, OR OTHER APPLICABLE LOW IMPACT DEVELOPMENT PRACTICES.

SEE FIGURE 3-9 FOR OFF-ROADWAY SECTION INFORMATION.

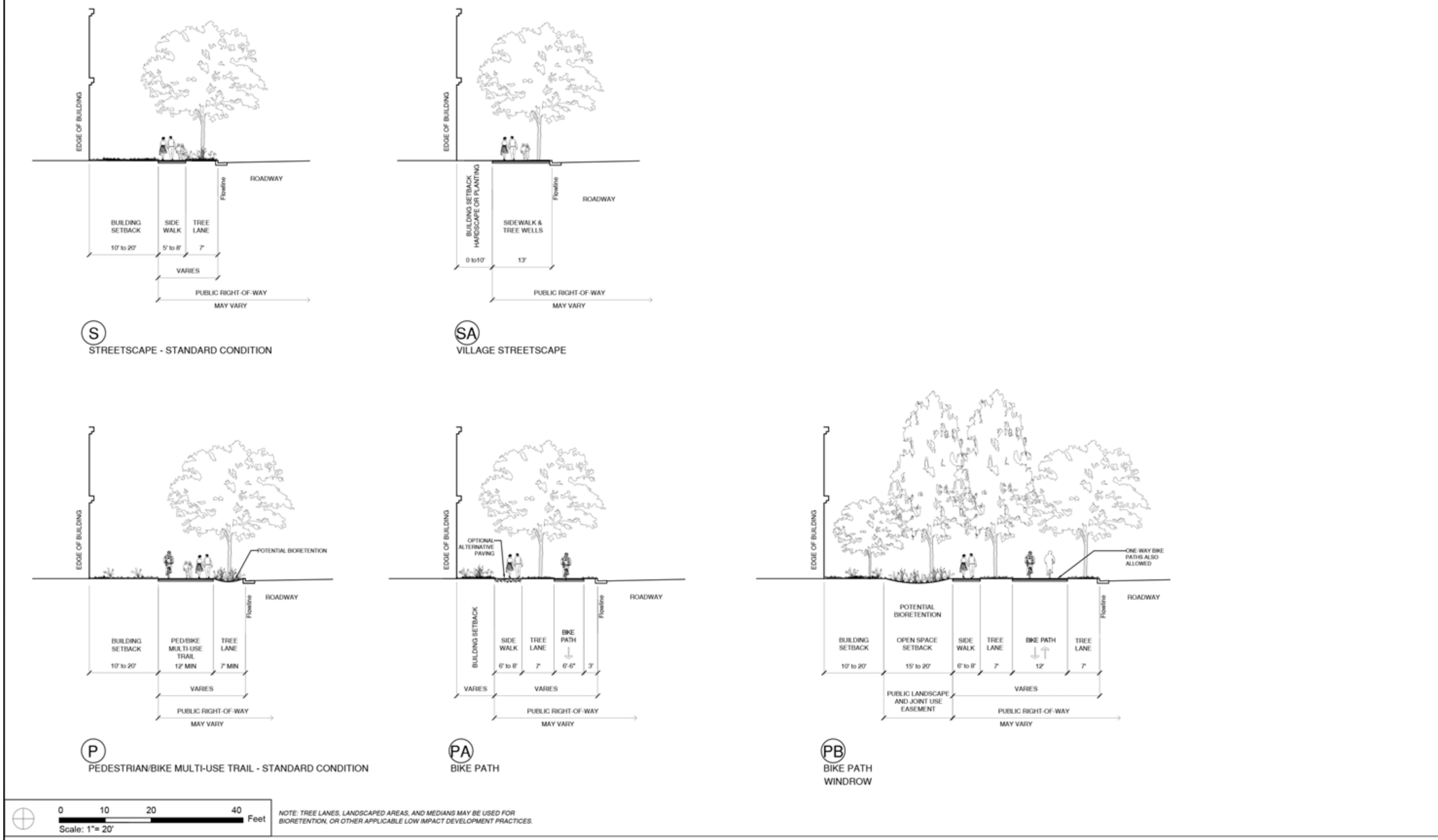
0 10 20 40 Feet
Scale: 1"= 20'

FIGURE 3-8

Type (4) | Freeway Connection Sections

Figure 10E
Grapevine Street Sections -
Freeway Connection

INTENTIONALLY LEFT BLANK



NOTE: TREE LANES, LANDSCAPED AREAS, AND MEDIANS MAY BE USED FOR BIORETENTION, OR OTHER APPLICABLE LOW IMPACT DEVELOPMENT PRACTICES.

FIGURE 3-9

Types (S) (P) | Off-Roadway Sections

GRAPEVINE SPECIAL PLAN

Figure 10F
Grapevine Street Sections - Off-Roadway

INTENTIONALLY LEFT BLANK

Wider bike lanes provide bicyclists with additional space to maneuver and allow faster cyclists to pass slower cyclists without weaving into adjacent travel lanes. The buffered bike lanes, cycle tracks, and bicycle/pedestrian trails provide additional space or physical barriers between cyclists and adjacent vehicle traffic for safety and to improve the user experience for bicyclists. These project amenities are designed to make bicycling more attractive for youths, seniors, and less avid but "interested but concerned" bicyclists that typically comprise more than half (51%) of the population (see Exhibit 1) and encourage biking to reduce automotive use.

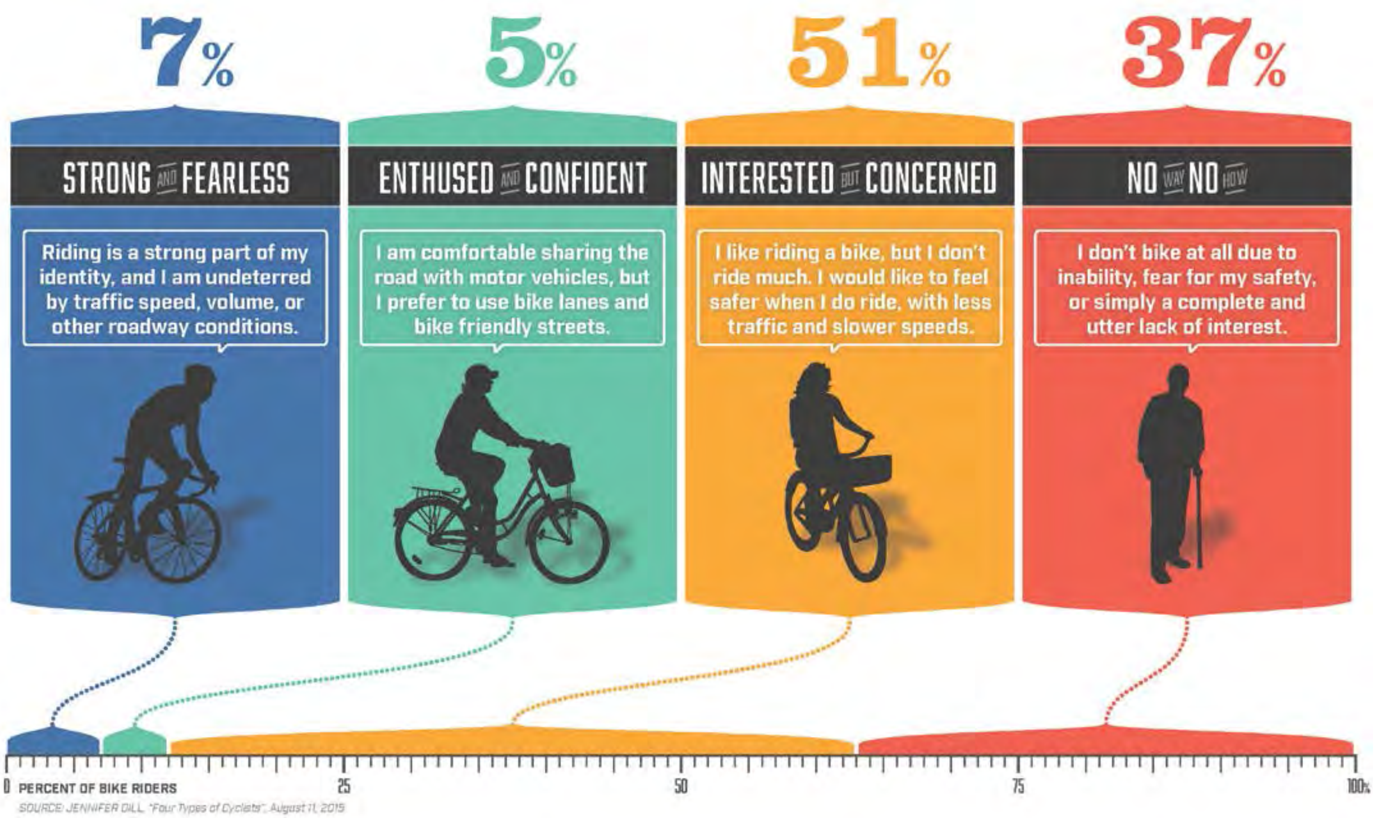


Exhibit 1 – Four Types of Cyclists

The project also includes a comprehensive multi-purpose trail network along creeks and the California Aqueduct crossings throughout the project site (see Figure 3). This trail network will support both recreational and transportation-related walking and cycling within the project area.

1.3.2 Transit Services

The proposed project will include transit services that will be implemented over time. During initial development, transit service will primarily be provided by Kern Transit in response to demand and may be coordinated with the support of the TMA that will be created for the project (see below). Other demand-based transportation services may include car-sharing services, vanpools, ride-share matching through the TMA, or private transportation network services (e.g., Uber, Lyft, etc.).

At buildout, the proposed project will include two transit hubs to provide convenient, centralized access for local and regional transit service. Local transit would provide service within the project area and to TRCC, Regional transit service would connect the project with Arvin, Bakersfield, Shafter, Frazier Park, and Tejon Mountain Village. Park and ride lots will be provided to facilitate ride sharing and transit use. The project's comprehensive public transportation network and the density and diversity of project land uses will discourage single-occupancy vehicle travel reduce emissions, and foster transit consistent with the smart growth provisions of the Kern County General Plan and the "Planned Transit Priority Area" and "Strategic Employment Center" designations for the project area in the approved Kern COG RTP/SCS.

1.3.3 Transportation Demand Management Measures

A Transportation Management Association will be formed and funded prior to the first occupancy to implement transportation demand management (TDM) measures and other transportation programs in a phased manner as development occurs within the project area. A TMA is an organized group created to apply carefully selected approaches for facilitating the movement of people and goods within an area, including commuter transit and non-automotive movement strategies. As discussed below, Section 2.3.4 of the Kern County General Plan Circulation Element includes the establishment of a TMA to manage ride sharing programs, transit projects, and other transportation system measures to address future growth in the County. The project TMA will focus on encouraging multimodal, non-automotive movement to and from employment centers in TRCC, local and regional transit use, and pedestrian and biking movement. Potential TDM measures include:

(a) coordinating transit schedules to align with employer work schedules;

(b) providing discounted transit passes;

(c) organizing ridesharing, bike-share or car-share programs;

(d) TMA-sponsored shuttle/vanpool services, in collaboration with employers, to serve major employment centers; and

(e) commute trip reduction program including that includes such measures as: (1) vanpool service; (2) preferential carpool parking; (3) end of trip facilities for bicyclists; (4) encouraging flexible work schedules/telecommuting; (5) funding a transportation coordinator for the project area; and (6) conducting marketing campaigns to encourage non-automotive modes for commuting and other movement requirements.

The purpose of the TDM measures is to encourage project area employees and residents to carpool, use transit, bike in lieu of single-occupancy vehicle trips. Encouraging flexible or alternative work schedules would also reduce traffic congestion during morning and evening peak traffic hours.

1.4 Analysis Scenarios

To evaluate the potential effects of the proposed project, this study analyzes transportation and traffic conditions for the following scenarios:

Existing Conditions: This scenario establishes the existing traffic and transportation conditions that comprise the environmental setting or baseline conditions for assessing the significance of potential project related impacts.

Existing Plus Project Conditions: This scenario evaluates transportation and traffic conditions that would be associated with the full build out of the proposed project in addition to existing conditions.

Cumulative No Project and Cumulative Plus Conditions: Cumulative conditions are evaluated to identify potential project impacts that could occur in the future from reasonably foreseeable transportation system and regional development without and with the project. A list of the reasonably foreseeable transportation system and regional development included in the cumulative analysis is provided in Appendix H. These cumulative scenarios evaluate 2040 traffic conditions, consistent with the horizon year of the most recently adopted Kern COG RTP/SCS.

The cumulative no project scenario reflects the Kern COG TDF model traffic projections for 2040 without the proposed Grapevine project. The Kern COG 2040 projections include certain levels of future development within seven traffic analysis zones (TAZs) that encompass the Grapevine project and the adjacent land area. Consistent with Kern County direction regarding reasonably foreseeable projects for the CEQA analysis of Grapevine, the cumulative no project scenario includes land use inputs that correspond to buildout of TRCC and removes the other residential and non-residential development projections in the TAZs. The cumulative plus project scenario adds full build out of the proposed Grapevine project to the cumulative no project inputs, including the residential and non-residential development in the TAZs not included in the cumulative no project scenario. Therefore, the cumulative plus project scenario accounts for the cumulative effects associated with full build out of the proposed Grapevine project.

The cumulative analysis does not include a proposed Trust Acquisition and Casino Project that would be located approximately seven miles north of the proposed project if approved by the

U.S. Bureau of Indian Affairs (BIA). In September 2015, the BIA announced that a federal Environmental Impact Statement would be prepared for the project. Detailed information about the project is not available, the project has not been approved, and potential traffic impacts from the project, if it is eventually approved by the BIA, cannot be reasonably evaluated at this time.

Interim Conditions: This scenario evaluates potential project impacts that could occur in the future with an interim, Phase 1 level of development at the proposed Grapevine project along with reasonably foreseeable transportation system and regional development projected to occur by 2025. This scenario assumes that Interim B access improvements, including operational enhancements approved by Caltrans for the existing I-5 / Grapevine Road interchange, are implemented for project access until the expanded and relocated I-5 interchange is constructed. Cumulative growth was interpolated to the approximate interim year (2025 assuming full project buildout in 2040) when the interim project traffic plus cumulative background traffic would possibly cause at least one of the existing interchanges to operate below LOS D or queuing on the freeway. Approximately 6,000 homes and 2,100,000 sf of commercial uses could be developed in Phase 1 with the interpolated level of cumulative growth before projected traffic volumes would cause an existing interchange to operate below LOS D

1.5 Analysis Time Periods

The temporal distribution of trip activity for the proposed project is anticipated to match conventional travel patterns with peak travel occurring during weekday morning and evening peak hours. Consequently, traffic conditions are evaluated for highest midweek traffic hour between 7:00 – 9:00 a.m. and 4:00 – 6:00 p.m. Potential peak traffic on Friday and Sunday mid-afternoons due to regional recreational travel were also considered for analysis. Project-related trip generation, however, would be significantly lower on Friday and Sunday than during the midweek peak hours. As a result, the analysis focuses on midweek peak hours because the project is more likely to cause transportation impacts to the transportation system during these periods.

1.6 Traffic Analysis Methodology

This study analyzes traffic conditions using Level of Service (LOS) as the primary measure of operational performance. Vehicle LOS is a qualitative description of traffic flow from the perspective of motorists. Consistent with Kern County Standards for Traffic Engineering, the LOS analysis is based on the current (2010) Highway Capacity Manual (HCM) published by the Transportation Research Board of the National Academies of Science. The 2010 HCM provides an integrated multimodal approach to traffic analysis from the points of view of automobile drivers, transit passengers, bicyclists, and pedestrians. The HCM defines six levels of service ranging from LOS A (representing free-flow vehicular traffic conditions with little or no delay) to LOS F (oversaturated conditions where traffic demand exceeds design capacity, resulting in long queues and delays). The analysis methodology for specific traffic facilities is described in more detail below.

1.6.1 Intersections

The intersection analysis methodology is based on the HCM and focuses on intersections within and immediately adjacent to the proposed Grapevine project study area. Intersection LOS is determined by the control delay experienced by motorists traveling through the intersection. Control delay is comprised of initial deceleration delay, queue move-up time, stopped delay, and final acceleration, and is measured in seconds per vehicle.

At signalized intersections, the LOS is based on the weighted average control delay (HCM, Chapter 18). At unsignalized intersections, the LOS determination varies depending on the type of traffic control. At all-way stop-controlled (AWSC) intersections and roundabout controlled intersections, the LOS is based on the weighted average control delay (HCM, Chapters 20 and 21). At side-street stop controlled (SSSC) intersections, the control delay is calculated for each stop-controlled movement (or shared movement) as well as major street left-turns, if any. The LOS is determined by the movement (or shared movement) with the greatest delay (i.e., worst vehicle LOS (HCM, Chapter 19). Delay and LOS for SSSC intersections as a whole is also provided for informational purposes only.

The Synchro 8 analysis software, which calculates the average control delay consistent with the HCM methodology, was used to analyze signalized and unsignalized intersections. Table 2 summarizes the relationship between the control delay and LOS for signalized and unsignalized intersections as defined in the HCM.

Table 2
HCM Level of Service Characteristics for Intersections

Level of Service	Description	Average Control Delay (seconds/vehicle)	
		Signalized	*Unsignalized*
A	Uncongested conditions with very low control delay. Signalized intersections operate with exceptionally favorable traffic signal progression and/or very short cycle lengths.	≤ 10.0	≤ 10.0
B	Low control delay and light congestion. Signalized intersections operate with highly favorable progression and/or short cycle lengths.	10.1 – 20.0	10.1 – 15.0
C	Light congestion with moderate delays. Signalized intersections operate with favorable progression and moderate cycle lengths; individual cycle failures begin to appear.	20.1 – 35.0	15.1 – 25.0
D	Increased delays due to higher demand volumes, ineffective signal progression, and/or longer cycle lengths. At signalized intersections, many vehicles stop and individual cycle failures are noticeable.	35.1 – 55.0	25.1 – 35.0
E	Significant delay due to a combination of high traffic demand volume, adverse signal progression, and/or long cycle lengths. At signalized intersections, individual cycle failures are frequent.	55.1 – 80.0	35.1 – 50.0
F	Congested conditions with very high traffic demand volumes and extensive queuing. Signalized intersections operate with poor signal progression, long cycle lengths, and most cycles fail to clear the queue.	> 80	> 50

Source: *Highway Capacity Manual*, Transportation Research Board, 2010.

The configuration of the Wheeler Ridge Road / I-5 northbound ramps intersection was determined to not be compatible with the current HCM methodology. The intersection methodology in the 2000 HCM and Synchro 8 analysis software, which uses the same delay thresholds as summarized in Table 4, was used to analyze this location.

1.6.2 Roadway Segments

The roadway segment analysis focuses on the p.m. peak hour because the project would generate the largest volume of traffic during this period. Local roadway capacity utilization was evaluated by using the two-way total traffic volume during the p.m. peak hour to calculate the applicable roadway volume-to-capacity ratio. The LOS for each roadway segment was based on the HCM hourly volume thresholds presented in Table 3 consistent with Kern County recommendations.

Table 3
Roadway Segment Hourly Traffic Volume Thresholds

Roadway Classification	LOS Hourly Traffic Volume Thresholds[1]			
	LOS B	*LOS C*	*LOS D*	*LOS E*[2]
Rural Roadway[3]				
2-lane Class I Highway	440	790	1,340	2,710
2-lane Class II Highway	370	790	1,440	2,710
Urban Roadways[4]				
2-lane "Collector" Street	NA	530	1,380	1,790
4-lane "Collector" Street	NA	1,010	2,820	3,410
6-lane "Collector" Street	NA	1,470	4,180	4,890
2-lane "Arterial" Street	NA	930	1,680	1,790
4-lane "Arterial" Street	NA	1,930	3,350	3,410
6-lane "Arterial" Street	NA	2,870	4,860	4,890

Notes: [1]Thresholds indicate the maximum amount of traffic volume before exceeding the identified level of service (LOS).
[2]LOS E threshold represents the "capacity" for the roadway classification.
[3]LOS traffic volume threshold is two-way traffic volume total for rural roadways. Based on Exhibit 15-30 in 2010 HCM for Class I – Level and Class II – Rolling roadways.
[4]LOS traffic volume threshold is two-way traffic volume total for urban roadways. Based on Exhibit 16-14 in 2010 HCM.
"Collector" street uses traffic volumes for urban street with speed of 30 mph and corresponding inputs. "Arterial" Street uses traffic volumes for urban street with speed of 45 mph and corresponding inputs.
NA = not applicable; LOS cannot be achieved with the assumptions identified in Exhibit 16-14 of the 2010 HCM.
Source: *Highway Capacity Manual*, Transportation Research Board, 2010.

1.6.3 Project Area Freeway Facilities

Consistent with Kern County's Standards for Traffic Engineering and Caltrans' *Guide for the Preparation of Traffic Impact Studies*, freeway facilities in the vicinity of the proposed project were evaluated by using the methodology in Chapters 11 and 13 of the HCM. Freeway LOS was determined in terms of vehicle density measured in passenger cars per mile per lane (pcpmpl). The HCM identifies density thresholds for basic (i.e., mainline) freeway segments and other thresholds for ramp junctions, or merge (i.e., on-ramp) and diverge (i.e., off-ramp) segments. Table 4 presents the HCM LOS density thresholds for freeway facilities in the vicinity of the proposed project.

Table 4
Level of Service Characteristics for Freeways

Level of Service	Description	Density (pcpmpl)	
		Basic Segment	*Ramp Junction*
A	Freeway operates at free-flow speed; vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. Incidents or point breakdowns are easily absorbed.	≤11	≤10
B	Reasonably free-flow operations, with ability to maneuver within the traffic stream is only slightly restricted. Effects of minor incidents and point breakdowns are still easily absorbed.	11-18	10-20
C	Freeway operates at near free-flow speed; freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Minor incidents may still be absorbed, but local deterioration in service quality will be significant.	18-26	20-28
D	Speeds begin to decline with increasing flows; freedom to maneuver within the traffic stream is seriously limited. Minor incidents can be expected to create queuing	26-35	28-35
E	Freeway operates at capacity. Operations can be highly volatile because there are virtually no usable gaps within the traffic stream, leaving little room to maneuver within the traffic stream. Any incident can produce a serious breakdown and substantial queuing.	35-45	>35
F	Breakdown conditions with freeway operating at unstable flow. Queues form behind bottlenecks. Breakdowns can occur due to traffic incidents, points of recurring congestion, and traffic demand exceeding capacity.	>45	Demand exceeds capacity

Notes: pcpmpl = passenger cars per mile per lane
Source: *Highway Capacity Manual*, Transportation Research Board, 2010.

Consistent with the current Caltrans *Guide for the Preparation of Traffic Impact Studies*, weave segments were analyzed by using the Leisch methodology as defined in Chapter 500 of the *Highway Design Manual* (Caltrans, 2010).

The five-mile segment of I-5 from the existing I-5 / Grapevine Road interchange south to the existing I-5 / Fort Tejon interchange travels up a six percent grade (the “Grapevine Grade”) as the freeway climbs into the Tehachapi Mountains. Freeway conditions on the Grapevine Grade are significantly affected by the interaction between passenger vehicles and heavy vehicles. As a result, the analysis of the Grapevine Grade considers heavy vehicle as well as passenger car operations.

1.6.4 Freeway and Roadway Facilities North & South of the Project Area

Potential project impacts to Caltrans facilities located north of the junction of I-5 and SR-99 through Bakersfield along SR-99 were considered by using volume to capacity ratio estimates under 2040 cumulative no project and 2040 cumulative plus project conditions.

Potential project impacts to freeway and roadway facilities including I-5, SR-138, SR-14 and SR-126 located south of the project area in southern Kern County and Los Angeles County were considered by using volume to capacity ratio estimates under 2035 cumulative no project and 2035 cumulative plus project conditions. The analysis of the Grapevine Grade in Kern County south of the project site is discussed in Section 1.6.3.

The traffic volumes used in the analysis within Los Angeles County are based on the 2035 Southern California Association of Governments (SCAG) 2035 RTP/SCS projections as incorporated into the traffic model used by Los Angeles County to evaluate the 2015 Antelope Valley Area Plan amendments to the Los Angeles County General Plan.

1.6.5 Off-Ramp Queuing

The 95th percentile queues at freeway off-ramps were analyzed by using the Synchro 8 analysis software, which provides queue lengths in feet. The analysis assumes that each vehicle in a queue uses approximately 25 feet, and the Synchro 8 output is rounded where applicable to the next 25-foot interval. The analysis of project I-5 interim access (Interim A and Interim B) considers potential queuing impacts that could occur prior to the construction of the expanded and relocated I-5 interchange using this same methodology.

1.6.6 Methodology Limitations and Enhancements

This study analyzes traffic conditions using the methods in the latest edition of the HCM consistent with Kern County Standards for Traffic Engineering and Caltrans *Guide for the Preparation of Traffic Impact Studies*. The HCM uses LOS as a roadway and transportation network performance measure. Other measures, such as queue lengths, demand-to-capacity ratios, average travel speeds, indicators of safety, or quantities of persons or vehicles served, can be important to consider in certain circumstances. To address this potential concern, queuing at freeway off-ramps that extends towards the freeway mainline is also considered in this report. In addition, if a vehicle LOS analysis indicate roadway widening may be necessary to address congested vehicle traffic conditions, secondary effects on other modes of travel, including perceived level of comfort and safety, are considered in the analysis.

The Synchro 8 software does not take into account additional delay or queuing that may occur due spilling out of or blocking a turn pocket at an intersection. The HCM methodology also does not account for additional delay incurred by queues spilling back from adjacent intersections.

These potential delays or queuing are generally of most concern under more congested conditions and/or where intersections are closely spaced. Congestion would likely be most significant at the expanded and relocated I-5 interchange area under project buildout condition. Consequently, this study analyzes traffic operations at this locations using the SimTraffic microsimulation software, which is able to reflect the effects of signal timing progression, queuing and congestion at downstream intersections, and queues blocking turn pockets.

The HCM methodology analyzes each freeway segment in isolation, and does not account for the effect of congested upstream and downstream locations. Freeway segments upstream from a congested bottleneck may experience additional queue spillback and locations downstream may operate better than anticipated due to upstream constraints. Congestion on the local street system may reduce traffic loads on certain study freeway segments, and congestion on the freeway system may limit traffic on local streets. The HCM methodology does not include potential traffic incidents that would interrupt traffic flows and cause queues affecting traffic operations.

Finally, the HCM freeway analysis methodology does not account for the effects of ramp metering. Ramp meters at the freeway on-ramps smooth traffic flow at freeway merge and weave sections by preventing large groups of vehicles from entering the freeway all at once. When ramp meters are in effect, merge and weave sections would operate better than typically estimated in the HCM methodology. For example, this report may overestimate the congestion at the I-5 / Laval Road on-ramps where ramp meters would be installed, as well as at any other freeway on-ramp that may be metered under future conditions.

2 ENVIRONMENTAL SETTING

The following sections describe the existing roadway, bicycle, pedestrian and transit service and existing traffic conditions within the project region.

2.1 Existing Roadway Network

Regional Roadway Facilities

Interstate 5 is a major north-south interstate freeway that travels the length of California connecting the metropolitan regions of Southern and Northern California. It is also a primary goods movement route for trucking goods and materials through California and beyond.

Near the proposed project, I-5 is an 8-lane freeway with interchanges at Laval Road and Grapevine Road, and is the primary regional transportation facility. A CVEF is located approximately halfway between the existing Laval Road and Grapevine interchanges for southbound commercial vehicles. North of the proposed project, I-5 travels northwest along the west side of the San Joaquin Valley towards Northern California. South of the proposed project, I-5 traverses upgradient through the Grapevine Grade climbing into the Tehachapi Mountain towards Tejon Pass and then to Southern California.

The Grapevine Grade includes two outside truck/automobile lanes and two inside auto lanes in each direction. The farthest outside lane is dedicated for truck travel in each direction to accommodate heavy vehicles. These vehicles are limited to 35 mph northbound descending the grade and 55 mph southbound climbing the grade.

State Route 99 is a north-south state highway that begins approximately three miles north of the proposed project at the I-5/SR 99 “Y” junction as a 6-lane freeway traveling north towards Bakersfield and connects many of the major cities in the western San Joaquin Valley. SR 99 is a primary goods movement route, particularly for shipping goods from agricultural producers in the San Joaquin Valley to the rest of California.

State Route 166 is an east-west, 2-lane state highway that begins north of the I-5/SR 99 junction approximately five miles north of the proposed project and connects SR 99 and I-5 with the cities of Taft and Maricopa. SR 16 as it heads west towards the Central Coast. And provides access to agriculture and oil extraction operations northwest of the proposed project.

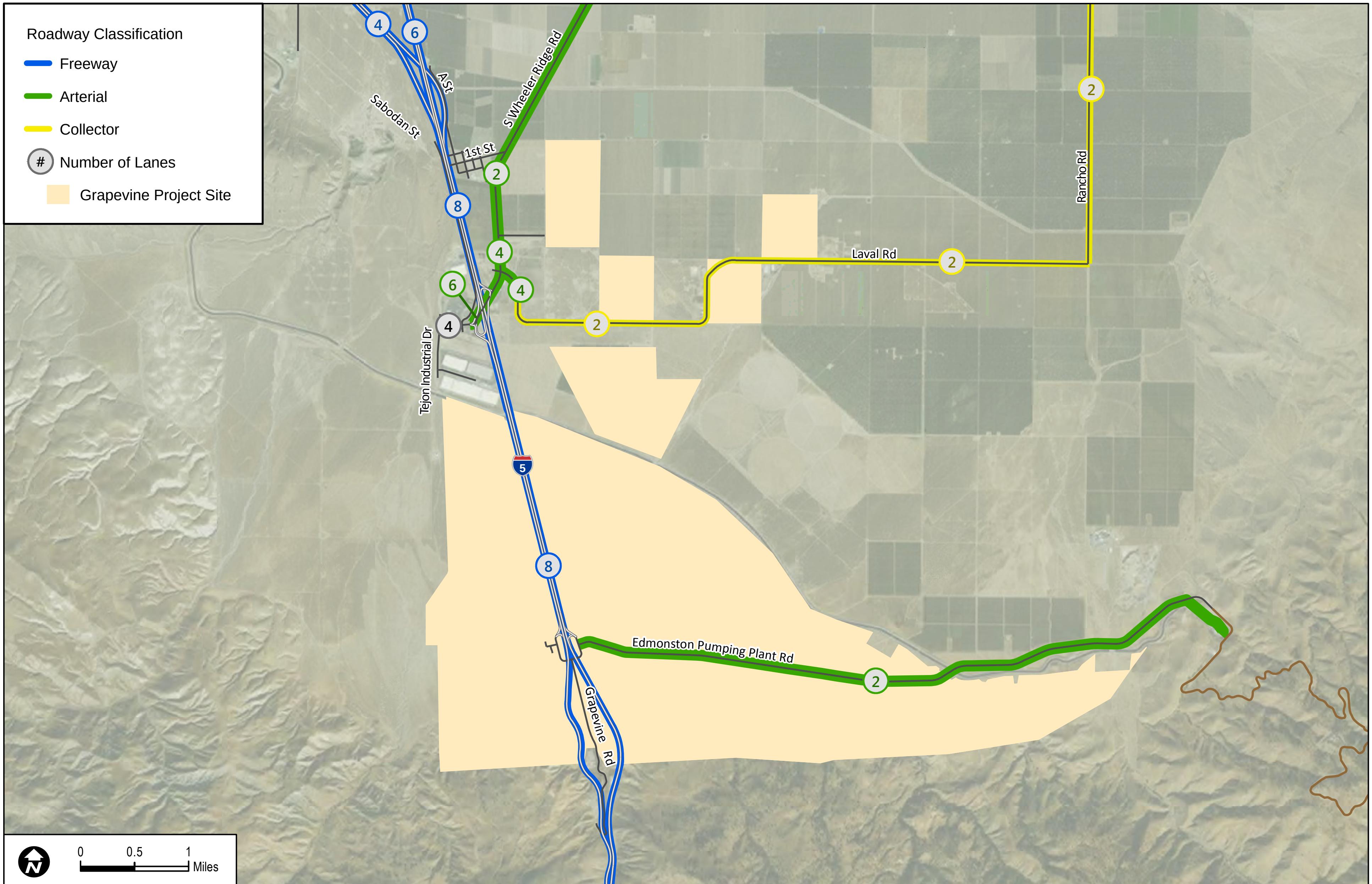
State Route 223 is an east-west state highway that travels between I-5 and SR 58 through the City of Arvin approximately 15 miles north of the proposed project. It is a 2-lane rural highway outside of the City of Arvin, and a 4-lane divided roadway within the City of Arvin.

State Route 138 is an east-west state highway that begins south of Tejon Pass in Los Angeles County located approximately 15 miles south of the proposed project. SR 138 is generally a 2-lane highway that provides regional access between I-5 and the Antelope Valley cities of Lancaster and Palmdale.

Wheeler Ridge Road is a County arterial street connecting I-5 to SR 223 and SR 184. Near I-5 and the proposed project, it is a 4- to 6-lane divided roadway providing access to highway commercial and industrial warehousing uses at TRCC. North of TRCC, it is a rural 2-lane roadway traveling through agricultural areas toward Arvin, Weedpatch, and Lamont.

Laval Road is a discontinuous County collector street that provides access to I-5 via Wheeler Ridge Road. West of I-5, Laval Road is a 4- to 6-lane divided roadway that is the primary route to and from highway commercial and industrial warehousing uses off Dennis McCarthy Drive and Tejon Industrial Drive at TRCC. East of I-5, Laval Road is a 4-lane divided roadway that provides access to the recently opened Outlets at Tejon before becoming a rural, 2-lane roadway east of TRCC. Laval Road crosses Sub Areas 6c, 6d, and 6e within the project.

Edmonston Pumping Plant Road is a private 2-lane roadway traveling east-west through the proposed project. It connects to Grapevine Road near the existing I-5/Grapevine interchange, and extends approximately six miles east to serve the Edmonston Pumping Station operated by the State Department of Water Resources, the Pastoria Energy Center operated by Calpine Corp., and the Griffith Sand and Gravel Mine operated by the Griffith Company.



SOURCE: County of Kern GIS

FIGURE 11

Existing Roadway Network (2015)

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

2.2 Existing Bicycle Facilities

Bicycle facilities are grouped into the following four classifications:

- **Multi-use paths (Class I)** provide a completely separated right-of-way designated for the exclusive use of bicycles and pedestrians with crossflows by motorists minimized.
- **On-street bike lanes (Class II)** provide a restricted right-of-way designated for the exclusive or semi-exclusive use of bicycles. They are designated for use by bicycles through striping, pavement legends, and signs.
- **On-street bike routes (Class III)** are designated by signage for shared bicycle use with vehicles but do not necessarily include any additional pavement width.
- **Protected bikeways (Class IV)** are bicycle facilities which provide a right-of-way designated exclusively for bicycle travel within a roadway and are protected from other vehicle traffic with devices including, but not limited to, grade separation, flexible posts, inflexible physical barriers, or parked cars. These are also known as "cycle tracks."

There are no existing bicycle facilities on any of the local roadways within the project vicinity, including at TRCC. Bicycles are prohibited from using I-5 and SR 99.

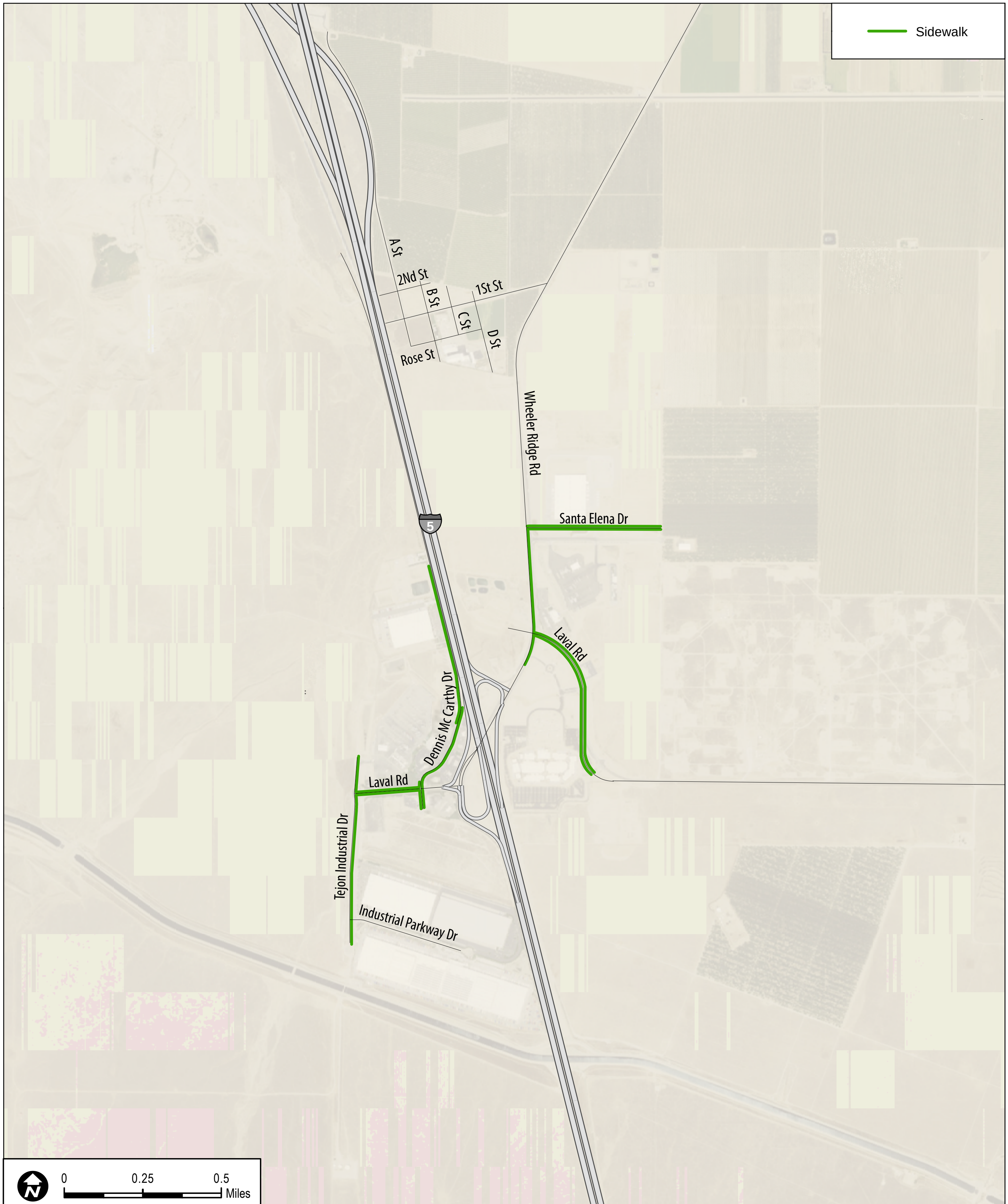
2.3 Existing Pedestrian Facilities

Sidewalks are present along most of the existing local roadways at TRCC, including the following:

- Dennis McCarthy Drive
- Tejon Industrial Drive
- Laval Road: west of Dennis McCarthy Drive
- Laval Road: Wheeler Ridge Road to Outlets at Tejon Parkway
- Wheeler Ridge Road: Outlets at Tejon Driveway to north of Santa Elena Drive

Sidewalks are absent on Laval Road and Wheeler Ridge Road at the I-5 interchange, and along County roadways in the more rural surroundings outside of TRCC. Figure 12 presents the existing pedestrian facilities in the project vicinity.

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

FIGURE 12

Existing Pedestrian Facilities (2015)

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

2.4 Existing Transit Service

The nearest transit services are provided to TRCC, located immediately north of the project site. The three transit services to TRCC are Kern Transit's Frazier Park Express, Golden Empire Transit (GET) District Tejon Ranch Commerce Center Express, and Arvin Transit's Arvin-Tejon service as illustrated in Figure 13.

Kern Transit

The County of Kern operates Kern Transit, which plans, coordinates, and administers the public transit system within the County's unincorporated areas. Kern Transit provides a combination of demand-response, fixed-route, and intercity transit services. Additionally, Kern Transit provides transit recommendations for development plans and also administers the County's transit enterprise fund.

Currently, Kern Transit provides regional linkage service to Frazier Park, Lebec, and mountain communities located south of the proposed project. This Frazier Park Express (Route 130) service is a fixed-route service that includes optional stops at commercial establishments at the I-5/Grapevine and I-5/Laval Road interchanges on its route between Bakersfield and Frazier Park. The Frazier Park Express bus will pick up or drop off passengers at the Grapevine and TRCC stops only if requested by phone call or by a passenger notifying the driver when boarding a bus. The Frazier Park Express provides four daily round trips between the Downtown Bakersfield Transit Center and Frazier Park Monday through Saturday, generally operating on three to five hour headways between 4 a.m. and 9 p.m. (County of Kern 2011).

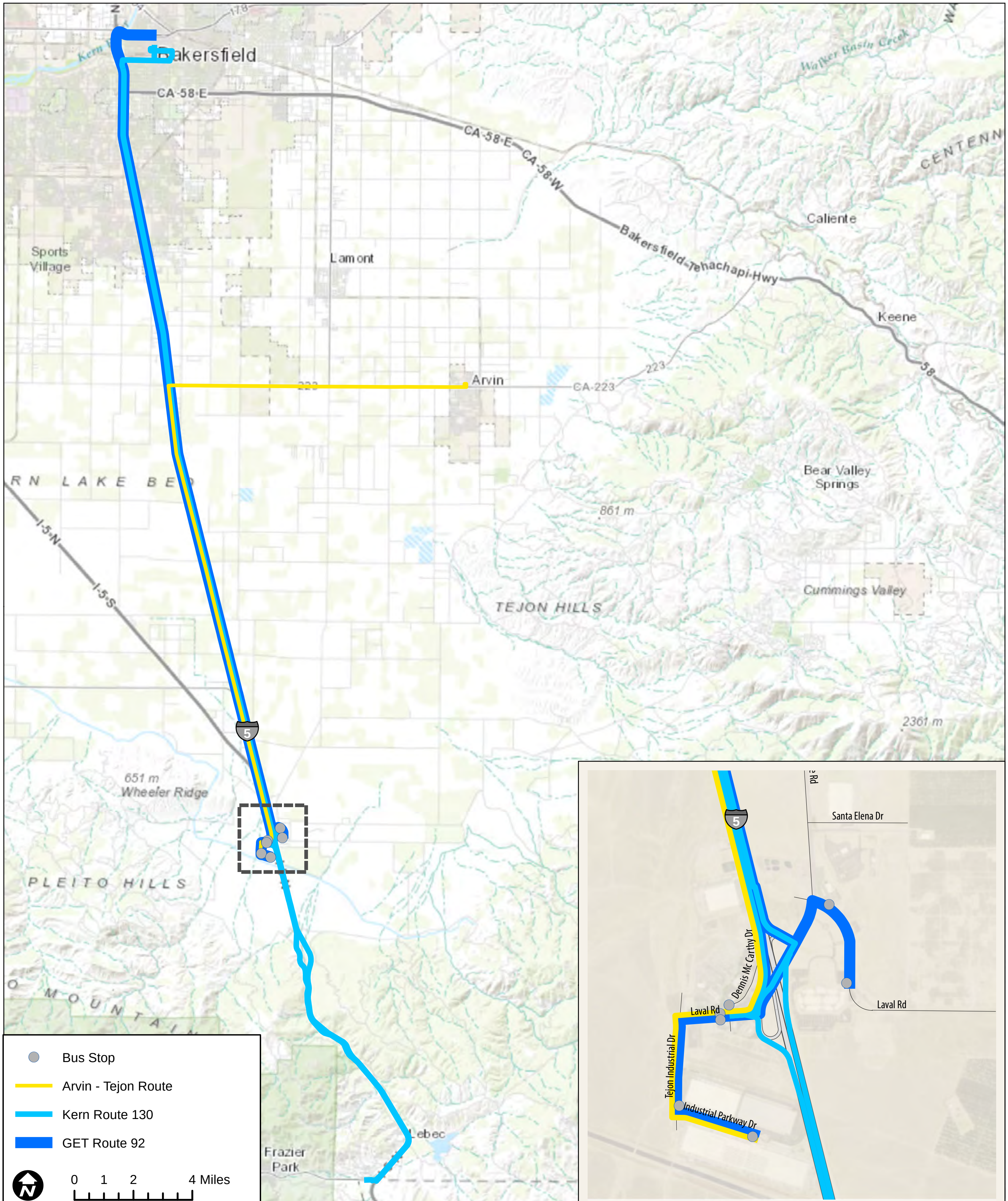
Golden Empire Transit

The GET District was formed in 1973 and serves the Bakersfield metropolitan area. This includes fixed-route service between Downtown Bakersfield, the Kern Delta Park & Ride facility on the southern edge of Bakersfield, and TRCC off Laval Road. The GET Tejon Ranch Commerce Center Express route (Route X92) provides nine daily round trips between the Downtown Bakersfield Transit Center and the Tejon Ranch Commerce Center Monday through Friday, generally operating on two-hour headways between 4 a.m. and midnight (GET 2013).

Arvin City Bus

The City of Arvin offers transit service within the City of Arvin, as well as between Arvin and TRCC and Arvin and Lamont. The fixed-route service between Arvin and TRCC provides mass-transit service for Arvin-area residents to reach employment or services at TRCC. This route operates Monday through Friday and provides two round trips per day departing Arvin at 4:10 a.m. and 1:05 p.m. (City of Arvin 2011).

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

FIGURE 13

Existing Transit Service (2015)

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

2.5 Existing Traffic Conditions

Traffic operations at existing project area intersections, roadways, and freeway segments were characterized using the data and methodology described below.

2.5.1 Study Locations

Existing conditions study area was identified in consultation with the Kern County Public Works Department and Caltrans and includes the following roadway and freeway locations:

Roadway Facilities

This study analyzes the following six existing intersections:

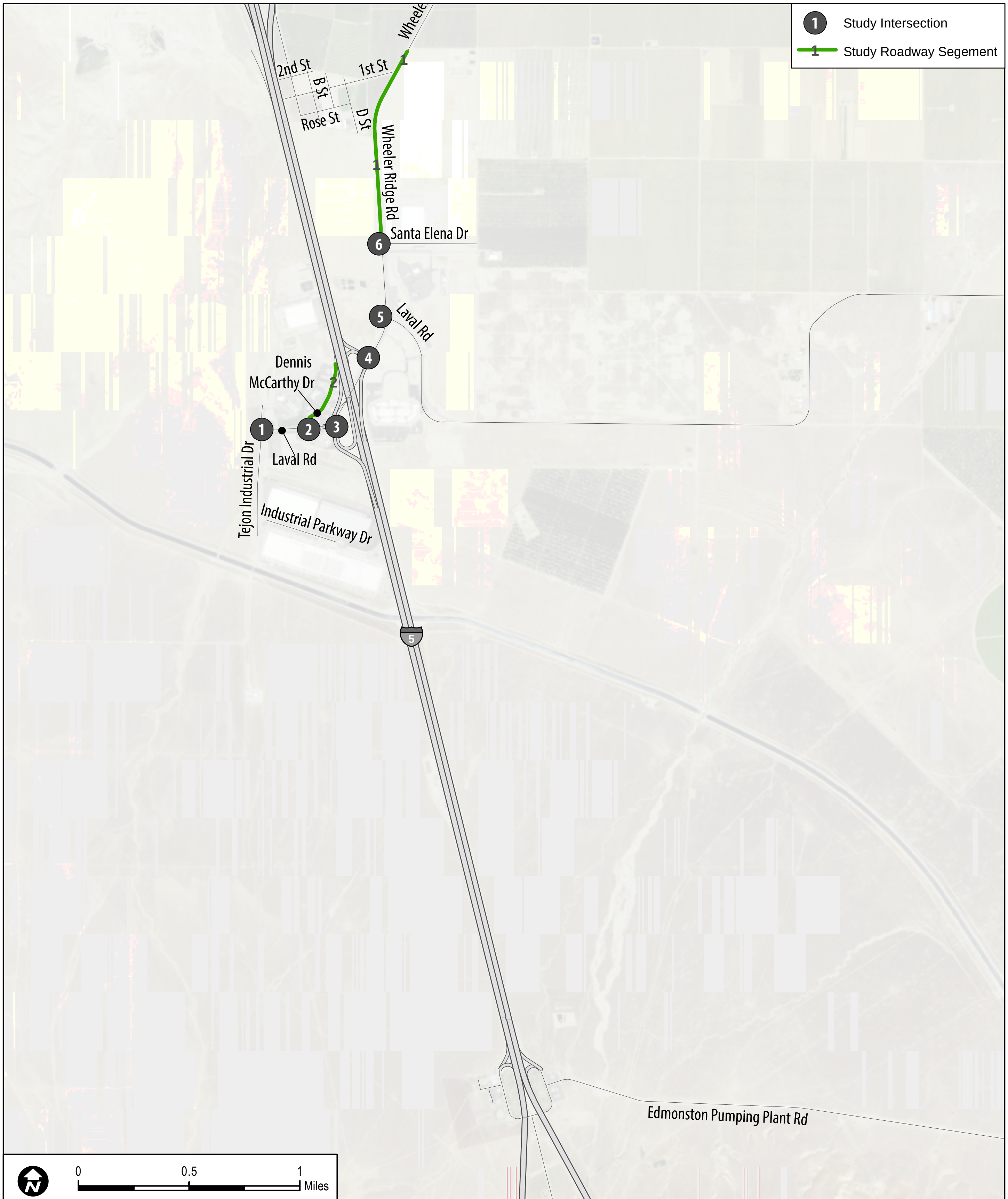
1. Laval Road / Tejon Industrial Drive
2. Laval Road / Dennis McCarthy Drive
3. Laval Road (West) / Wheeler Ridge Road – I-5 Southbound Ramps
4. I-5 Northbound Ramps / Wheeler Ridge Road
5. Laval Road (East) / Wheeler Ridge Road
6. Santa Elena Drive / Wheeler Ridge Road

In addition to these intersections, this study evaluates the roadway capacity utilization for the following two existing roadway segments:

1. Wheeler Ridge Road: north of Santa Elena Drive
2. Dennis McCarthy Drive: north of Laval Road

Figure 14 presents the existing conditions roadway intersections and segments in the study area.

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

FIGURE 14

Study Area

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

Freeway Facilities

This study analyzes the following freeway segments and ramps in the project vicinity:

I-5 Northbound

1. Fort Tejon to Grapevine (Grapevine Grade)
2. Grapevine off-ramp
3. Grapevine on-ramp
4. Grapevine to Laval Road
5. Laval Road East off-ramp
6. Laval Road West off-ramp
7. Laval Road on-ramp
8. Laval Road to SR 99
9. I-5 Northbound off-ramp at SR 99 junction
10. North of SR 99 Junction

SR 99 Northbound

11. North of I-5 Junction

SR 99 Southbound

1. North of I-5 Junction

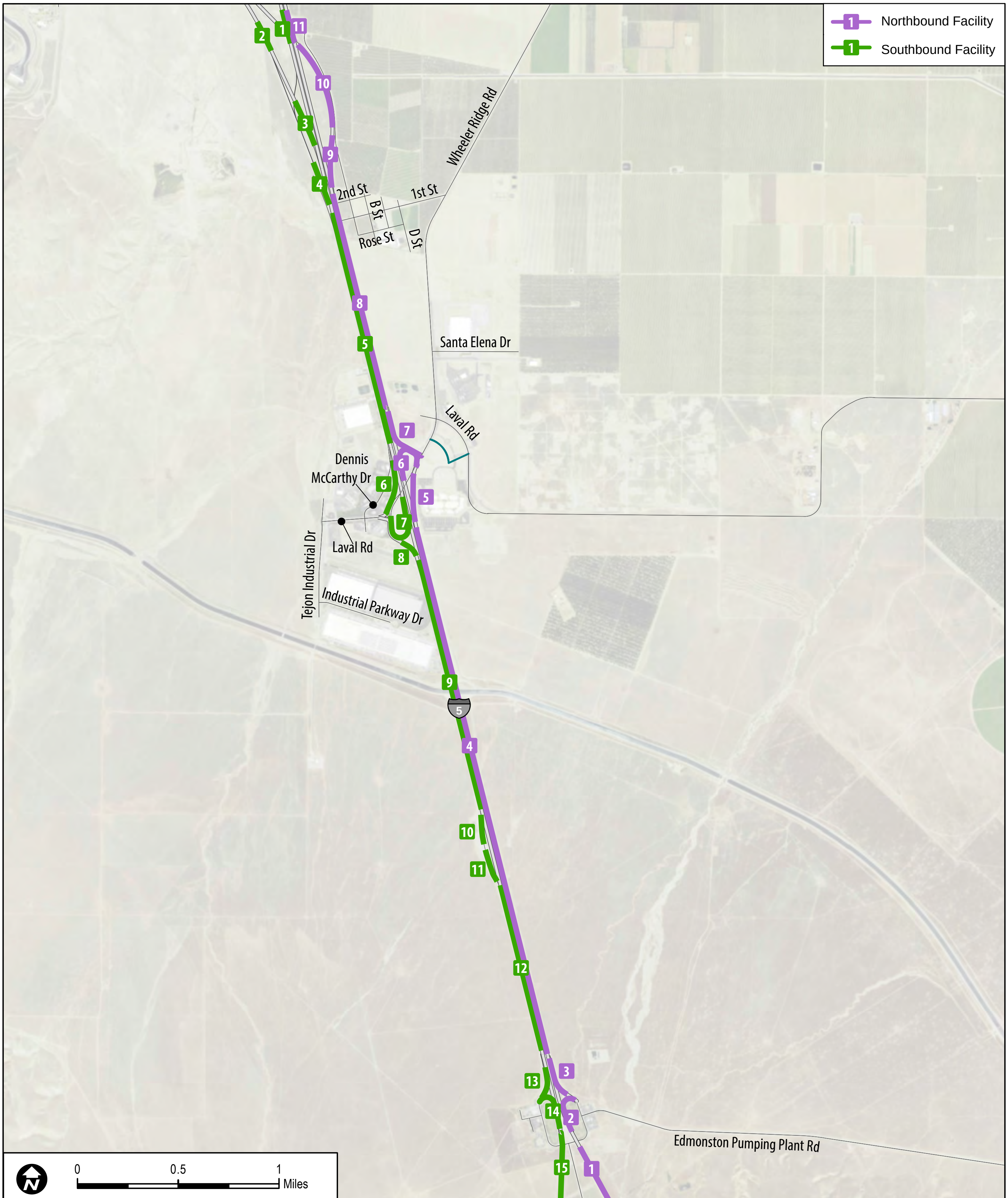
I-5 Southbound

2. North of SR 99 Junction
3. I-5 Southbound automobile on-ramp at SR 99 junction
4. SR 99/I-5 Southbound truck on-ramp at SR 99 junction
5. SR 99 to Laval Road
6. Laval Road West off-ramp
7. Laval Road East off-ramp
8. Laval Road on-ramp
9. Laval Road to CVEF
10. CVEF off-ramp
11. CVEF on-ramp
12. CVEF to Grapevine
13. Grapevine off-ramp
14. Grapevine on-ramp
15. Grapevine to Fort Tejon (Grapevine Grade)

Figure 15 presents these existing study freeway facilities in the study area.

Existing conditions were also evaluated for Caltrans facilities located to the south of the project within Los Angeles County and north of the project through Bakersfield as part of the analysis of potential cumulative project impacts in these locations. These facilities are listed in Table 32, Cumulative Freeway Level of Service Analysis - North of Project Area and Table 33, Cumulative Freeway Level of Service Analysis - South of Project Area. Figure 16 presents the study freeway facilities north of the project area into Bakersfield. Figure 17 presents the study freeway facilities south of the project area into Los Angeles County.

INTENTIONALLY LEFT BLANK

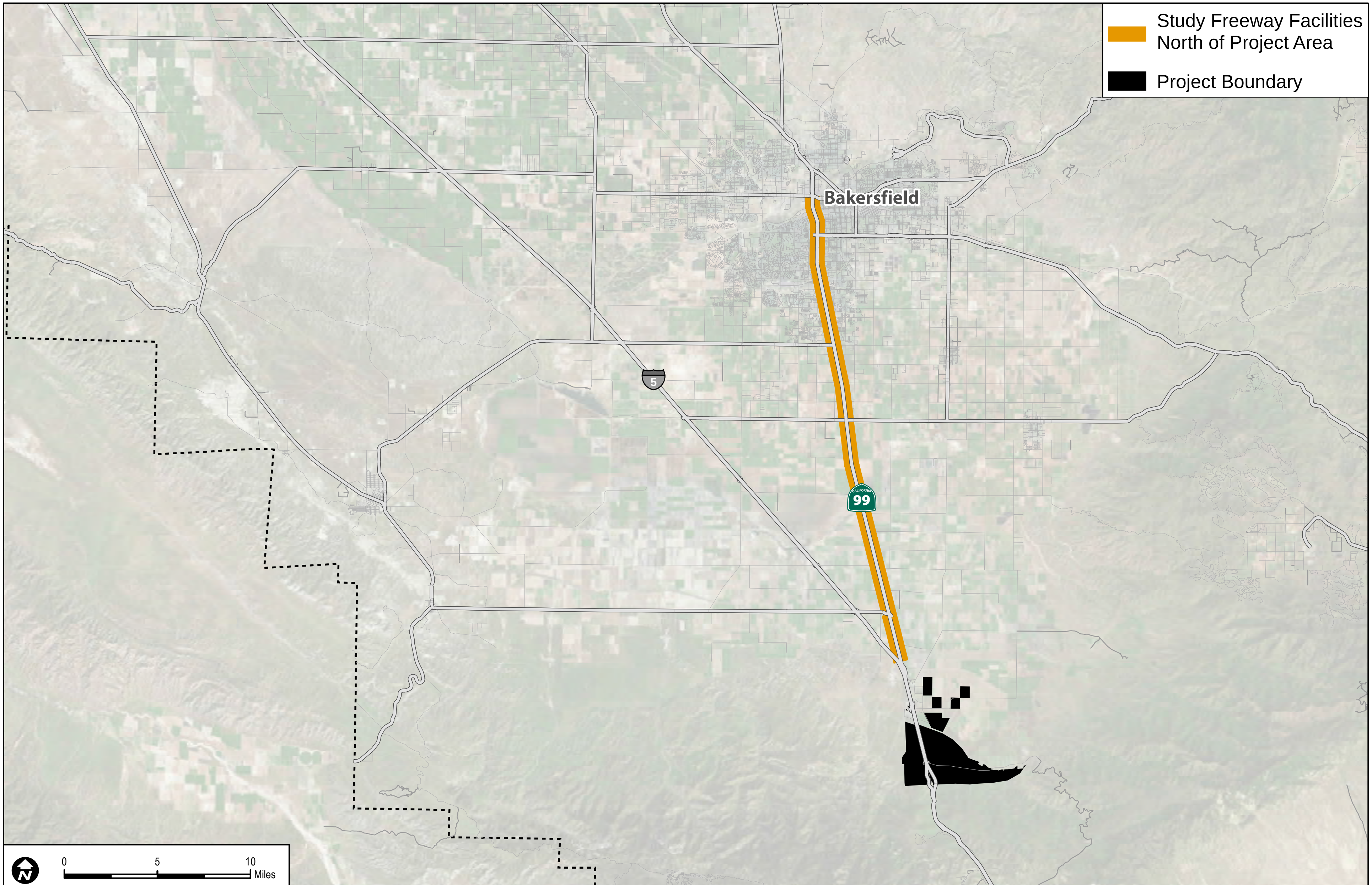


SOURCES: USGS, ESRI

Figure 15

Study Freeway Facilities – Existing Conditions (2015)

INTENTIONALLY LEFT BLANK

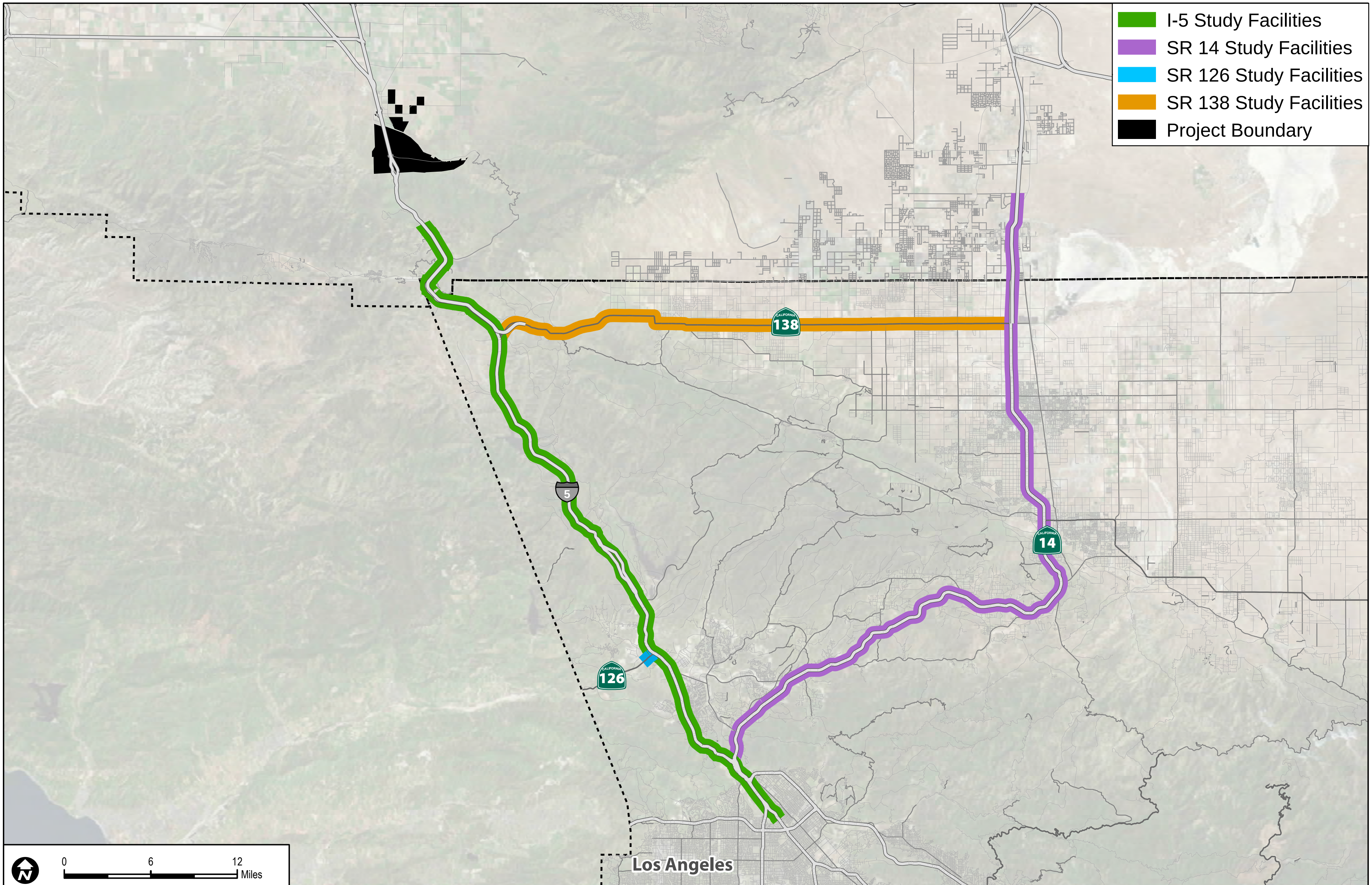


SOURCES: USGS, ESRI

FIGURE 16
Cumulative Freeway Analysis Locations - North of Project Area

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

FIGURE 17
Cumulative Freeway Analysis Locations - South of Project Area

INTENTIONALLY LEFT BLANK

2.5.2 Existing Traffic Volumes

Caltrans traffic data indicates that peak travel volumes on I-5 in the project vicinity occurs in late June. Based on consultations with Caltrans and Kern County, traffic counts were collected on Tuesday, June 23, 2015 to establish existing traffic conditions for study area roadways and freeway facilities. Weather conditions were sunny and dry, and no special events occurred while the counts were collected. Traffic conditions were characteristically uncongested. Morning (7:00 – 9:00 a.m.) and evening (4:00 – 6:00 p.m.) peak period counts were collected at the six study intersections and five freeway mainline locations, including bicycle and pedestrian counts at the study intersections, and heavy vehicle counts at the study intersections and freeways.

Traffic counts for the two study roadway segments (Wheeler Ridge Road north of Santa Elena Drive and Dennis McCarthy Drive north of Laval Road) and Grapevine Road East and Grapevine Road West were also collected for a 24 hour period. The segment counts on Grapevine Road East and Grapevine Road West were collected to establish existing a.m. and p.m. peak hour on- and off-ramp traffic volumes at the existing I-5 / Grapevine interchange. This traffic count data is provided in Appendix A.

The uncongested conditions observed during the study period indicate that traffic demand volume was served when the traffic counts were collected.

2.5.3 Existing Roadway Traffic Conditions

Existing Intersection Operations

Existing intersection traffic conditions were evaluated by using the HCM traffic operations methodology discussed above. Figure 18 presents the existing a.m. and p.m. peak hour turning movement volumes and lane configurations at the study intersections observed in the June 2015 traffic counts. Table 5 presents the a.m. and p.m. peak hour LOS at the study intersections under existing conditions (see Appendix B). All existing intersections operate at LOS B or better during both the a.m. and p.m. peak hours.

Table 5
Peak Hour Intersection Operations – Existing Conditions (2015)

Intersection	Traffic Control	Peak Hour	Existing Conditions (2015)	
			Delay[2]	*LOS[3]*
1. Tejon Industrial Drive / Laval Road	Traffic Signal	A.M.	9	A
		P.M.	10	A
2. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	13	B
		P.M.	17	B
3. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	9	A
		P.M.	12	B
4. S. Wheeler Ridge Road / I-5 Northbound Ramps[1]	Traffic Signal	A.M.	3	A
		P.M.	3	A
5. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	13	B
		P.M.	10	B
6. S. Wheeler Ridge Road / Santa Elena Drive	Traffic Signal	A.M.	10	B
		P.M.	10	A

Notes: [1]Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.
[2]The overall average intersection control delay is reported in seconds per vehicle.
[3]Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).
Source: Fehr & Peers, 2015.

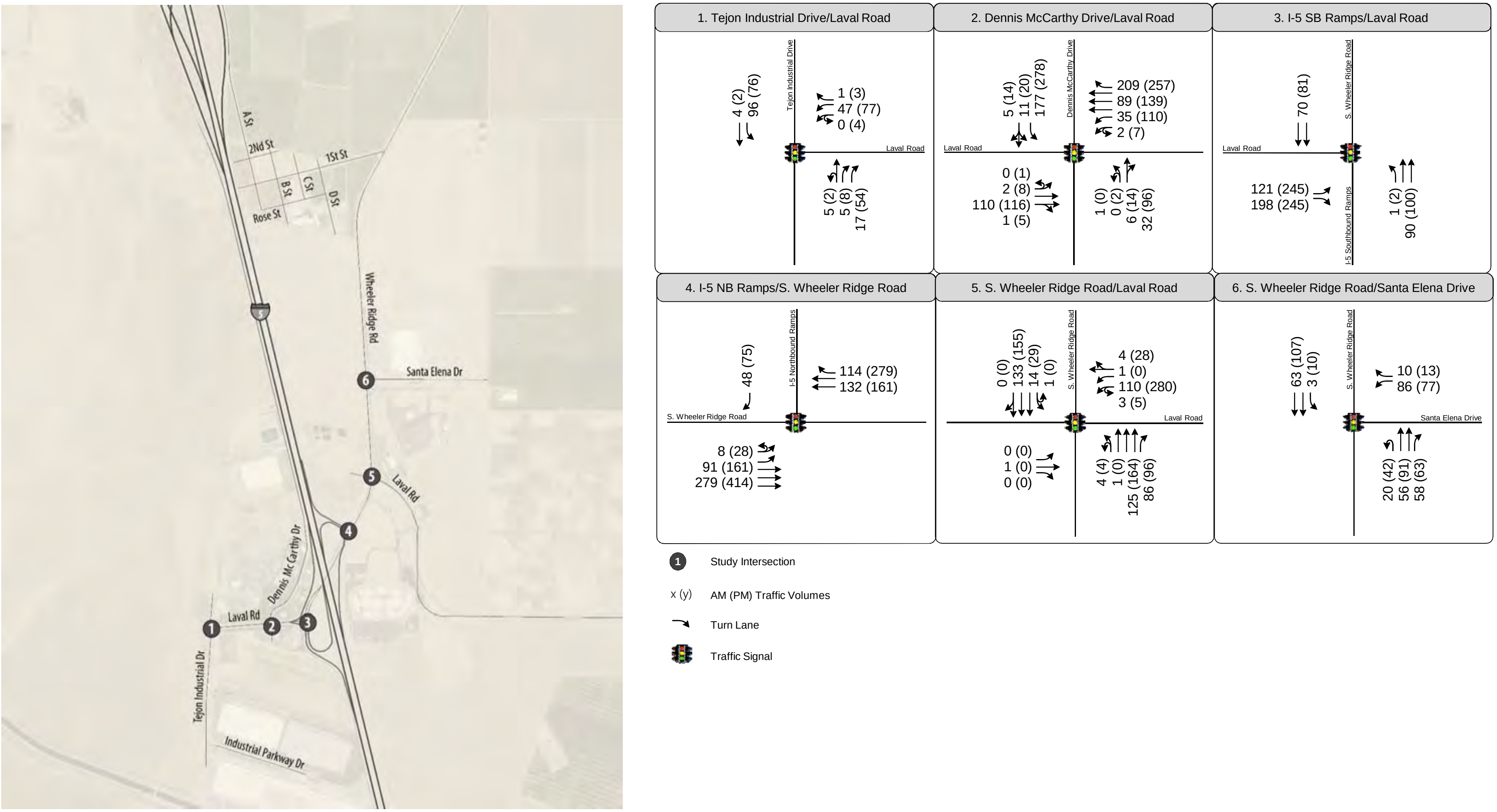


FIGURE 18

Peak Hour Traffic Volumes and Lane Configurations - Existing Conditions (2015)

INTENTIONALLY LEFT BLANK

Existing Roadway Segment Capacity Conditions

Existing roadway capacity conditions were evaluated by using the HCM peak hour traffic capacities presented in Table 3. Figure 19 shows the roadway study segment locations. Table 6 summarizes the p.m. peak hour volumes collected on June 23, 2015 at the two study roadway segments under existing conditions. Based on the results presented in Table 6, all study roadway segments have sufficient capacity to serve existing traffic volumes.

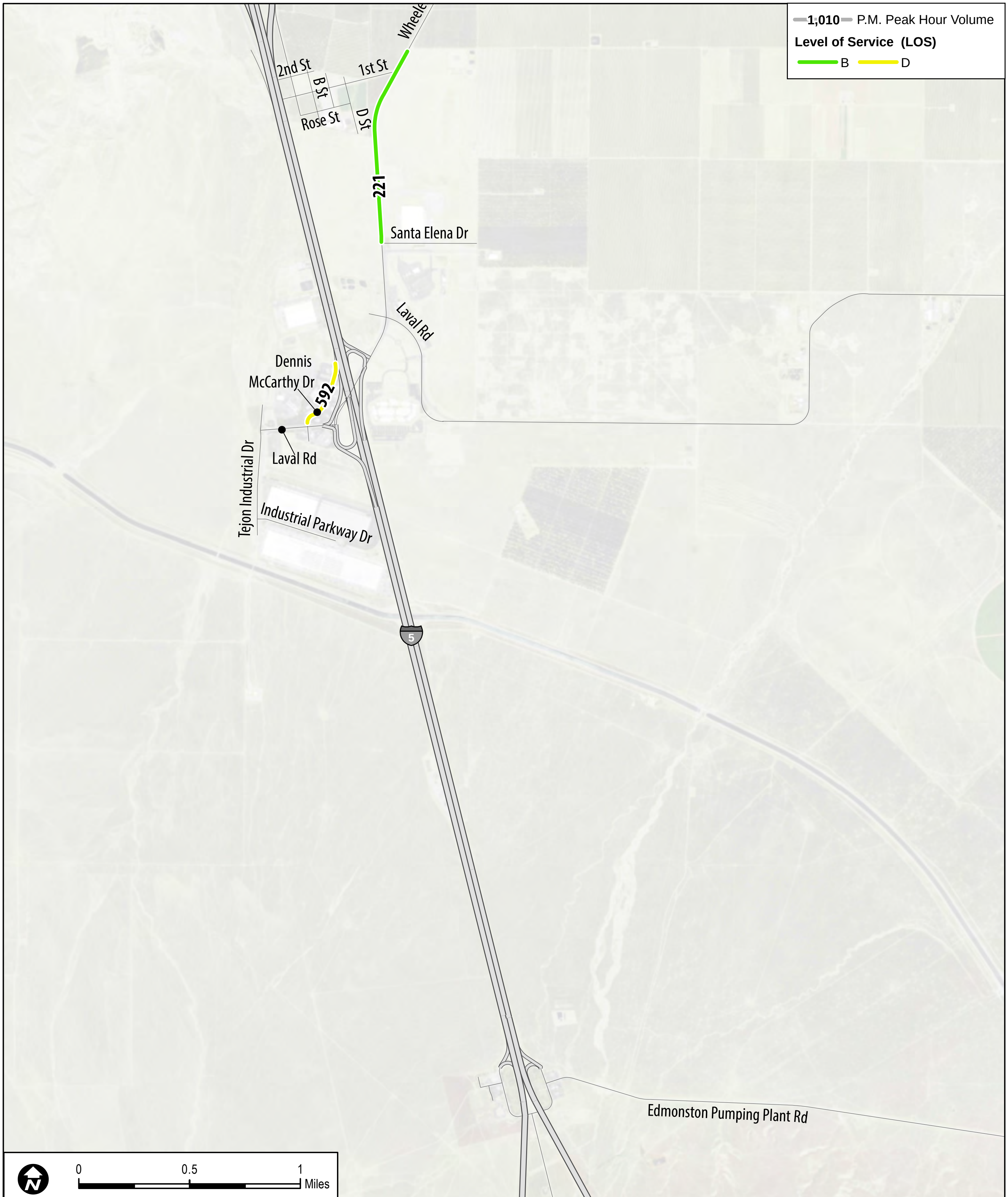
Table 6
P.M. Peak Hour Roadway Capacity Evaluation – Existing Conditions (2015)

Roadway Segment	Classification	Existing Conditions (2015)		
		P.M. Peak Hour Volume	*V/C*[1]	*LOS*[2]
1. Wheeler Ridge Road: North of Santa Elena Drive	2-lane Class I Highway	221	0.08	B
2. Dennis McCarthy Drive: North of Laval Road	2-lane Collector Street	592	0.33	D

Notes: [1]V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.
[2]Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table5.
Source: Fehr & Peers, 2015.

Table 6 shows that the existing volume-to-capacity ratios at the two roadway segments serving TRCC are relatively low. Dennis McCarthy Drive north of Laval Road operates slightly above the 530 peak hour volume LOS C/D threshold, and well below the 1,380 peak hour traffic volume LOS D/E threshold. Wheeler Ridge Road north of Santa Elena Drive operates at LOS B.

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

FIGURE 19

P.M. Peak Hour Roadway Volumes & LOS

Existing Conditions - 2015

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

2.5.4 Existing Freeway Traffic Conditions

Existing Freeway Operations

Existing freeway traffic conditions were evaluated by using the HCM traffic operations methodology discussed above. Figure 20 presents the existing a.m. and p.m. peak hour freeway volumes and lane configurations at the study freeway segments observed in the June 2015 traffic counts. Table 7 summarizes the a.m. and p.m. peak hour LOS on the study freeway segments under existing conditions (see Appendix C). All of the freeway segments operate at LOS B or better during both the a.m. and p.m. peak hours under existing conditions.

Table 7
Peak Hour Freeway Operations – Existing Conditions (2015)

Segment	Segment Type	Peak Hour	Existing Conditions (2015)	
			Density[1]	*LOS*[2]
I-5 Northbound				
1. Fort Tejon to Grapevine (Grapevine Grade)	Basic	A.M.	9	A
		P.M.	13	B
2. Grapevine Off-Ramp	Diverge	A.M.	10	B
		P.M.	13	B
3. Grapevine On-Ramp	Merge	A.M.	9	A
		P.M.	11	B
4. Grapevine to Laval Road	Basic	A.M.	7	A
		P.M.	9	A
5. Laval Road East Off-Ramp	Diverge	A.M.	11	B
		P.M.	14	B
6. Laval Road West Off-Ramp	Diverge	A.M.	9	A
		P.M.	12	B
7. Laval Road On-Ramp	Merge	A.M.	9	A
		P.M.	13	B
8. Laval Road to SR-99	Basic	A.M.	7	A
		P.M.	9	A

Table 7
Peak Hour Freeway Operations – Existing Conditions (2015)

Segment	Segment Type	Peak Hour	Existing Conditions (2015)	
			Density[1]	*LOS*[2]
9. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	7	A
		P.M.	9	A
10. North of SR 99 Junction	Basic	A.M.	5	A
		P.M.	8	A
SR 99 Northbound				
11. North of I-5 Junction	Basic	A.M.	6	A
		P.M.	7	A
SR 99 Southbound				
1. North of I-5 Junction	Basic	A.M.	6	A
		P.M.	7	A
I-5 Southbound				
2. North of SR 99 Junction	Basic	A.M.	5	A
		P.M.	9	A
3. I-5 Southbound Automobile On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	6	A
		P.M.	9	A
4. SR 99/I-5 Southbound Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	6	A
		P.M.	8	A
5. SR 99 to Laval Road	Basic	A.M.	7	A
		P.M.	9	A
6. Laval Road West Off-Ramp	Diverge	A.M.	12	B
		P.M.	14	B
7. Laval Road East Off-Ramp	Diverge	A.M.	10	A
		P.M.	10	B
8. Laval Road On-Ramp	Merge	A.M.	9	A
		P.M.	10	B
9. Laval Road to CVEF	Basic	A.M.	7	A
		P.M.	8	A

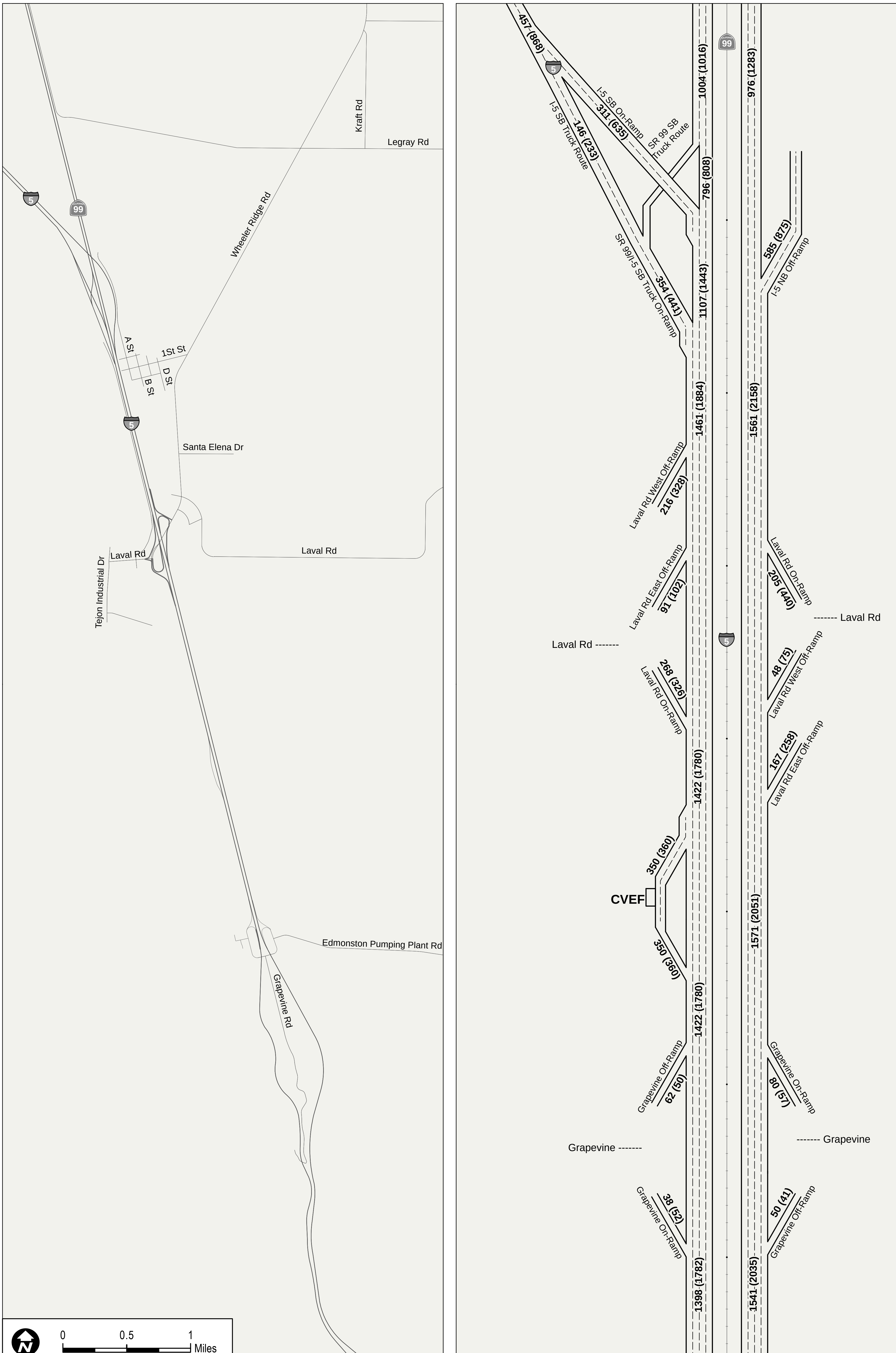
Table 7
Peak Hour Freeway Operations – Existing Conditions (2015)

Segment	Segment Type	Peak Hour	Existing Conditions (2015)	
			Density[1]	*LOS*[2]
10. CVEF Off-Ramp	Diverge	A.M.	11	B
		P.M.	11	B
11. CVEF On-Ramp	Merge	A.M.	5	A
		P.M.	6	A
12. CVEF to Grapevine	Basic	A.M.	7	A
		P.M.	8	A
13. Grapevine Off-Ramp	Diverge	A.M.	10	A
		P.M.	11	B
14. Grapevine On-Ramp	Merge	A.M.	9	A
		P.M.	7	A
15. Grapevine to Fort Tejon (Grapevine Grade)	Basic	A.M.	12	B
		P.M.	14	B

Notes: [1]Density is reported in passenger car equivalents per mile per lane (pcpmpl).
[2]Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).
Source: Fehr & Peers, 2015.

As shown in Table 7, the existing I-5/Grapevine interchange currently operates at LOS A or B, well above applicable performance thresholds. The interchange is located at the base of the Grapevine Grade and includes hook ramps that require vehicles to decelerate quickly on off-ramps and to accelerate quickly on on-ramps. The dedicated truck lanes on the Grapevine Grade also begin and end at the interchange. The confluence of the hook ramps and truck lanes result in short passenger car weaving lengths through slower-moving truck traffic. Speed divergence between heavy and lighter vehicles travelling up and down the grade and vehicles using the existing Grapevine interchange also occurs at the northbound off ramp and southbound on ramp. As discussed in the Project Description certain operational enhancements subject to Caltrans approval would be required before the existing I-5/Grapevine interchange could be used for interim project access to address these conditions Grapevine Grade traffic, including: an I-5 auxiliary lane between the CVEF and southbound Grapevine off ramp; an I-5 northbound on-ramp acceleration lane; enhanced lighting on all gores; enhanced overhead signage on I-5 for both northbound and southbound off-ramps; enhanced signage on northbound off ramp horseshoe curve; and enhanced super elevation rate on northbound off ramp horseshoe curve.

INTENTIONALLY LEFT BLANK



AM (PM) AM and PM Traffic Volume

FIGURE 20
Peak Hour Traffic Volumes
Freeway & Ramp Configurations - Existing Conditions (2015)

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

Existing Freeway Off-Ramp Queuing

Table 8 summarizes the traffic controls at ramp terminal intersections for existing freeway off-ramps in the study area. As shown in Table 8, most of the existing off-ramps in the study area operate as free-flowing movements at the ramp terminal and queuing would only occur from congestion building back from downstream locations. The Laval Road east off-ramp is the only controlled downstream intersection that could generate queue under existing conditions.

Table 8
Freeway Off-Ramps – Existing Conditions (2015)

Freeway Off-Ramp	Off-Ramp Length[1]	Traffic Control at Ramp Terminal	Nearest Downstream Controlled Intersection[2]		Total Queuing Space[4]
			Intersection	*Distance[3]*	
I-5 Northbound					
Grapevine off-ramp	1,000 ft.	Free	None	N/A	N/A
Laval Road east off-ramp	1,500 ft.	Free	5. S. Wheeler Ridge Road / Laval Road	1,300 ft.	2,800 ft.
Laval Road west off-ramp	1,600 ft.	Free	2. Dennis McCarthy Drive / Laval Road	500 ft.	2,100 ft.
I-5 Southbound					
Laval Road west off-ramp	1,300 ft.	Free	2. Dennis McCarthy Drive / Laval Road	2,100 ft.	3,400 ft.
Laval Road east off-ramp	1,700 ft.	Traffic Signal	N/A	N/A	1,700 ft.
Grapevine off-ramp	900 ft.	Free	None	N/A	N/A

Notes: [1]Approximate off-ramp lengths measured from the stop bar at the ramp terminal intersection or end of ramp to gore point at mainline diverge. Measured in feet.
[2]For off-ramps that operate freely at the ramp terminal, the nearest downstream intersection controlled by a traffic signal, stop sign, or yield sign that could potentially generate queues building back to the off-ramp. If none exists, listed as "None."
[3]Approximate distance from the off-ramp terminal to the downstream intersection measured in feet. N/A if not applicable.
[4]Total queuing space = Off-ramp length + Distance to Nearest Downstream Controlled Intersection (if applicable). N/A if not applicable.
Source: Fehr & Peers, 2015.

Table 9 presents the results of the a.m. and p.m. peak hour queuing analysis (see Appendix B). Based on these results, existing queues do not extend back onto the freeway and create a traffic safety issue. More specifically, the existing conditions queuing analysis shows that:

- The 95th percentile existing conditions queue on the southbound loop off-ramp to Laval Road east is approximately 25 feet during both the a.m. and p.m. peak hours, would not extend into the curved portion of the off-ramp, and would not cause safety issues on the loop ramp or at the diverge segment.
- The S. Wheeler Ridge Road / Laval Road and Dennis McCarthy Drive / Laval Road intersections operate at LOS B during both the a.m. and p.m. peak hours and generate minimal queues that do not reach the Laval Road off-ramps under existing conditions.

- Queues do not occur at the I-5 / Grapevine interchange off-ramps due to low demand volume and the free traffic control at the off-ramps under existing conditions.

Table 9
Peak Hour Off-Ramp Queuing – Existing Conditions (2015)

Freeway Ramp	Traffic Control at Ramp Terminal	Available Storage[1]	Peak Hour	95th Percentile Queue[2]
I-5 Northbound				
Grapevine off-ramp	Free	1,000 ft.	A.M.	N/A
			P.M.	N/A
Laval Road east off-ramp	Free	2,800 ft.	A.M.	50 ft.
			P.M.	50 ft.
Laval Road west off-ramp	Free	2,100 ft.	A.M.	50 ft.
			P.M.	75 ft.
I-5 Southbound				
Laval Road west off-ramp	Free	3,400 ft.	A.M.	50 ft.
			P.M.	75 ft.
Laval Road east off-ramp	Traffic Signal	1,700 ft.	A.M.	25 ft.
			P.M.	25 ft.
Grapevine off-ramp	Free	900 ft.	A.M.	N/A
			P.M.	N/A

Notes: [1]Available storage based on total available queue space shown in Table 8. Based on a combination of off-ramp length and distance to nearest downstream controlled intersection for free-flow off-ramps.
[2]95th percentile vehicle queue results are based on output from the Synchro traffic operations model; taken from controlling intersection (i.e., ramp terminal intersection with signal; or nearest downstream controlled intersection when ramp terminal operates free).
Source: Fehr & Peers, 2015.

3 REGULATORY SETTING

This section provides a discussion of applicable federal, state, and local regulations pertaining to transportation that may be applicable to the proposed project.

3.1 Federal Regulations

There are no applicable federal regulations related to transportation that directly apply to the proposed project. However, federal regulations relating to the Americans with Disabilities Act (ADA), Title VI, and Environmental Justice relate to transit service. Furthermore, relocation and expansion of the I-5 / Grapevine interchange will require a Modified Access Report in accordance with Federal Highway Administration (FHWA) Interstate Access Policy. This Modified Access Report will need to be reviewed and approved by FHWA for the relocated I-5 / Grapevine interchange on- and off-ramp access points.

3.2 State Regulations

3.2.1 California Department of Transportation

The California Department of Transportation (Caltrans) is responsible for operating and maintaining the State highway system. In the project vicinity, I-5, SR 99, SR 138, SR 166, and SR 184, SR 223, along with all the freeway ramps and ramp terminal intersections fall under Caltrans jurisdiction. Caltrans provides administrative support for transportation programming decisions made by the California Transportation Commission (CTC) for state funding programs. The State Transportation Improvement Program (STIP) is a multi-year capital improvement program that sets priorities and funds transportation projects envisioned in long-range transportation plans.

Corridor System Management Plans and Transportation Concept Reports

Caltrans prepares two types of long-range planning documents for its facilities: Corridor System Management Plans (CSMP) and Transportation Concept Report (TCR). Both planning documents identify the current traffic LOS on a facility and the anticipated future LOS when considering feasible long-term projects. Both planning documents also identify a concept LOS, or “target” LOS, for the applicable highway facility. A deficiency or need for improvement is triggered when the actual LOS falls below the concept LOS.

Guide for the Preparation of Traffic Impact Studies

Caltrans’ *Guide for the Preparation of Traffic Impact Studies* (Caltrans, 2002) provides general guidance regarding the preparation of traffic impact studies for projects that may have an impact on the State Highway System. The guidance identifies when a traffic study should be prepared and the methodology to use when evaluating operating conditions on the State highway system.

The *Guide for the Preparation of Traffic Impact Studies* states that "Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on state highway facilities; however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS." Caltrans was consulted to determine the applicable threshold for the project analysis, and in a meeting on September 1, 2015 confirmed that the target LOS for State Highway System is LOS D. Recognizing the unique circumstances at the Grapevine Grade, Caltrans also confirmed that LOS D may not be achievable on this segment under cumulative conditions. Consistent with these recommendations, LOS D is used as the threshold for passenger vehicles and density as the measure of effectiveness for heavy vehicles for the evaluation of the Grapevine Grade.

The *Guide for the Preparation of Traffic Impact Studies* also states that where "an existing State highway facility is operating at less than the appropriate target LOS, the existing measure of effectiveness (MOE) should be maintained." MOEs include density in passenger cars per mile per lane (pcpmpl) for multi-lane highways, freeway segments, and ramps (i.e., merge and diverge segments), average control delay in seconds per vehicle for intersections, and percent time spent following and average travel speed for two-lane highways. Tables 4 and 6 summarize the relationship between LOS performance and the applicable MOEs for the project analysis.

Caltrans Highway Design Manual

The Caltrans Highway Design Manual (HDM) establishes uniform policies and procedures to carry out the State highway design functions of Caltrans. The standards, procedures, and requirements included in the manual are for the information and guidance of Caltrans officers and employees in designing State highway facilities.

Chapter 500 of the HDM identifies design concepts and standards related to traffic interchanges. These standards include interchange spacing requirements that are relevant to providing access to the proposed project. The HDM establishes a minimum interchange spacing standard of three miles on Interstate freeways outside of urban areas. In urban areas, the minimum interchange spacing is one mile.

3.2.2 Senate Bill 375

Senate Bill (SB) 375 was enacted in 2008 and addresses greenhouse gas (GHG) emissions associated with the transportation sector through regional transportation and sustainability plans. Regional GHG reduction targets for the automobile and light-truck sector for 2020 and 2035, as determined by the California Air Resources Board (CARB), are required to consider the emission reductions associated with vehicle emission standards (see Assembly Bill 1493), the composition of fuels (see Executive Order S-1-07), and other CARB-approved measures to reduce GHG emissions. Regional metropolitan planning organizations (MPOs) are responsible for preparing a Sustainable Communities Strategy (SCS) within the Regional Transportation Plan (RTP). The goal of the SCS is to establish a development plan for the region, which, after considering transportation measures and policies, will achieve, if feasible, the GHG reduction targets. If an SCS is unable to achieve the GHG reduction target, an MPO must prepare an alternative planning strategy demonstrating how the GHG reduction target would be achieved through alternative development patterns, infrastructure, or additional transportation measures or policies. SB 375 provides incentives for streamlining CEQA requirements by substantially reducing the requirements for “transit priority projects,” as specified in SB 375, and eliminating the analysis of the impacts of certain residential projects on global warming and the growth-inducing impacts of those projects when the projects are consistent with the SCS or alternative planning strategy.

On September 23, 2010, CARB adopted the SB 375 targets for the regional MPOs. The targets for Kern COG, the designated MPO for the project area, are a 5% reduction in emissions per capita by 2020 and a 10% reduction by 2035.

3.2.3 Assembly Bill 1493

Assembly Bill (AB) 1493 was enacted in 2002 and required CARB to set GHG emission standards for passenger vehicles, light-duty trucks, and other vehicles primarily used for noncommercial personal transportation. The emission standards apply to motor vehicles manufactured in 2009 and subsequent model years and were adopted in September 2004. The standards are intended to achieve reduction of about 22% in GHG emissions compared to the emissions from the 2002 fleet by 2012 and a reduction of about 30% by 2016.

3.2.4 Executive Order S-1-07

Executive Order S-1-07 was issued on January 18, 2007 and sets a declining Low Carbon Fuel Standard for GHG emissions measured in “carbon dioxide equivalent” grams per unit of fuel energy sold in California. The target of the Low Carbon Fuel Standard is to reduce the carbon intensity of California passenger vehicle fuels by at least 10% by 2020. The carbon intensity measures the amount of GHG emissions in the lifecycle of a fuel, including extraction/feedstock production, processing, transportation, and final consumption, per unit of energy delivered. CARB adopted the implementing regulation in April 2009. The regulation is expected to increase the production of biofuels, including those from alternative sources, such as algae, wood, and agricultural waste. In addition, the Low Carbon Fuel Standard is intended to increase the availability of plug-in hybrid, battery electric, and fuel-cell power motor vehicles. The Low Carbon Fuel Standard is anticipated to lead to the replacement of 20% of the fuel used in motor vehicles with alternative fuels by 2020.

3.2.5 Senate Bill 743

SB 743 was enacted in 2013 and directs the California Governor’s Office of Planning and Research (OPR) to develop new approach for analyzing the transportation impacts under CEQA, which may eliminate vehicle delay and level of service as CEQA impacts for many parts of California. SB 743 also creates a new exemption for specific projects that are consistent with a Specific Plan, and eliminates the need to evaluate aesthetic and parking impacts in certain circumstances. OPR is in the process of developing new CEQA guidelines in response to SB 743, which will require certification and adoption by the Secretary for Resources before they go into effect. As of March 2016, no such CEQA guidelines have been certified and adopted, and the currently available proposed draft guidelines would not require implementation for two years following adoption. The current CEQA statute and guidelines for assessing transportation impacts remain in effect until analysis approaches in response to SB 743 are adopted and implemented.

3.3 Regional

3.3.1 Kern Council of Governments Congestion Management Program

The Kern Council of Governments (Kern COG) is the designated Congestion Management Agency for Kern County. Under the State CEQA Guidelines, the Congestion Management Agency monitors a countywide level of service standard and withholds federal gas tax funds if the standard is not met or mitigated.

Kern COG prepares and updates a Congestion Management Program (CMP) as part of the RTP. The CMP provides a systematic process for managing congestion and information regarding transportation system performance and alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet State and local needs. The CMP fulfills the federal and state statutory CMP requirements. The purpose of the CMP is to ensure that a balanced transportation system is developed that relates population growth, traffic growth and land use decisions to transportation system LOS performance standards and air quality improvement. The program attempts link land use, air quality, transportation, advanced transportation technologies as integral and complementary parts of this region's plans and programs.

The CMP defines a regional transportation system of roadways that are monitored in relation to the CMP established level-of-service standard. The Kern COG CMP system includes state highways and principal arterials in Kern County, including:

- Interstate 5
- State Route 14
- State Route 33
- State Route 43
- State Route 46
- State Route 58
- State Route 65
- State Route 99
- State Route 119
- State Route 155
- State Route 166
- State Route 178
- State Route 184
- State Route 202
- State Route 204
- State Route 223
- U.S. Route 395
- China Lake Boulevard – SR 178 to US 395
- Rosamond Boulevard – Tehachapi-Willow Springs Road to SR 14
- 7th Standard Road – SR 99 to I-5
- Tehachapi-Willow Springs Road – SR 58 to Rosamond Boulevard
- Wheeler Ridge Road – I-5 to SR 223

Of these facilities, Interstate 5, SR 99, SR 166, SR 184, SR 223, and Wheeler Ridge Road are located within 20 miles of the proposed project site.

The Kern COG CMP establishes a system-wide LOS E standard for the CMP regional roadway network, as required by California Government Code Section 65089(b)(1)(B). The CMP system also accepts roads that currently experience LOS F traffic congestion.[1] The CMP LOS standard does not conflict with locally adopted LOS standards that are more stringent because local agencies have the latitude to establish more stringent level of service requirements.

3.3.2 2014 Regional Transportation Plan/Sustainable Communities Strategy

Kern COG adopted the current RTP/SCS in June 2014 and established regional transportation goals, policies, and actions intended to guide development of planned multimodal transportation systems in Kern County over a 26-year planning horizon to 2040. The RTP/SCS is a financially constrained plan that identifies strategic investments in the transportation system based on available funding. The financially constrained transportation network along with the forecasted development patterns are incorporated into the Kern COG RTP/SCS travel demand forecasting (TDF) model, used to forecast regional travel patterns within Kern County. The 2014 Kern COG RTP/SCS was also approved by the California Air Resources Board on July 23, 2015.

[1] Kern Council of Governments. *2014 Final Regional Transportation Plan*, page 5-68, June 19, 2014.

The RTP/SCS designates the Grapevine project and adjacent locations, including TRCC, as a "Planned Transit Priority Area" and a "Strategic Employment Center." These designations identify the project area as an activity node around which future transit, vanpooling services, and mixed-use development patterns would be planned to support forecasted development patterns within the KernCOG planning region. The RTP/SCS supports a land use pattern and corresponding transportation network that encourages the location of housing near jobs and transportation facilities designed to reduce regional passenger vehicle travel and the resulting reduction in air emissions.

3.3.3 Kern County Airport Land Use Compatibility Plan

The Kern County Airport Land Use Compatibility Plan (ALUCP) establishes procedures and criteria to assist Kern County and affected incorporated cities in addressing compatibility issues between airports and surrounding land uses. The nearest airports to the project site include:

- Bakersfield Municipal Airport located approximately 25 miles north of the project site
- Taft Airport located approximately 30 miles northwest of the project site
- Tehachapi Municipal Airport located approximately 30 miles east of the project site

The proposed project is not within any of the compatibility zones established in the ALUCP.

3.4 Local

3.4.1 Kern County General Plan

The Kern County General Plan is a composite of many policies, programs, and intended actions to govern future physical development within the unincorporated area of Kern County. The following section identifies the General Plan policies related to transportation that are relevant to this study.

Land Use, Open Space, and Conservation Element

The Land Use, Open Space, and Conservation Element of the Kern County General Plan identify the following transportation related goals, provisions, and policies that guide land development within Kern County:

- Section 1.10.8, General Provisions: Smart Growth, Policy 49: Discretionary development projects should be encouraged to incorporate innovative or "smart growth" land use planning techniques as design features, as follows:
  - Higher density development, where compatible, to maximize the efficient use of land.

- Mixed use developments that promote reduced vehicle trips by having residential, commercial, and public uses proximate to each other.
- Variety of housing types, including those using energy efficient design, and densities to address Kern County's housing needs.
- Master planned communities that feature interconnected roads, transit stops, sidewalks, landscaping, and trails to encourage efficient multi-modal movements
- Compact development that conserves open space, agricultural land, flood prone areas, creeks, hillsides, ridge tops, wetlands, and other natural features.
- Adequate infrastructure (i.e. roads, sewer, water, parks, etc.) is provided as a condition of development approval by the project proponent.
- Aesthetically pleasing and unifying design features that promote a visually pleasing environment.

• Implementation Measure CC: Promote the creation of innovative development through the use of smart growth principles and various implementing tools including, but not limited to: Community Plans, Specific Plans, Combing Zone districts CL (Cluster), SP (Special Planning), OS (Open Space), Density Bonuses, Transit facilities, etc. Allow the flexibility to assess traffic and safety impacts through means other than Level of Service (LOS) when development utilizes Smart Growth policies that encourage efficient multi-modal movements, and is proposed as part of a Community Plan or Specific Plan.

Circulation Element

The Circulation Element identify the following transportation goals and guiding policies for Kern County:

Objectives

1. Make certain that transportation facilities needed to support development are available to ensure that these facilities occur in a timely manner to avoid traffic degradation.
2. Plan for transportation modes available to all segments of the population, including people with restricted mobility.
3. Maintain a minimum Level Of Service (LOS) D for all roads throughout the County unless the roads are part of an adopted Community Plan or Specific Plan which utilizes Smart Growth policies that encourage efficient multi-modal movements (See Section 1.10.8)
4. Coordinate with the California Department of Transportation (Caltrans) regarding various transportation developments within the County

2.3.2 Traffic Levels of Service (LOS)

- The General Plan policies consider LOS D acceptable within the general plan area for County maintained roads unless the roads are part of an adopted Community Plan or Specific Plan that utilizes Smart Growth policies that encourage efficient multi-modal movements (See Section 1.10.8). Caltrans standard for State highways is LOS C-D.

2.3.4 Future Growth

Policies

1. Monitor traffic volumes and patterns on County arterials. Undertake special studies when monitoring shows traffic is such that additional traffic would exceed LOS D unless the roads are part of an adopted Community Plan or Specific Plan that utilizes Smart Growth policies that encourage efficient multi-modal movements (See Section 1.10.8). The purpose of the special studies is eventually to upgrade key major highways to expressway standards. Expressway standards would limit access to one-half mile spacing.
2. The County should monitor development applications as they relate to traffic estimates developed for this plan. Mitigation is required if development causes affected roadways to fall below Level of Service (LOS) D. However, development proposed as part of a Community Plan or Specific Plan that utilizes Smart Growth policies that encourage efficient multi-modal movements (See Section 1.10.8) is allowed the flexibility to assess traffic and safety impacts through other means than Level of Service (LOS) Utilization of the CEQA process would help identify alternatives to or mitigation for such developments. Mitigation could involve amending the Land Use, Open Space and Conservation Element to establish jobs/housing balance if projected trips in any traffic zone exceed trips identified for this Circulation Element. Mitigation could involve exactions to build off-site transportation facilities. These enhancements would reduce traffic congestion to an acceptable level.
3. Participate in establishment of a Transportation Management Association (TMA) to manage ride sharing programs, transit projects, and other transportation system measures as needed and as allowed by law.
4. As a condition of private development approval, developers shall build roads needed to access the existing road network. Developers shall build these roads to County standards unless improvements along State routes are necessary then roads shall be built to Caltrans standards. Developers shall locate these roads (width to be determined by the Circulation Plan) along centerlines shown on the circulation diagram map unless otherwise authorized by an approved Specific Plan Line. Developers may build local roads along lines other than those on the circulation diagram map. Developers would negotiate necessary easements to allow this.

5. The County may accept a developer's road into the county’s maintained road system. This is at Kern County's discretion. Acceptance would occur after the developer follows the above requirements. Roads are included in the County road maintenance system through approval by the Board of Supervisors.
6. Work with and support Kern Council of Governments in developing a Countywide Transportation Impact fee for subregional areas that shall include a determination of the appropriate use of differential fee structures to encourage infill, urban development.

INTENTIONALLY LEFT BLANK

4 IMPACT ANALYSIS AND MITIGATION MEASURES

This section discussed the project's potential transportation impacts and identifies mitigation measures that would reduce potentially significant impacts to less than significant levels.

Section 4.1 summarizes the project's estimated total daily and a.m. and p.m. peak hour trip generation at build out, the percentage of these trips that would be internalized and remain within the project area (the Grapevine project and TRCC), and the assignment of project build out traffic to transportation facilities in the project area and to locations north and south of the project.

Section 4.2 summarizes the LOS and queuing analysis results for existing plus project conditions.

Section 4.3 summarizes the LOS and queuing analysis results for 2040 cumulative and interim 2025 conditions.

Section 4.4 analyzes potential project impacts using the Kern County CEQA Implementation Document and Kern County Environmental Checklist thresholds for evaluating potentially significant traffic and transportation impacts under CEQA. These thresholds were further refined with standards developed in consultation with Kern County and Caltrans. The effects of the project are categorized as either a "less than significant impact" or a "potentially significant impact." Consistent with CEQA, feasible mitigation measures are identified to reduce potentially significant impacts to less than significant levels. Potentially significant impacts that cannot be mitigated to less than significant levels are considered to be "significant and unavoidable impacts" under CEQA. As discussed in more detail below, all potentially significant traffic and transportation impacts will be mitigated to less than significant levels.

4.1 Project Travel Characteristics

This section discusses the methodologies used to estimate project buildout trip generation rates and the estimation results used to evaluate potential project impacts, including:

(1) a description of the transportation facilities that would be constructed and in operation at project buildout, including project area local roadways and the expanded and relocated I-5 interchange;

(2) the volume of traffic that will be generated by the project at buildout;

(3) the extent to which project traffic is internally captured within the project area, including work trips that occur between project residences and TRCC and project employment centers as a result of the jobs-housing balance the project will achieve; and

(4) assigning project-related traffic to transportation facilities within and external to the project area.

Each of these analysis requirements is discussed in more detail below.

4.1.1 Project Buildout Transportation System Facilities

The project area transportation facilities that will be operational at buildout are described above in Section 1.2, Project Description. The proposed Grapevine project's Circulation Plan (Exhibit 3-1 in the Grapevine Specific Plan) is shown in Figure 3.

The preferred proposed project circulation system is Variant 1 (see Figure 6), which would include the following:

- Locate the expanded and relocated I-5 / Grapevine interchange approximately one mile north of the existing I-5 / Grapevine interchange and connect with planned Street A (sufficient right-of-way will be reserved to facilitate a 6-lane Street A overpass at the interchange, if required);
- Construct a 2-lane overpass at planned Street B about 0.5 mile south of the interchange;
- Maintain the existing Grapevine Road underpass at I-5; and
- Close freeway access at the existing I-5 / Grapevine interchange.

Four-lane arterials will be constructed east (planned Street D) and west (planned Street C) of I-5 and will extend north/south approximately parallel with the freeway. Two new overcrossings of the California Aqueduct will be constructed east and west of I-5 to extend Streets C and D north to the existing I-5 / Laval Road interchange and TRCC. Streets C and D will also connect with a network of 2-lane minor arterials and collectors in the project area.

The existing CVEF would be relocated north to the west side of the junction of I-5 and SR 99 on land owned by Tejon RanchCorp. New access and bypass ramps would connect the CVEF with I-5 and SR 99, and an additional on-ramp would be constructed from the relocated CVEF to I-5 resulting in a southbound auxiliary lane to the I-5 / Laval interchange to accommodate truck movement. The Haul Road will be improved from the existing Edmonston Pumping Plant Road north to Laval Road to route utility and quarry truck traffic around the project area.

As shown in Figure 7, if necessary Variant 2 would locate the expanded and relocated interchange about 0.5 miles south of Variant 1 to connect with planned Street B and the 2-lane I-5 overpass in Variant 1 would be located approximately 0.5 miles north at planned Street A. The CVEF would remain in its existing location, and a braided CVEF on-ramp would be constructed east of I-5. The locations and design of other transit facilities would be substantially the same as in Variant 1.

At the request of Kern County and Caltrans, the possibility of improving the existing I-5 / Grapevine Road interchange to serve project buildout demand was considered at a screening level of analysis. As discussed in Section 2 above, although existing LOS conditions at the interchange are above applicable performance thresholds, the facility is located at the base of the Grapevine Grade where the confluence of hook ramps and truck lanes, and speed divergence between heavy and lighter vehicles travelling up and down the grade, result in short passenger car weaving lengths through slower-moving truck traffic. Certain operational enhancements subject to Caltrans approval could be made to the existing interchange in conjunction with the use of the existing I-5 / Laval Road interchange to provide interim project access within existing LOS performance and queuing standards prior to the construction of the expanded and relocated interchange (see Figure 5). If these operational enhancements are not implemented, interim project access would be provided solely through the existing I-5 / Laval Road interchange prior to the construction of the expanded and relocated interchange (see Figure 4).

As shown in Figure 6 and 7, project buildout demand would require the construction of a partial cloverleaf interchange (Caltrans Interchange Type L-9) with the possibility of up to a 6-lane overpass. If the new interchange was located at the foot of the Grapevine Grade, northbound and southbound braided ramps would be required due to the proximity of the interchange with the northbound and southbound truck lane control on the Grapevine Grade to the south and with the southbound truck exit activity from the CVEF to the north. Constructing an expanded and relocated interchange at the existing I-5 / Grapevine Road interchange with sufficient capacity to meet the project’s full buildout access demand would significantly exacerbate existing truck, passenger car, and freeway ingress and egress conditions associated with the Grapevine Grade and the CVEF. As a result of these traffic management and compatibility concerns, potential project access from I-5 at Grapevine Road beyond the interim levels that could occur in Interim B was not analyzed further for CEQA purposes.

The transportation system shown in Figure 6 (the preferred interchange Variant 1) was used as the primary basis for analyzing potential project transportation impacts. Potential impacts associated with Variant 2 would be largely the same as for Variant 1 except with respect to the project roadways that would connect with the more southern expanded and relocated interchange location. To analyze potential interim access impacts, the interchange facilities in Interim A and Interim B would be monitored and not operate below applicable LOS and queuing requirements.

In addition to project traffic facilities at buildout, the cumulative analysis includes fully-funded and approved Caltrans and major road improvements and foreseeable development projects not otherwise included in the SCAG and Kern COG projections that would affect future traffic system operations. Appendix H lists the additional improvements and projects included in the cumulative analysis under 2040 conditions north along SR-99 and under 2035 conditions south along I-5.

4.1.2 Project Buildout Traffic Generation

Project buildout trip generation volumes were estimated on the basis of the proposed land uses discussed in Section 1.2, Project Description, including 12,000 residential dwelling units (or up to 14,000 units with sufficient reductions in other land use to fully offset potential traffic increases), 5,100,000 square feet of commercial, retail, office, industrial/warehouse use, and K-12 schools. Table 10 describes the proposed project land use inputs used to analyze buildout trip generation volumes in more detail.

Table 10
Land Use Inputs for Grapevine Buildout Traffic Generation Analysis

Land Use Category	Land Use Type	Amount
Residential[1]	Single-Family Residential	8,400 Dwelling Units
	Multi-Family Residential	3,600 Dwelling Units
	Total	12,000 Dwelling Units
Non-Residential	Village Center Commercial - Retail[3]	450,000 square feet
	Village Center Commercial - Office[3]	350,000 square feet
	Freeway Commercial	750,000 square feet
	Office / Research & Development	2,100,000 square feet
	Light Industrial / Warehouse	1,450,000 square feet
	Total	5,100,000 square feet
Schools[2]	K-5 Students	3,520 Students
	6-8 Students	1,760 Students
	High School	2,454 Students
	Total	7,734 Students
Parks	Parks	96 Acres[4]

Notes: [1]Residential split based on Table 2-1 and 2-2 from the Grapevine Specific Plan
[2]Based on student generation calculations provided by Tejon Ranch
[3]Village Center Commercial is a mix of 450,000 sq. ft. of Village Center Retail and 350,000 sq. ft. of Village Center Office, per data provided by Tejon Ranch and Ken Kay Associates
[4]Up to 112 acres if unit count increases to 14,000 to comply with Kern County park requirements
Source: Grapevine Specific Plan.

Project buildout trip generation was estimated based on the land use inputs in Table 10 using the Kern COG travel demand forecasting (TDF) model. Project buildout daily, a.m. peak hour, and p.m. peak hour volumes were also estimated by using the trip generation rates developed by the Institute of Traffic Engineers (ITE) in *Trip Generation 9th Edition* (ITE, 2012) to validate and calibrate the TDF results.

The Kern COG TDF model uses land use inputs, trip rates, and other traffic engineering inputs to estimate travel demand. The model's roadway network includes major roadways, including freeways, highways, arterials, and collectors and was initially calibrated and validated for 2010 traffic conditions to prepare the Kern COG RTP/SCS and air quality conformity analysis. The TDF forecasts are validated and calibrated the Kern COG using Census data, existing travel data, and trip generation information from the Institute of Transportation Engineers.

For project analysis purposes, project area buildout network and traffic analysis zone (TAZ) system detail was added to the TDF base year and cumulative year models. The base year model adjustments primarily focused on accurately representing existing facilities and conditions in the TRCC area. The cumulative model was adjusted to reflect the build out of the proposed project under cumulative conditions, including the buildout facilities shown in Figure 6.

The TDF model outputs for the project were validated and calibrated by calculating buildout project traffic generation using the ITE trip generation rates and the land use inputs summarized in Table 10. Project a.m. and p.m. peak hour trip generation estimates were estimated to be higher using the ITE method compared with the TDF model output. As a result, the TDF model was adjusted to increase trip volumes during these periods and to analyze potential project impacts using more conservative, higher peak hour traffic volumes. Table 11 summarizes the estimated daily, a.m. peak hour, and p.m. peak hour traffic volumes for the project at buildout using the ITE methodology.

Table 11
ITE Trip Generation Estimate – Proposed Project

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	*In*	*Out*	*Total*	*In*	*Out*	
Residential									
Residential	8,400 DUs	210	6,300	1,575	4,725	8,400	5,292	3,108	79,968
Village Center Residential	3,600 DUs	220	1,836	367	1,469	2,232	1,451	781	23,940
Non-Residential									
Village Center Commercial - Retail[1]	450 ksf	820[1]	432	268	164	1,670	802	868	19,215
Village Center Commercial - Office[1]	350 ksf	710[1]	546	480	66	522	89	433	3,861
Freeway Commercial	750 ksf	820	720	446	274	2,783	1,336	1,447	32,025
Office/Research & Development	2,100 ksf	710	3,276	2,883	393	3,129	532	2,597	23,163
Light Industrial/Warehouse[2]	1,450 ksf	130/ 150[2]	813	660	153	848	187	661	7,533
Schools & Parks									

Elementary Schools	3,520 students	520	1,584	871	713	528	259	269	4,541
Middle Schools	1,760 students	522	950	523	427	282	138	144	2,851
High Schools	2,454 students	530	1,055	717	338	319	150	169	4,196
Parks[3]	96 acres	411	-	-	-	-	-	-	249
Total			17,512	8,790	8,723	20,713	10,236	10,477	201,542

Notes: DUs = dwelling units; ksf = thousand square feet
Trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition*
[1]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[2]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
[3]City Park land use (ITE Code 411) in ITE's *Trip Generation Manual* only includes daily trip information; up to 112 acres if unit count increases to 14,000 to comply with Kern County park requirements

Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

The volumes in Table 11 likely overestimate project buildout trips for several reasons. First, the models do not generally account for enhanced levels of multimodal travel in locations, like the proposed project, that are designed to foster transit, bicycle system, and pedestrian movement. The models also assume that school trips are consistent with typical existing suburban communities and do not account for the lower level of vehicular trips that would likely occur in the project area by locating schools in close proximity to residential development. Buildout traffic volumes would be lower than estimated in Table 16 if a greater number of non-automotive project and school trips occur.

4.1.3 Project Buildout Internal and External Trip Distribution

The distribution of project trips, including internal trips that occur within the Grapevine Specific Plan area and TRCC, and external trips to other locations to the north and south of the project area, was estimated by using the Kern COG TDF model. The Kern COG TDF model trip distribution estimates were further validated through an internalization analysis using a wide range of national transportation research and demographic data sources, including:

- Journey to Work data from the 2007-2011 American Community Survey (ACS) (U.S. Census Bureau, 2011);
- *NCHRP Report 365: Travel Estimation Techniques for Urban Planning* (Transportation Research Board, 1998)
- *Summary of Travel Trends: 2009 National Household Travel Survey* (Federal Highway Administration, 2011)
- Cell phone and GPS data for trips with origins or destinations in southern Bakersfield ; and

- Fehr & Peers MXD+ model based on the U.S. Environmental Protection Agency's *Traffic Generated by Mixed-Use Developments – A Six Region Study Using Consistent Built Environmental Measures*.

The Kern COG TDF model predicts that 73% of a.m. peak hour project trips and 72% of p.m. peak hour project trips will be internalized within the Project Area (i.e., Grapevine, TRCC, and the immediate area). As noted above, the estimated trip internalization rates were validated through a trip internalization analysis that uses U.S. Census commuting data, cell phone and GPS data, and national research travel data from the National Cooperative Highway Research Program (NCHRP). This trip internalization analysis applies the following analysis methodology:

Step 1. Estimate the number or percentage of project trips by purpose

Step 2. Estimate internalization rates by trip purpose

Step 3. Estimate the total project trip internalization rate

The trip internalization analysis methodology is described in more detail in Appendix D. Appendix E includes additional calculations and data supporting the internalization analysis for the project. The following sections summarize steps 1-3 of the trip internalization analysis.

Step 1: Determining Peak Hour Trip Purpose

Peak hour project trip purposes were estimated by using the methodology in the NCHRP Report 365 (Transportation Research Board, 1998). The NCHRP method classifies trips into three purpose groups: (1) home-based work (HBW) trips, which include trips to and from residences to work; (2) home-based other (HBO) trips, which include trips to and from residences to non-work locations, such as shopping or recreation; and (3) non-home-based (NHB) trips, which include trips to and from non-work locations, such as from work to a restaurant. The percentage of trips within each of these three groups estimated for the project during the peak a.m. and p.m. hours is shown in Table 12 and described in more detail in Appendix E.

Table 12
Peak Hour Trip Purpose

A.M. Peak Hour			P.M. Peak Hour		
HBW	*HBO*	*NHB*	*HBW*	*HBO*	*NHB*
47.8%	46.5%	5.7%	28.1%	47.5%	24.4%

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
Source: *National Cooperative Highway Research Program Report 365* (Transportation Research Board, 1998); Fehr & Peers, 2015.

Step 2: Estimating Internalization Rates By Trip Purpose

Internal trip capture rates are typically different for home-based work trips than home-based other or non-home-based trips because employees are often willing to accept longer commutes for employment. As a result, the internalization rate for project home-based work trips was calculated separately from the rate for home-based other and non-home-based trips.

Step 2A: Home-Based Work Trip Internalization Rate

The internalization rate for project home-based work trips was estimated by using the U.S. Census Journey to Work data for California communities with similar characteristics as the proposed project, including residential and employment opportunities, and proximity to other developed areas. The data was obtained from the 2008-2012 5-year American Community Survey, which provides estimates of the percentage of a community's workforce that either worked in the place of residence and generated internalized HBW trips or worked outside the place of residence and generated external HBW trips. Consistent with recommendations from Caltrans and Kern County, the percentage of internal HBW trips was obtained from the Census data for the following six communities (see Appendix E):

- El Centro, CA
- Madera, CA
- Paso Robles, CA
- Porterville, CA
- Santa Maria, CA
- Watsonville, CA

The percentage of the workforce over age 16 that worked in the place of residence in each of these locations is summarized in Table 13.

Table 13
Journey to Work Data For Similar Communities

City	Percent of Workforce that Worked in Place of Residence
El Centro, CA	57.6%
Madera, CA	51.2%
Paso Robles, CA	48.5%
Porterville, CA	58.0%
Santa Maria, CA	62.0%
Watsonville, CA	49.4%
Average	54.5%

Source: 2008-2012 ACS – Report S0801, U.S. Census Bureau, 2012.

Table 13 shows that 54.5% of the workforce in the six representative communities worked in the place of residence and would generate internalized HBW trips. Consequently, the analysis of project trips also assumes that 54.5% of home-based work trips will be internal to the project area.

At the request of Caltrans, a sensitivity analysis was performed assuming a buildout internalization rate lower than projected (see Appendix N). The project traffic mitigation and monitoring program will confirm that traffic volumes are consistent with projections as development occurs over time or identify additional measures that may be required to address higher than projected traffic levels. The Phase 1 (Interim B) analysis also used a lower internalization rate (46%) to provide a conservative assessment of potential interim conditions.

Step 2B: Home-Based Other and Non-Home-Based Trip Internalization Rate

Internalization rates for home-based other and non-home-based trips are based on travel data from NCHRP 365, project land use characteristics, cell phone data, and the MXD+ model. The analysis estimated the number of home-based other/non-home-based trips versus home-based work trips by land use based on data from NCHRP 365 and the MXD+ model. The number of home-based other/non-home-based trips versus home-based work trips related to education was estimated by using the NCHRP 365 date and school employment data from the California School Boards Association and the National Center for Education Statistics. These estimates are described in more detail in Appendix E. Table 14 summaries the projected number of project buildout home-based other and non-home-based trips by non-residential land use type for peak a.m. and p.m. hours.

Table 14
HBO/NHB Trip Estimate – Non-Residential Land Uses

Land Use	Quantity	A.M. Peak Hour		P.M. Peak Hour	
		Total Trip Generation[1]	*HBO+NHB*[2]	*Total Trip Generation*[1]	*HBO+NHB*[2]
Non-Residential					
Village Center Comm. - Retail[3]	450 ksf	432	311	1,670	1,436
Village Center Comm. - Office[3]	350 ksf	546	186	522	303
Highway/Regional Commercial	750 ksf	720	518	2,783	2,393
Office/Research & Development	2,100 ksf	3,276	1,114	3,129	1,815
Light Industrial/Warehouse[4]	1,450 ksf	813	114	848	280
Non-Residential Sub-Total		*5,787*	*2,243*	*8,952*	*6,227*
Schools					
Elementary Schools	3,520 students	1,584	1,515	528	472
Middle Schools	1,760 students	950	915	282	254
High Schools	2,454 students	1,055	1,007	319	280
Schools Sub-Total		*3,589*	*3,437*	*1,129*	*1,006*
Total		9,376	5,680	10,081	7,233

Notes: ksf = thousand square feet
[1]A.M. and P.M. peak hour trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition* from Table 11.
[2]Home-based other and non-home-based trip estimate based on percentages presented in Table 19 for non-residential uses; and the remaining trips after home-based work trips calculated in Table 19 are subtracted from total school trips.
[3]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[4]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

Table 15 summarizes the estimated internal home-based other/non-home-based trips by land use type for the project based on the methodologies described in Appendix E. The internalization rates for these trips is estimated to range from 88.3% during the a.m. peak hour to 78% during the p.m. peak hour.

Table 15
HBO/NHB Trip Internalization Estimate – Non-Residential Land Uses

Land Use	Quantity	A.M. Peak Hour			P.M. Peak Hour		
		HBO/NHB[1]	*Internal %[2]*	*Internal HBO/NHB*	*HBO/NHB[1]*	*Internal %[2]*	*Internal HBO/NHB*
Non-Residential							
Village Center Comm. - Retail[3]	450 ksf	311	95%	295	1,436	95%	1,364
Village Center Comm. - Office[3]	350 ksf	186	95%	177	303	95%	288
Highway/Regional Commercial	750 ksf	518	60%	311	2,393	60%	1,436
Office/Research & Development	2,100 ksf	1,114	85%	947	1,815	85%	1,543
Light Industrial/Warehouse[4]	1,450 ksf	114	20%	23	280	20%	56
Non-Residential Sub-Total		*2,243*	*77.0%*	*1,753*	*6,227*	*75.3%*	*4,687*
Schools							
Elementary Schools	3,520 students	1,515	95%	1,439	472	95%	448
Middle Schools	1,760 students	915	95%	869	254	95%	241
High Schools	2,454 students	1,007	95%	957	280	95%	266
Schools Sub-Total		*3,437*	*95.0%*	*3,265*	*1,006*	*95.0%*	*955*
Total		5,680	88.3%	5,018	7,233	78.0%	5,642

Notes: ksf = thousand square feet
[1]Home-based other and non-home-based trip estimate based on data presented in Table 21.
[2]Internalization percentage based on discussion provided in Appendix E.
[3]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[4]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

The estimated internalization rates for home-based work, home-based other and non-home-based trips were validated by comparison with cell phone travel pattern data for southern Bakersfield during 2012. The data show that approximately 93.4% of all trips to and from Bakersfield remain within Bakersfield and Kern County. The cell-phone travel internalization rate is generally consistent with the estimates for project home-based work, home-based other and non-home-based trips, which range from 54.5% (HBW) to 88.3% (HBO/NHB) in the analysis (see Table 13, Table 15 and Appendix E).

Step 3: Total Project Trip Internalization by Peak Hour

The total project trip internalization rate was estimated by combining the percentages of each trip purpose summarized in Table 16 with the estimated internalization rate for each type of trip in Table 13 and Table 15.

Table 16
Estimated Project Trip Internalization By Peak Hour

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips[1]	*% Internal*[2]	*Total Internalization %*[3]	*% of Trips*[1]	*% Internal*[2]	*Total Internalization %*[3]
Home-Based Work	47.8%	54.5%	26.1%	28.1%	54.5%	15.3%
Home-Based Other/ Non-Home-Based	52.2%	88.3%	46.1%	71.9%	78.0%	56.1%
Total			72.2%			71.4%

Notes: [1]Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Table 17.
[2]Internalization percentage by trip purpose. Home-based work trip internalization shown in Table 18. Home-based other/non-home-based trip internalization shown in Table 22.
[3]Overall internalization estimate calculation.
Source: Fehr & Peers, 2015.

As shown in Table 16, the total project trip internalization by peak hour is estimated to be 72.2% in the a.m. and 71.4% in the p.m. As discussed above, the Kern COG TDF model estimates that trip internalization rates would be 73% in the a.m. peak hour and 72% in the p.m. peak hour. The results of the internalization analysis are consistent with and validate the Kern COG TDF model estimates.

4.1.4 Project Buildout Traffic Assignment and Distribution

The 2040 Kern COG TDF model distributes trips using a "gravity model" which assumes that trips are more likely to occur based on complementary uses, such as nearby residences and a supermarket. The TDF model accounts for the distance between trip origins and destinations in travel time, the type of land use, and the amount of land use (size) in distributing trips. Table 17 summarizes the proposed project trip distribution at project buildout under 2040 cumulative plus project conditions.

Table 17
Project Buildout Trip Distribution Estimate – Cumulative Plus Project Conditions (2040)

Origin/Destination	Trip Distribution Estimate	
	A.M. Peak Hour	*P.M. Peak Hour*
Project Area	73%	72%
North of Grapevine	19%	19%
West Bakersfield via I-5	2%	2%
North of Bakersfield via I-5	1%	1%
Bakersfield Metropolitan Area via SR 99	11%	11%
North of Bakersfield via SR 99	1%	1%
Arvin-Lamont Area	3%	3%
Eastern Kern County via SR 58	1%	1%
South of Grapevine	8%	9%
Southern Kern County (Frazier Park/Tejon Mountain Village)	1%	1%
Antelope Valley Area (Lancaster/Palmdale/Centennial)	3%	3%
Santa Clarita Valley Area	2%	2%
Los Angeles Basin/Orange County/Inland Empire	2%	3%

Source: Fehr & Peers, 2015.

As discussed above, during both morning and evening peak hours 73%- 72% of all project trips at buildout would be internalized and remain within the project area (the Grapevine project and TRCC). Approximately 19% of the total project trips would travel north to and from the Bakersfield metropolitan area. Approximately 8 to 9% of the total project trips would travel south to and from Los Angeles County.

Table 18 summarizes project trip distribution at project buildout under existing plus project conditions. As shown in Table 18, during both morning and evening peak hours, the majority of project vehicle trips (70% and 69%) would be internalized and remain within the project area. Approximately 21 to 22% of project trips would travel north to and from the Bakersfield metropolitan area. Approximately 9 to 10% of total project trips would travel south to and from Los Angeles County. The internalization rates are lower under existing plus project than cumulative plus project conditions because TRCC would not be fully built out and there would be fewer local employment opportunities near the project under the existing plus project scenario.

Table 18
Project Trip Distribution Estimate – Existing Plus Project Conditions (2015)

Origin/Destination	Trip Distribution Estimate	
	A.M. Peak Hour	*P.M. Peak Hour*
Project Area	70%	69%
North of Grapevine	21%	22%
West Bakersfield via I-5	2%	2%
North of Bakersfield via I-5	1%	1%
Bakersfield Metropolitan Area via SR 99	12%	13%
North of Bakersfield via SR 99	1%	1%
Arvin-Lamont Area	4%	4%
Eastern Kern County via SR 58	1%	1%
South of Grapevine	9%	10%
Southern Kern County (Frazier Park)	1%	1%
Antelope Valley Area (Lancaster/Palmdale)	3%	3%
Santa Clarita Valley Area	2%	3%
Los Angeles Basin/Orange County/Inland Empire	3%	3%

Source: Fehr & Peers, 2015.

Project trips were allocated in more detail using the “difference method” of analysis for each turning movement at the study intersections, roadway segments, highways, and freeway facilities. Figures 21A and 21B presents the a.m. and p.m. peak hour turning movements of project trips at the study intersections under existing plus project conditions. Figure 22 presents the a.m. and p.m. peak hour project trips on the study freeway segments, the net new project trips on the freeway mainline, the total number of trips traveling to and from the proposed project on the ramps, and the number of diverted link trips on the ramps under existing plus project conditions.

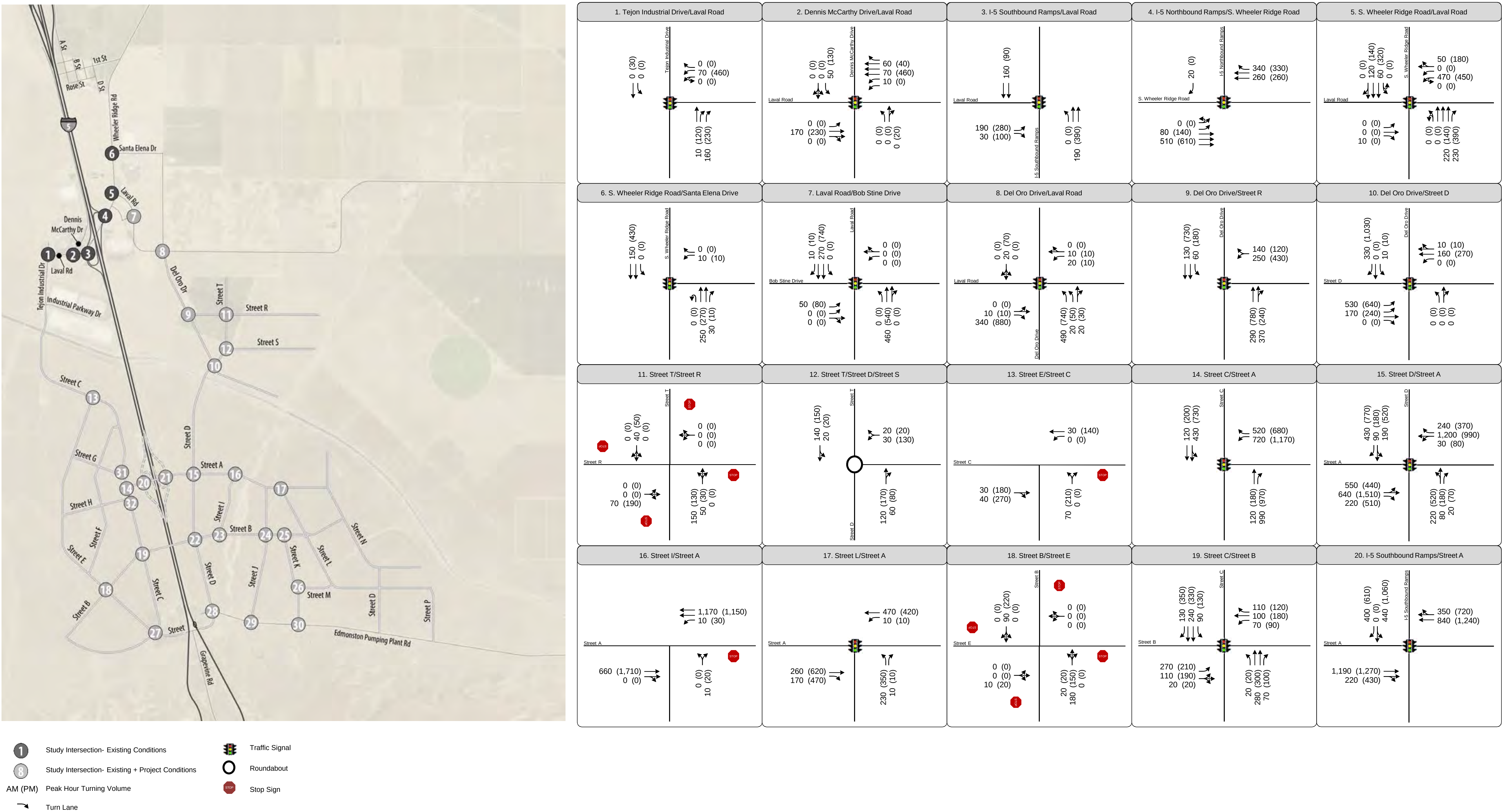
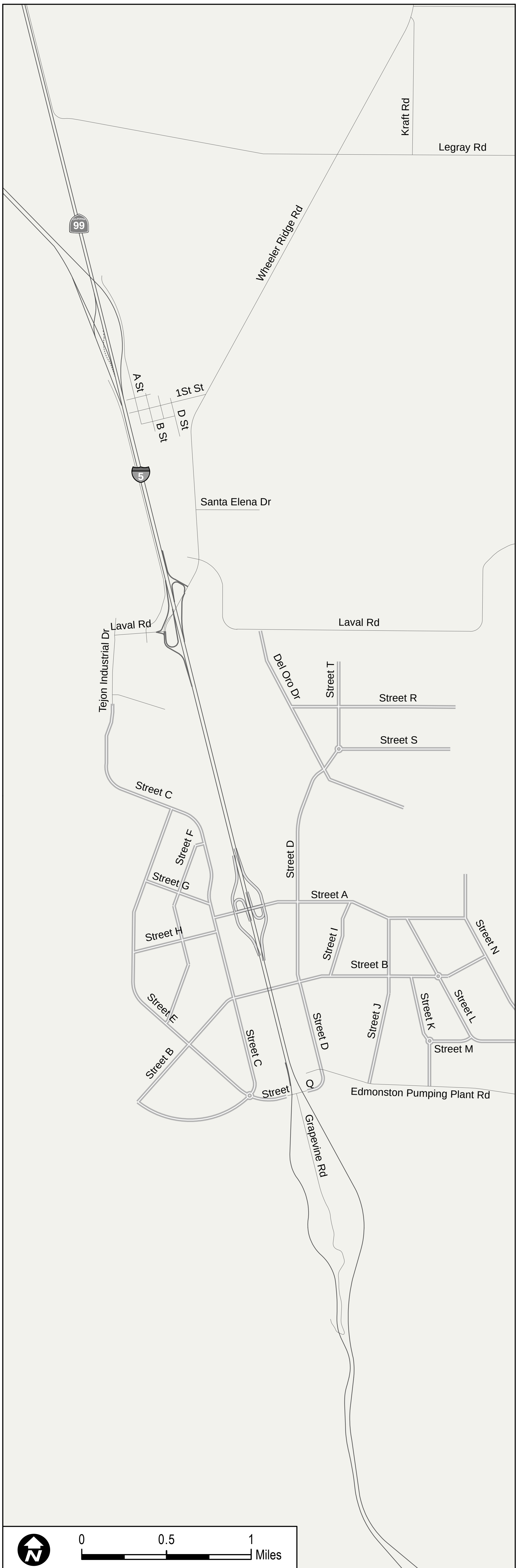
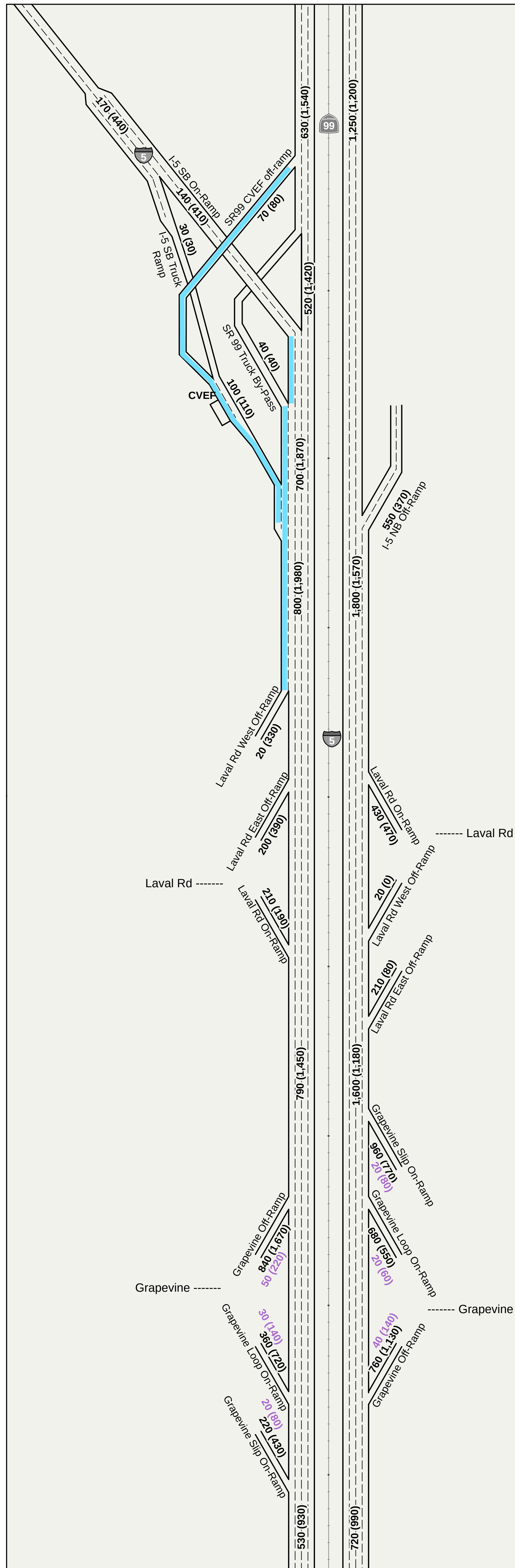


Figure 21
Project Trips – Intersections –
Existing Plus Project Conditions (2015)

INTENTIONALLY LEFT BLANK





AM (PM) AM and PM Traffic Volume - Net New Trips

AM (PM) AM and PM Traffic Volume - Diverted Link Trips

Relocated CVEF

Figure 22

Project Trips – Freeway – Existing Plus Project Conditions (2015)

SOURCES: USGS, ESRI

INTENTIONALLY LEFT BLANK

4.2 Existing Plus Project Transportation Conditions

This section describes the transportation conditions that would occur under existing plus project conditions. The analysis was conducted by adding the trips generated by the proposed project at buildout as described in Section 4.1 to the existing roadway and freeway facility volumes summarized in Section 2. The project buildout transportation facilities used in the analysis, including the preferred location for the expanded and relocated I-5 interchange and relocated CVEF, are shown in Figure V1. Potential impacts based on the results of the existing plus project conditions analysis are evaluated in Section 4.4 below.

4.2.1 Roadway Traffic Existing Plus Project Conditions

Intersection Operations Under Existing Plus Project Conditions

Table 19 presents the anticipated a.m. and p.m. peak hour delay and LOS at the study intersections under existing plus project conditions using the methodology described in Section 1.6 above (see Appendix F). Figures 23A and 23B present the a.m. and p.m. peak hour turning movement forecasts and lane configurations at the study intersections under existing plus project conditions.

Table 19
Peak Hour Intersection Operations – Existing Plus Project Conditions (2015)

Intersection	Traffic Control	Peak Hour	Existing Conditions		Existing Plus Project	
			Delay[2]	*LOS*[3]	*Delay*[2]	*LOS*[3]
1. Tejon Industrial Drive / Laval Road	Traffic Signal	A.M.	9	A	10	B
		P.M.	10	A	14	B
2. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	13	B	16	B
		P.M.	17	B	18	B
3. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	9	A	11	B
		P.M.	12	B	15	B
4. S. Wheeler Ridge Road / I-5 Northbound Ramps[1]	Traffic Signal	A.M.	3	A	3	A
		P.M.	3	A	3	A
5. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	13	B	18	B
		P.M.	10	B	26	C
6. S. Wheeler Ridge Road / Santa Elena Drive	Traffic Signal	A.M.	10	B	10	A
		P.M.	10	A	9	A

Table 19
Peak Hour Intersection Operations – Existing Plus Project Conditions (2015)

Intersection	Traffic Control	Peak Hour	Existing Conditions		Existing Plus Project	
			Delay[2]	*LOS*[3]	*Delay*[2]	*LOS*[3]
7. Laval Road / Bob Stine Drive	Traffic Signal	A.M.	8	A	7	A
		P.M.	8	A	9	A
8. Del Oro Drive / Laval Road	Traffic Signal	A.M.	Does Not Exist		11	B
		P.M.			11	B
9. Del Oro Drive / Street R	Traffic Signal	A.M.	Does Not Exist		12	B
		P.M.			40	D
10. Del Oro Drive / Street D	Traffic Signal	A.M.	Does Not Exist		21	C
		P.M.			26	C
11. Street T / Street R	All-Way Stop	A.M.	Does Not Exist		9	A
		P.M.			9	A
12. Street D / Street S	Roundabout	A.M.	Does Not Exist		6	A
		P.M.			7	A
13. Street E / Street C[4]	Side-Street Stop	A.M.	Does Not Exist		10 (6)	B (A)
		P.M.			35 (11)	D (B)
14. Street C / Street A	Traffic Signal	A.M.	Does Not Exist		14	B
		P.M.			33	C
15. Street D / Street A	Traffic Signal	A.M.	Does Not Exist		54	D
		P.M.			<u>76</u>	<u>E</u>
16. Street I / Street A[4]	Side-Street Stop	A.M.	Does Not Exist		23 (0)	C (A)
		P.M.			<u>153</u> (1)	<u>F</u> (A)
17. Street L / Street A	Traffic Signal	A.M.	Does Not Exist		10	A
		P.M.			15	B
18. Street B / Street E	All-Way Stop	A.M.	Does Not Exist		10	B
		P.M.			18	C
19. Street C / Street B	Traffic Signal	A.M.	Does Not Exist		18	B
		P.M.			20	C

Table 19
Peak Hour Intersection Operations – Existing Plus Project Conditions (2015)

Intersection	Traffic Control	Peak Hour	Existing Conditions		Existing Plus Project	
			Delay[2]	*LOS*[3]	*Delay*[2]	*LOS*[3]
20. I-5 Southbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		15	B
		P.M.			27	C
21. I-5 Northbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		13	B
		P.M.			20	B
22. Street D / Street B	Traffic Signal	A.M.	Does Not Exist		16	B
		P.M.			19	B
23. Street I / Street B[4]	Side-Street Stop	A.M.	Does Not Exist		11 (1)	B (A)
		P.M.			13 (1)	B (A)
24. Street J / Street B	Traffic Signal	A.M.	Does Not Exist		8	A
		P.M.			10	A
25. Street K / Street B	Roundabout	A.M.	Does Not Exist		6	A
		P.M.			7	A
26. Street K / Street M	Roundabout	A.M.	Does Not Exist		4	A
		P.M.			4	A
27. Street C / Street Q	Roundabout	A.M.	Does Not Exist		4	A
		P.M.			4	A
28. Street D /Edmonston Pumping Plant Road	All-Way Stop	A.M.	Does Not Exist		8	A
		P.M.			8	A
29. Street J /Edmonston Pumping Plant Road[4]	Side-Street Stop	A.M.	Does Not Exist		12 (2)	B (A)
		P.M.			14 (5)	B (A)
30. Street K /Edmonston Pumping Plant Road[4]	Side-Street Stop	A.M.	Does Not Exist		11 (1)	B (A)
		P.M.			12 (1)	B (A)
31. Street C / Street G	Traffic Signal	A.M.	Does Not Exist		13	B
		P.M.			19	B

Table 19
Peak Hour Intersection Operations – Existing Plus Project Conditions (2015)

Intersection	Traffic Control	Peak Hour	Existing Conditions		Existing Plus Project	
			Delay[2]	*LOS*[3]	*Delay*[2]	*LOS*[3]
32. Street C / Street H	Traffic Signal	A.M.	Does Not Exist		10	B
		P.M.			11	B

Notes: [1]Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.
[2]The overall average intersection control delay is reported in seconds per vehicle at signalized, all-way stop, and roundabout controlled intersections.
[3]Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).
[4]The shared movement with the greatest delay is reported in seconds per vehicle at side-street stop controlled intersections. The overall intersection delay and LOS are provided for informational purposes only.
BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.
UNDERLINED text indicates a potentially significant impact based on the significance criteria.

As shown in Table 19, all existing intersections would operate acceptably at LOS C or better under existing plus project conditions. All of the new intersections that would be constructed within the Grapevine project would operate at applicable performance levels except Street A/Street D (#15) and Street A / Street I (#16) during the a.m. and/or p.m. peak hour. As discussed in Section 4.4, the project is designed as a multimodal development subject to performance criteria other than LOS standards in accordance with the smart growth provisions of the Kern County General Plan. Certain intersections within the project may operate at lower LOS levels to encourage non-automotive movements, including walking, biking and transit use.

The ramp terminal intersections (#3 and #4) at the I-5/Wheeler Ridge Road interchange would operate at LOS B or better. The ramp terminal intersections (#20 and #21) at the relocated I-5 / Grapevine interchange would operate acceptably at LOS C or better with the lane configurations in Figure 6.

Figure 23A

Peak Hour Traffic Volumes and Lane Configurations Existing Plus Project Conditions (2015)

INTENTIONALLY LEFT BLANK

Roadway Segment Capacity Evaluation Under Existing Plus Project Conditions

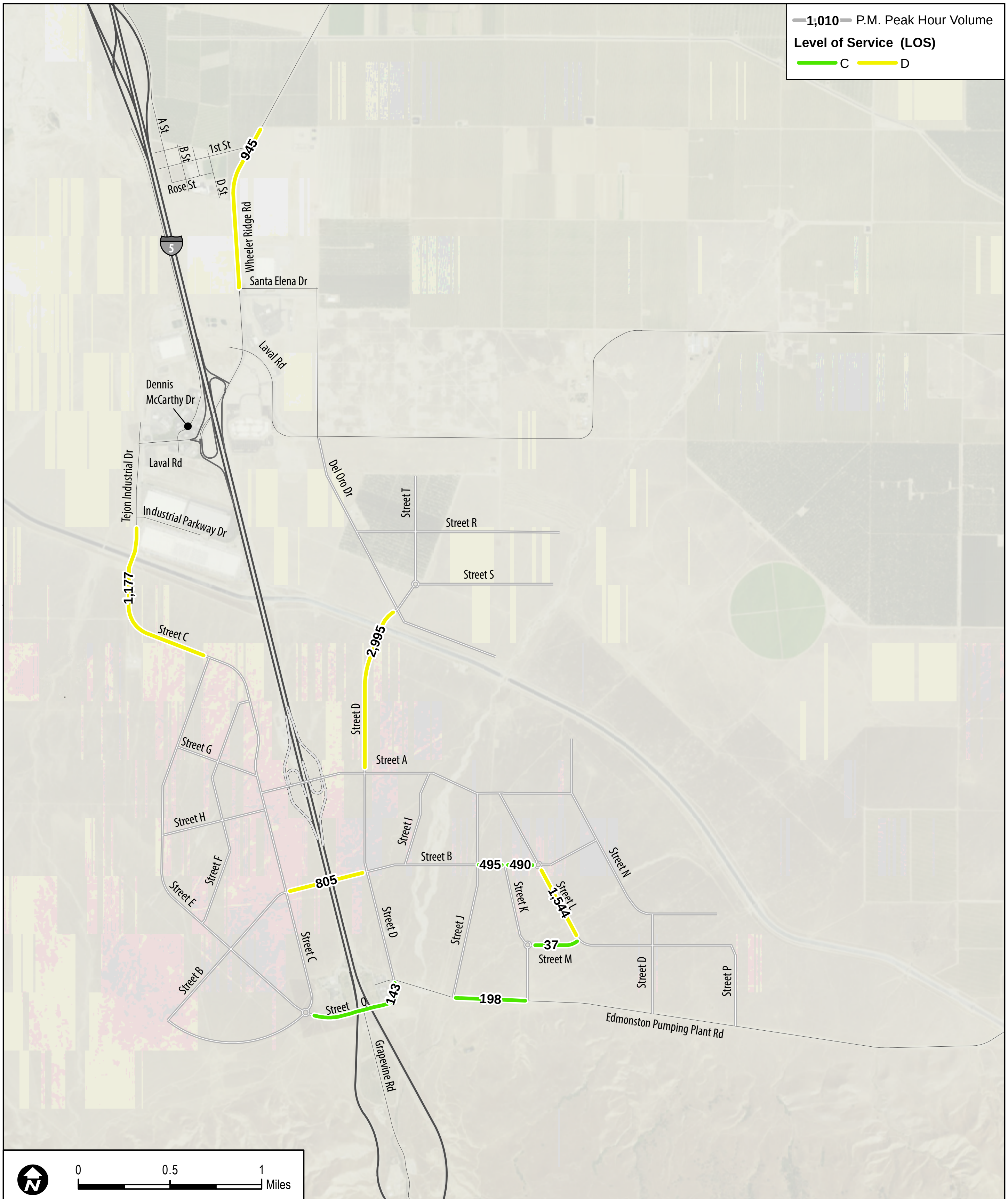
Table 20 summarizes the p.m. peak hour volumes on project area roadway segments under existing plus project conditions using the methodology discussed in Section 1.6. Figure 24 presents the p.m. peak hour volumes and estimated LOS on study roadway segments under existing plus project conditions. Table 20 shows that all roadway segments would have sufficient capacity to meet demand and would operate at acceptable LOS levels under existing plus project conditions.

Table 20
P.M. Peak Hour Roadway Capacity Evaluation – Existing Plus Project Conditions (2015)

Roadway Segment	Classification	Existing Conditions			Existing Plus Project		
		P.M. Peak Hour Volume	*V/C[1]*	*LOS[2]*	*P.M. Peak Hour Volume*	*V/C[1]*	*LOS[2]*
1. Wheeler Ridge Rd: North of Santa Elena Dr.	2-lane Class I Highway	221	0.08	B	950	0.35	D
2. Street C: Aqueduct Crossing to Street E	2-lane Arterial Street	Does Not Exist			1,180	0.66	D
3. Street D: Del Oro Dr. to Street A	4-lane Arterial Street	Does Not Exist			3,000	0.88	D
4. Street B: Street C to Street D	2-lane Arterial Street	Does Not Exist			810	0.45	C
5. Street Q: Street C to Edmonston Pumping Plant Rd.	2-lane Arterial Street	Does Not Exist			150	0.08	C
6. Street B: Street J to Street K	2-lane Arterial Street	Does Not Exist			500	0.28	C
7. Street B: Street K to Street L	2-lane Arterial Street	Does Not Exist			500	0.28	C
8. Street L: Street B to Street M	2-lane Arterial Street	Does Not Exist			1,550	0.87	D
9. Street M: Street K to Street L	2-lane Collector Street	Does Not Exist			40	0.02	C
10. Edmonston Pumping Plant Rd.: Street J to Street K	2-lane Collector Street	Not Analyzed			200	0.11	C
11. Dennis McCarthy Rd. : North of Laval Rd	2-lane Collector Street	592	.36	D	765	.43	D

Notes: [1]V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.
[2]Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table 3.
Source: Fehr & Peers, 2015.

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

Figure 24
P.M. Peak Hour Roadway Volumes & LOS
Existing Plus Project Conditions (2015)

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

4.2.2 Freeway Operations Under Existing Plus Project Conditions

Table 21 summarizes the a.m. and p.m. peak hour LOS levels on the freeway segments in the vicinity of the project area under existing plus project conditions using the methodology described in Section 1.6 (see also Appendix G). Figure 25 presents the p.m. peak hour volumes on the freeway segments and ramps under existing plus project conditions. Table 21 shows that all of freeway segments and ramps, including the Grapevine Grade, would operate at LOS C or better under existing plus project conditions.

Table 21
Peak Hour Freeway Operations – Existing Plus Project Conditions (2015)

Segment	Segment Type	Peak Hour	Existing Conditions		Existing Plus Project	
			Density[1]	*LOS[2]*	*Density[1]*	*LOS[2]*
I-5 Northbound						
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	9	A	13	B
		P.M.	13	B	18	C
2. Base of Grapevine Grade to Relocated Grapevine Interchange[3]	Basic	A.M.	Exists as Grapevine to Laval Road (see below)		10	A
		P.M.			14	B
3. Grapevine Off-Ramp	Diverge	A.M.	10	B	14	B
		P.M.	13	B	20	B
4. Grapevine Loop On-Ramp[3]	Merge	A.M.	Does Not Exist		14	B
		P.M.			15	B
5. Grapevine Slip On-Ramp	Merge	A.M.	9	A	19	B
		P.M.	11	B	19	B
6. Grapevine to Laval Road	Basic	A.M.	7	A	13	B
		P.M.	9	A	14	B
7. Laval Road East Off-Ramp	Diverge	A.M.	11	B	19	B
		P.M.	14	B	19	B
8. Laval Road West Off-Ramp	Diverge	A.M.	9	A	15	B
		P.M.	12	B	16	B
9. Laval Road On-Ramp	Merge	A.M.	9	A	18	B
		P.M.	13	B	21	C
10. Laval Road to SR-99	Basic	A.M.	7	A	14	B
		P.M.	9	A	16	B

Table 21
Peak Hour Freeway Operations – Existing Plus Project Conditions (2015)

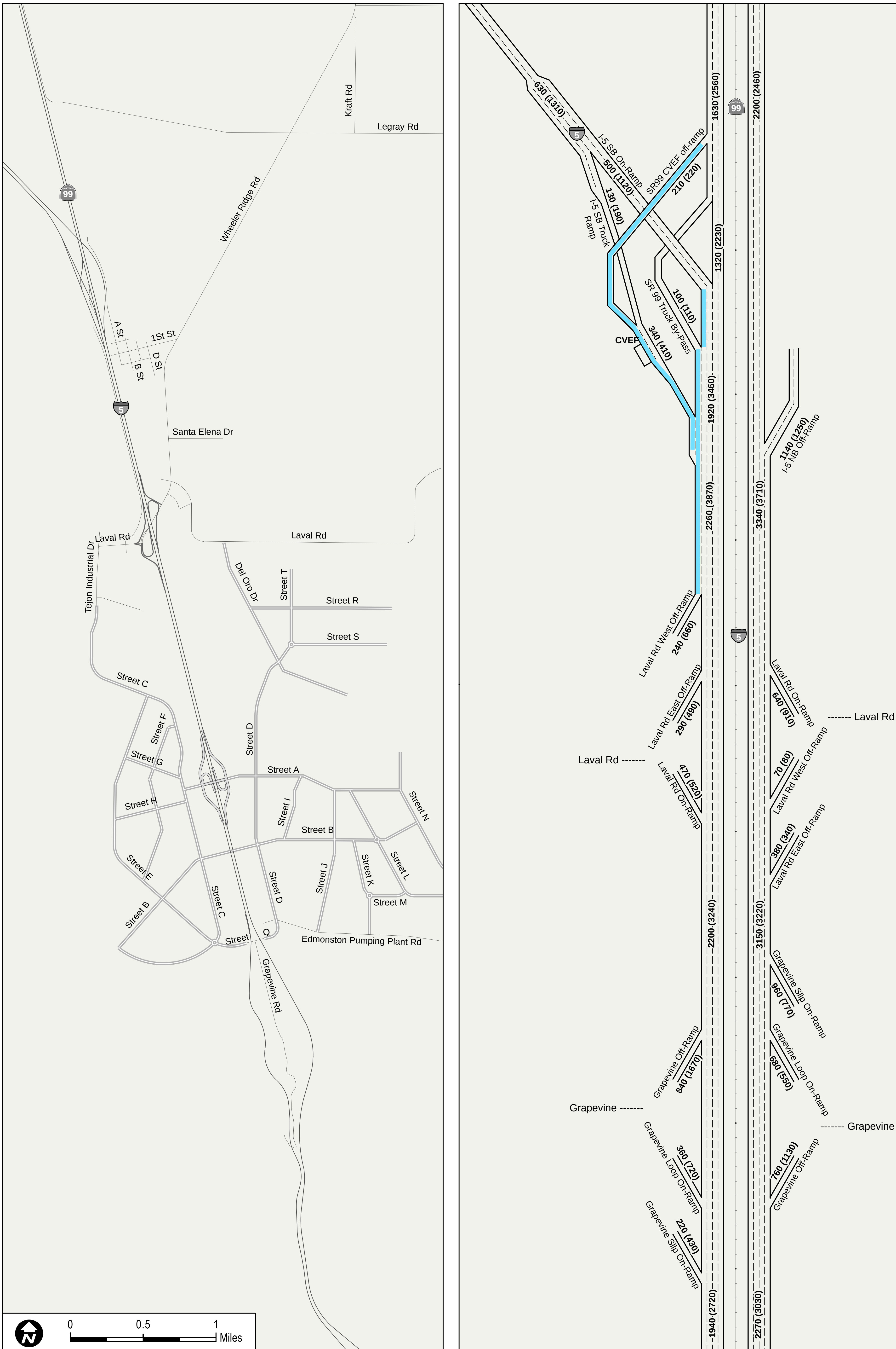
Segment	Segment Type	Peak Hour	Existing Conditions		Existing Plus Project	
			Density[1]	*LOS[2]*	*Density[1]*	*LOS[2]*
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	7	A	14	B
		P.M.	9	A	16	B
12. North of SR 99 Junction	Basic	A.M.	5	A	10	A
		P.M.	8	A	11	A
SR 99 Northbound						
13. North of I-5 Junction	Basic	A.M.	6	A	12	B
		P.M.	7	A	13	B
SR 99 Southbound						
1. North of I-5 Junction	Basic	A.M.	6	A	10	A
		P.M.	7	A	15	B
2. CVEF Off-Ramp[3]	Diverge	A.M.	Does Not Exist		15	B
		P.M.			21	C
3. Truck Bypass Off-Ramp	Basic (Major Diverge)	A.M.	6	A	8	A
		P.M.	7	A	13	B
4. SR 99 Auto Lanes to I-5 Southbound	Basic (2 Lanes)	A.M.	7	A	11	B
		P.M.	7	A	19	C
I-5 Southbound						
5. North of SR 99 Junction	Basic	A.M.	5	A	6	A
		P.M.	9	A	11	B
6. CVEF Off-Ramp[3]	Basic (Major Diverge)	A.M.	Does Not Exist		3	A
		P.M.			6	A
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction[3]	Basic (2 lanes)	A.M.	Does Not Exist		4	A
		P.M.			9	A
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	6	A	8	A
		P.M.	9	A	14	B
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	6	A	7	A
		P.M.	8	A	12	B

Table 21
Peak Hour Freeway Operations – Existing Plus Project Conditions (2015)

Segment	Segment Type	Peak Hour	Existing Conditions		Existing Plus Project	
			Density[1]	*LOS[2]*	*Density[1]*	*LOS[2]*
10. I-5/SR 99 CVEF On-Ramp[3]	Merge	A.M.	Does Not Exist		8	A
		P.M.			13	B
11. SR 99 to Laval Road	Basic	A.M.	7	A	8	A
		P.M.	9	A	14	B
12. Laval Road West Off-Ramp	Diverge	A.M.	12	B	8	A
		P.M.	14	B	14	B
13. Laval Road East Off-Ramp	Diverge	A.M.	10	A	14	B
		P.M.	10	B	20	B
14. Laval Road On-Ramp	Merge	A.M.	9	A	13	B
		P.M.	10	B	16	B
15. Laval Road to Grapevine[4]	Basic	A.M.	7	A	10	A
		P.M.	8	A	14	B
16. Grapevine Off-Ramp	Diverge	A.M.	10	A	15	B
		P.M.	11	B	23	C
17. Grapevine Loop On-Ramp	Merge	A.M.	9	A	11	B
		P.M.	7	A	15	B
18. Grapevine Slip On-Ramp[3]	Merge	A.M.	Does Not Exist		11	B
		P.M.			15	B
19. Relocated Grapevine Interchange to Base of Grapevine Grade	Basic	A.M.	Exists as Laval Road to Grapevine (See Above)		9	A
		P.M.			12	B
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	12	B	16	B
		P.M.	14	B	20	C

Notes: [1]Density is reported in passenger car equivalents per mile per lane (pcpmpl).
[2]Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).
[3]These segments are re-configured under existing plus project conditions to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.
[4]This table reports the "existing conditions" results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.
Source: Fehr & Peers, 2015.

INTENTIONALLY LEFT BLANK



AM (PM) AM and PM Traffic Volume

Relocated CVEF

Figure 25

Peak Hour Traffic Volumes Freeway and Ramp Configurations
Existing Plus Project Conditions (2015)

GRAPEVINE PROJECT

SOURCES: USGS, ESRI

INTENTIONALLY LEFT BLANK

4.2.3 Freeway Off-Ramp Queuing Under Existing Plus Project Conditions

Off-ramp queuing under existing plus project conditions was evaluated for the project area transportation facilities shown in Figure 6. Table 22 summarizes off-ramp queuing space and ramp terminal traffic controls in project area at buildout.

Table 22
Freeway Off-Ramp Queuing Space and Ramp Terminal Controls – Existing Plus Project Conditions (2015)

Freeway Off-Ramp	Off-Ramp Length[1]	Traffic Control at Ramp Terminal	Nearest Downstream Controlled Intersection[2]		Total Queuing Space[4]
			Intersection	*Distance[3]*	
I-5 Northbound					
Grapevine off-ramp	2,300 ft.	Traffic Signal	N/A	N/A	2,300 ft.
Laval Road east off-ramp	1,500 ft.	Free	5. S. Wheeler Ridge Road / Laval Road	1,300 ft.	2,800 ft.
Laval Road west off-ramp	1,600 ft.	Free	2. Dennis McCarthy Drive / Laval Road	500 ft.	2,100 ft.
I-5 Southbound					
Laval Road west off-ramp	1,300 ft.	Free	2. Dennis McCarthy Drive / Laval Road	2,100 ft.	3,400 ft.
Laval Road east off-ramp	1,700 ft.	Traffic Signal	N/A	N/A	1,700 ft.
Grapevine off-ramp	2,300 ft.	Traffic Signal	N/A	N/A	2,300 ft.

Notes: [1]Approximate off-ramp lengths measured from the stop bar at the ramp terminal intersection or end of ramp to gore point at mainline diverge. Measured in feet.
[2]For off-ramps that operate freely at the ramp terminal, the nearest downstream intersection controlled by a traffic signal, stop sign, or yield sign that could potentially generate queues building back to the off-ramp. If none exists, listed as "None."
[3]Approximate distance from the off-ramp terminal to the downstream intersection measured in feet. N/A if not applicable.
[4]Total queuing space = Off-ramp length + Distance to Nearest Downstream Controlled Intersection (if applicable). N/A if not applicable.
Source: Fehr & Peers, 2015.

Table 23 presents the results of the a.m. and p.m. peak hour queuing analysis at each off-ramp study intersection using the methodology described in Section 1.6 (see also Appendix F). Based on these results, the proposed project would not cause the 95th percentile queues to extend back onto the freeway and create safety issues at any off-ramp.

Table 23
Peak Hour Off-Ramp Queuing – Existing Plus Project Conditions (2015)

Freeway Ramp	Traffic Control at Ramp Terminal	Available Storage[1]	Peak Hour	95th Percentile Queue[2]	
				Existing Conditions	*Existing Plus Project*
I-5 Northbound					
Grapevine off-ramp[3]	Traffic Signal	2,300 ft.	A.M.	N/A	225 ft.
			P.M.	N/A	450 ft.
Laval Road east off-ramp	Free	2,800 ft.	A.M.	50 ft.	100 ft.
			P.M.	50 ft.	75 ft.
Laval Road west off-ramp	Free	2,100 ft.	A.M.	50 ft.	75 ft.
			P.M.	75 ft.	175 ft.
I-5 Southbound					
Laval Road west off-ramp	Free	3,400 ft.	A.M.	50 ft.	75 ft.
			P.M.	75 ft.	175 ft.
Laval Road east off-ramp	Traffic Signal	1,700 ft.	A.M.	25 ft.	75 ft.
			P.M.	25 ft.	125 ft.
Grapevine off-ramp[3]	Traffic Signal	2,300 ft.	A.M.	N/A	225 ft.
			P.M.	N/A	375 ft.

Notes: [1]Available storage based on total available queue space shown in Table 22. Based on a combination of off-ramp length and distance to nearest downstream controlled intersection for free-flow off-ramps.
[2]95th percentile vehicle queue results are based on output from the Synchro traffic operations model; taken from controlling intersection (i.e., ramp terminal intersection with signal; or nearest downstream controlled intersection when ramp terminal operates free).
[3]N/A = not applicable. The traffic using the existing Grapevine off-ramps never reach a controlled intersection. Therefore, no queues exist at the existing Grapevine off-ramps.
Source: Fehr & Peers, 2015.

4.3 Cumulative Transportation Conditions

This section describes the transportation conditions that would occur under cumulative without project and cumulative plus project conditions. As discussed in Section 1.4, reasonably foreseeable transportation system and regional development without and with the project are included in the cumulative analysis and listed in Appendix H. The cumulative without project scenario includes the Kern COG traffic projections for 2040, plus the full buildout of TRCC, and excludes future development in the Kern COG model within 7 TAZs that overlap with portions of the Grapevine project and adjacent land. Consistent with Kern County direction regarding reasonably foreseeable projects for the CEQA analysis of Grapevine, the development for these TAZs is included in the Grapevine project's full buildout projections in the cumulative plus project conditions scenario. The project buildout transportation facilities used in the analysis, including the preferred location for the expanded and relocated I-5 interchange and relocated CVEF, are shown in Figure V1. The cumulative conditions analysis for Variant 2 would be substantially the same except for potential impacts to roadways in the immediate vicinity of the project related to the more southerly location of the expanded and relocated interchange, which would connect with planned Street B instead of planned Street A in the project, and the retention of the CVEF in its existing location.

An analysis was also conducted of transportation conditions under interim conditions assuming cumulative growth up to the point that the existing Grapevine Road (with Caltrans-approved operational enhancements are completed) and Laval Road I-5 interchange that could provide project access prior to construction would operate below LOS D. The transportation facilities used in the interim analysis are shown in Figure IB.

Potential impacts based on the results of the cumulative conditions analysis are evaluated in Section 4.4 below.

4.3.1 Roadway Operations under Cumulative Conditions

Intersection Operations under Cumulative Conditions

Table 24 presents the anticipated a.m. and p.m. peak hour delay and LOS at the study intersections under cumulative no project and cumulative plus project conditions (see also Appendix I). Figure 26 presents the a.m. and p.m. peak hour turning movement forecasts and lane configurations at the study intersections under cumulative plus project conditions.

Table 24
Peak Hour Intersection Operations – Cumulative Conditions (2040)

Intersection	Traffic Control	Peak Hour	Existing		Existing + Project		Cumulative No Project		Cumulative + Project	
			Delay[2]	*LOS[3]*	*Delay[2]*	*LOS[3]*	*Delay[2]*	*LOS[3]*	*Delay[2]*	*LOS[3]*
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	13	B	16	B	16	B	17	B
		P.M.	17	B	18	B	16	B	18	B

Table 24
Peak Hour Intersection Operations – Cumulative Conditions (2040)

Intersection	Traffic Control	Peak Hour	Existing		Existing + Project		Cumulative No Project		Cumulative + Project	
			Delay[2]	*LOS*[3]	*Delay*[2]	*LOS*[3]	*Delay*[2]	*LOS*[3]	*Delay*[2]	*LOS*[3]
2. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	9	A	11	B	14	B	16	B
		P.M.	12	B	15	B	20	C	26	C
3. S. Wheeler Ridge Road / I-5 Northbound Ramps[1]	Traffic Signal	A.M.	3	A	3	A	3	A	3	A
		P.M.	3	A	3	A	4	A	4	A
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	13	B	18	B	20	C	18	B
		P.M.	10	B	26	C	45	D	33	C
5. Street C / Street A	Traffic Signal	A.M.	Does Not Exist		14	B	Does Not Exist		14	B
		P.M.			33	C			32	C
6. I-5 Southbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		15	B	Does Not Exist		14	B
		P.M.			27	C			27	C
7. I-5 Northbound Ramps / Street A	Traffic Signal	A.M.	Does Not Exist		13	B	Does Not Exist		12	B
		P.M.			20	B			20	B
8. Street D / Street A	Traffic Signal	A.M.	Does Not Exist		54	D	Does Not Exist		48	D
		P.M.			<u>76</u>	<u>E</u>			<u>109</u>	<u>F</u>
9. Street C / Street G	Traffic Signal	A.M.	Does Not Exist		13	B	Does Not Exist		14	B
		P.M.			19	B			17	B
10. Street C / Street H	Traffic Signal	A.M.	Does Not Exist		10	B	Does Not Exist		10	B
		P.M.			11	B			11	B

Notes: [1]Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.
[2]The overall average intersection control delay is reported in seconds per vehicle at signalized, all-way stop, and roundabout controlled intersections.
[3]Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).
BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.
<u>UNDERLINED</u> text indicates a potentially significant impact based on the significance criteria.
Source: Fehr & Peers, 2016.

As shown in Table 24, all intersections in the project area would operate at LOS C or better under cumulative plus project conditions except the Street A / Street D (#8) intersection. Under Variant 2, the Street A / Street D (#8) intersection would be expected to operate at LOS D or better, and the Street B / Street D intersection that would connect with the expanded and relocated interchange would be expected to operate below LOS D (see Figure 7). As discussed in Section 4.4, the project is designed as a multimodal development subject to performance criteria other than LOS standards in accordance with the smart growth provisions of the Kern County General Plan. Certain intersections within the project may operate at lower LOS levels to encourage non-automotive movements, including walking, biking and transit use.

The ramp terminal intersections (#2 and #3) at the I-5 / Laval Road interchange would operate at LOS C or better. The ramp terminal intersections (#6 and #7) at the relocated I-5 / Grapevine interchange would operate acceptably at LOS C or better with the lane configurations shown in Figure 6. The ramp terminal intersections at the relocated I-5 / Grapevine interchange in Variant 2 would also be expected to operate acceptably at LOS C or better with the lane configurations shown in Figure 7.

INTENTIONALLY LEFT BLANK

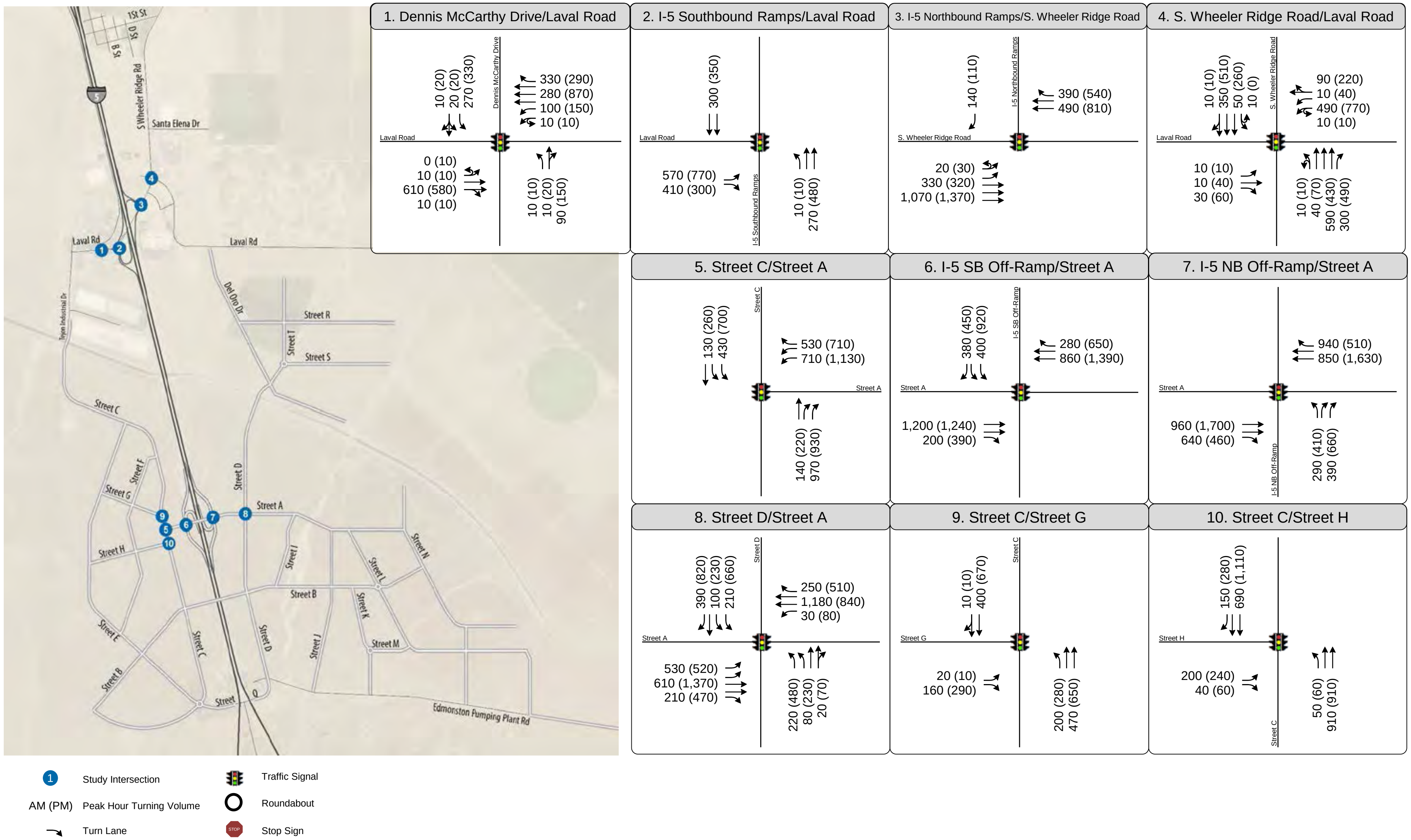


Figure 26

Peak Hour Traffic Volume and Lane Configurations – Cumulative Conditions (2040)

INTENTIONALLY LEFT BLANK

Roadway Segment Capacity Evaluation Under Cumulative Conditions

Table 25 summarizes the p.m. peak hour volumes on project area roadway segments under cumulative plus project conditions. Table 25 shows that all study roadway segments would have sufficient capacity to serve cumulative plus project traffic volumes at LOS D levels except Street A between Street D and Street I (#28). Under Variant 2, this level of traffic volume would be expected to occur at Street B between Street D and Street I. As discussed in Section 4.4, the project is designed as a multimodal development subject to performance criteria other than LOS standards in accordance with the smart growth provisions of the Kern County General Plan. Certain intersections within the project may operate at lower LOS levels to encourage non-automotive movements, including walking, biking and transit use.

Table 25
P.M. Peak Hour Roadway Capacity Evaluation – Cumulative Conditions (2040)

Roadway Segment	Classification	Cumulative Conditions (2040)		
		P.M. Peak Hour Volume	*V/C*[1]	*LOS*[2]
1. Wheeler Ridge Rd.: North of Santa Elena Dr.	2-lane Class I Highway	880	0.32	D
2. Wheeler Ridge Rd.: Santa Elena Dr. to Laval Rd.	4-lane Arterial Street	1,440	0.42	C
3. Laval Rd.: Wheeler Ridge Rd to Bob Stine Dr.	6-lane Collector Street	1,840	0.38	C
4. Laval Rd.: Bob Stine Dr. to Del Oro Dr.	4-lane Arterial Street	1,450	0.43	C
5. Del Oro Dr.: Laval Rd. to Street R	4-lane Arterial Street	2,610	0.77	D
6. Del Oro Dr.: Street R to Street D	4-lane Arterial Street	2,690	0.79	D
7. Street R: Del Oro Dr. to Street T	2-lane Arterial Street	970	0.54	D
8. Street T: Street R to Street S	2-lane Arterial Street	430	0.24	C
9. Street D: Del Oro Dr. to Street T	2-lane Arterial Street	550	0.31	C
10. Laval Rd.: Dennis McCarthy Dr. to Tejon Industrial Dr.	4-lane Arterial Street	1,450	0.43	C
11. Tejon Industrial Dr.: Laval Rd. to Industrial Pkwy Dr.	4-lane Arterial Street	1,200	0.35	C
12. Street C: Industrial Parkway Dr. to Street E	2-lane Arterial Street	1,430	0.80	D
13. Street C: Street E to Street G	4-lane Arterial Street	1,340	0.39	C
14. Street C: South of Street H	4-lane Arterial Street	2,550	0.75	D
15. Street C: North of Street B	4-lane Arterial Street	1,440	0.42	C
16. Street C: South of Street B	4-lane Arterial Street	860	0.25	C
17. Street C: North of Street Q	2-lane Arterial Street	430	0.24	C
18. Street B: Street C to Street E	2-lane Collector Street	980	0.55	D
19. Street E: Street B to Street C	2-lane Collector Street	410	0.23	C

Table 25
P.M. Peak Hour Roadway Capacity Evaluation – Cumulative Conditions (2040)

Roadway Segment	Classification	Cumulative Conditions (2040)		
		P.M. Peak Hour Volume	*V/C*[1]	*LOS*[2]
20. Street D: South of Del Oro Dr.	4-lane Arterial Street	3,130	0.92	D
21. Street D: North of Street A	4-lane Arterial Street	2,990	0.88	D
22. Street D: South of Street A	4-lane Arterial Street	1,570	0.46	C
23. Street D: North of Street B	4-lane Arterial Street	920	0.27	C
24. Street D: South of Street B	4-lane Arterial Street	450	0.13	C
25. Street D: North of Edmonston Pumping Plant Rd.	4-lane Arterial Street	220	0.06	C
26. Street Q: Street C to Edmonston Pumping Plant Rd.	2-lane Arterial Street	140	0.08	C
27. Street B: Street C to Street D	2-lane Arterial Street	790	0.44	C
28. Street A: Street D to Street I	4-lane Arterial Street	<u>3,550</u>	<u>1.04</u>	<u>F</u>
29. Street A: Street I to Street J	4-lane Arterial Street	2,910	0.85	D
30. Street A: Street J to Street L	4-lane Arterial Street	1,850	0.54	C
31. Street A: Street L to Street N	2-lane Arterial Street	1,050	0.59	D
32. Street I: South of Street A	2-lane Collector Street	80	0.04	C
33. Street I: North of Street B	2-lane Collector Street	40	0.02	C
34. Street J: South of Street A	2-lane Collector Street	720	0.40	D
35. Street J: North of Street B	2-lane Collector Street	800	0.45	D
36. Street L: Street A to Street B	2-lane Arterial Street	900	0.50	C
37. Street B: Street D to Street I	2-lane Arterial Street	900	0.50	C
38. Street B: Street I to Street J	2-lane Arterial Street	720	0.40	C
39. Street B: Street J to Street K	2-lane Arterial Street	720	0.40	C
40. Street B: Street K to Street L	2-lane Arterial Street	500	0.28	C
41. Street B: Street L to Street N	2-lane Collector Street	250	0.14	C
42. Street J: South of Street B	2-lane Collector Street	660	0.37	D
43. Street J: North of Edmonston Pumping Plant Rd.	2-lane Collector Street	230	0.13	C
44. Street L: Street B to Street M	2-lane Collector Street	1,140	0.64	D

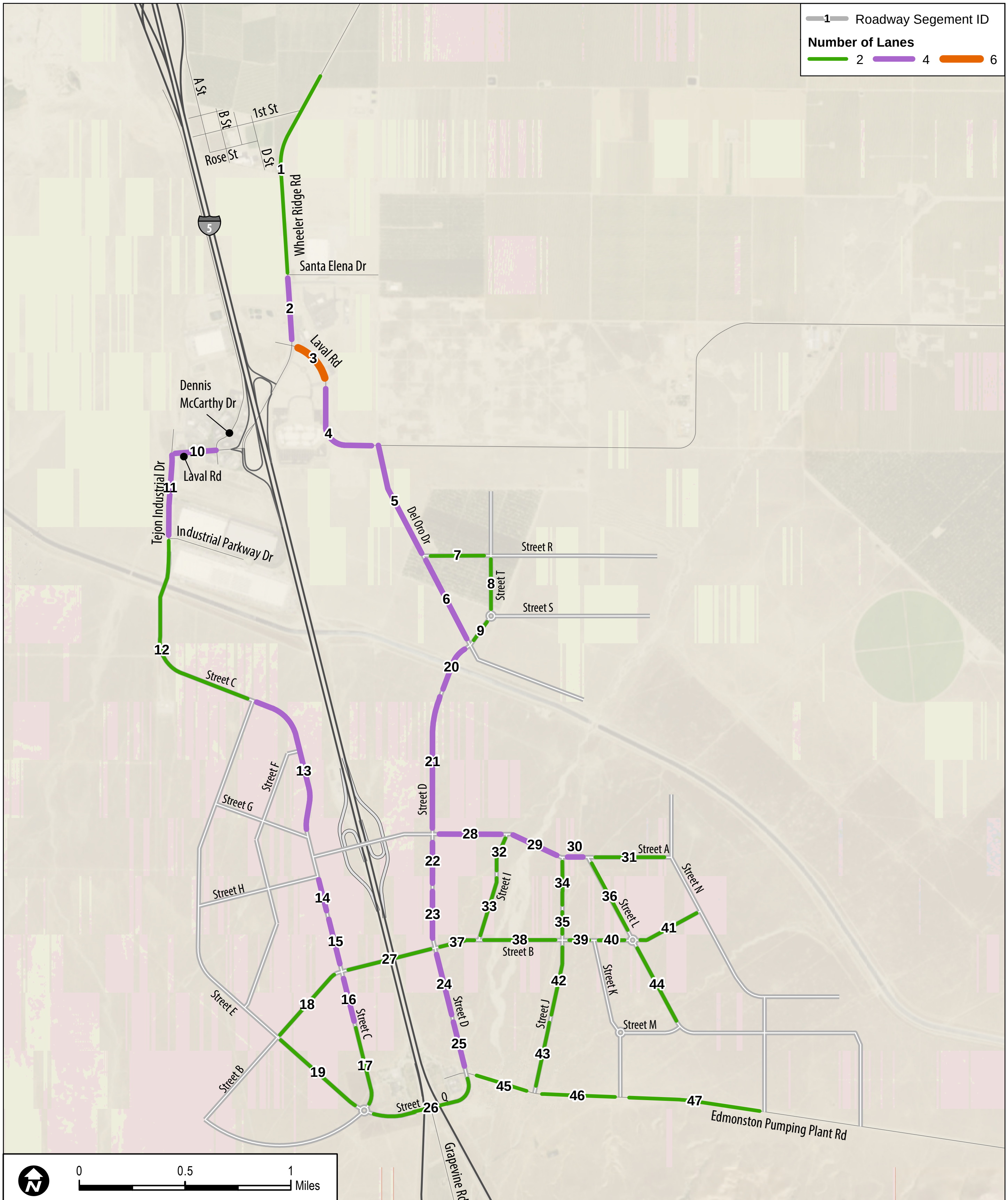
Table 25
P.M. Peak Hour Roadway Capacity Evaluation – Cumulative Conditions (2040)

Roadway Segment	Classification	Cumulative Conditions (2040)		
		P.M. Peak Hour Volume	*V/C[1]*	*LOS[2]*
45. Edmonston Pumping Plant Rd.: Street D to Street J	2-lane Collector Street	230	0.13	C
46. Edmonston Pumping Plant Rd.: Street J to Street K	2-lane Collector Street	430	0.24	C
47. Edmonston Pumping Plant Rd.: Street K to Street O	2-lane Collector Street	510	0.28	C

Notes: [1]V/C = volume-to-capacity ratio. Capacity = LOS E/F threshold, as presented in Table 3.
[2]Level of Service based on the volume thresholds from the 2010 Highway Capacity Manual as presented in Table 3.
BOLD text indicates the roadway operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.
UNDERLINED text indicates a potentially significant impact based on the significance criteria.
Source: Fehr & Peers, 2015.

Figure 27 presents the number of lanes on the study roadway segments under cumulative conditions. Figure 28 presents the p.m. peak hour volumes and estimated LOS on study roadway segments under cumulative conditions.

INTENTIONALLY LEFT BLANK

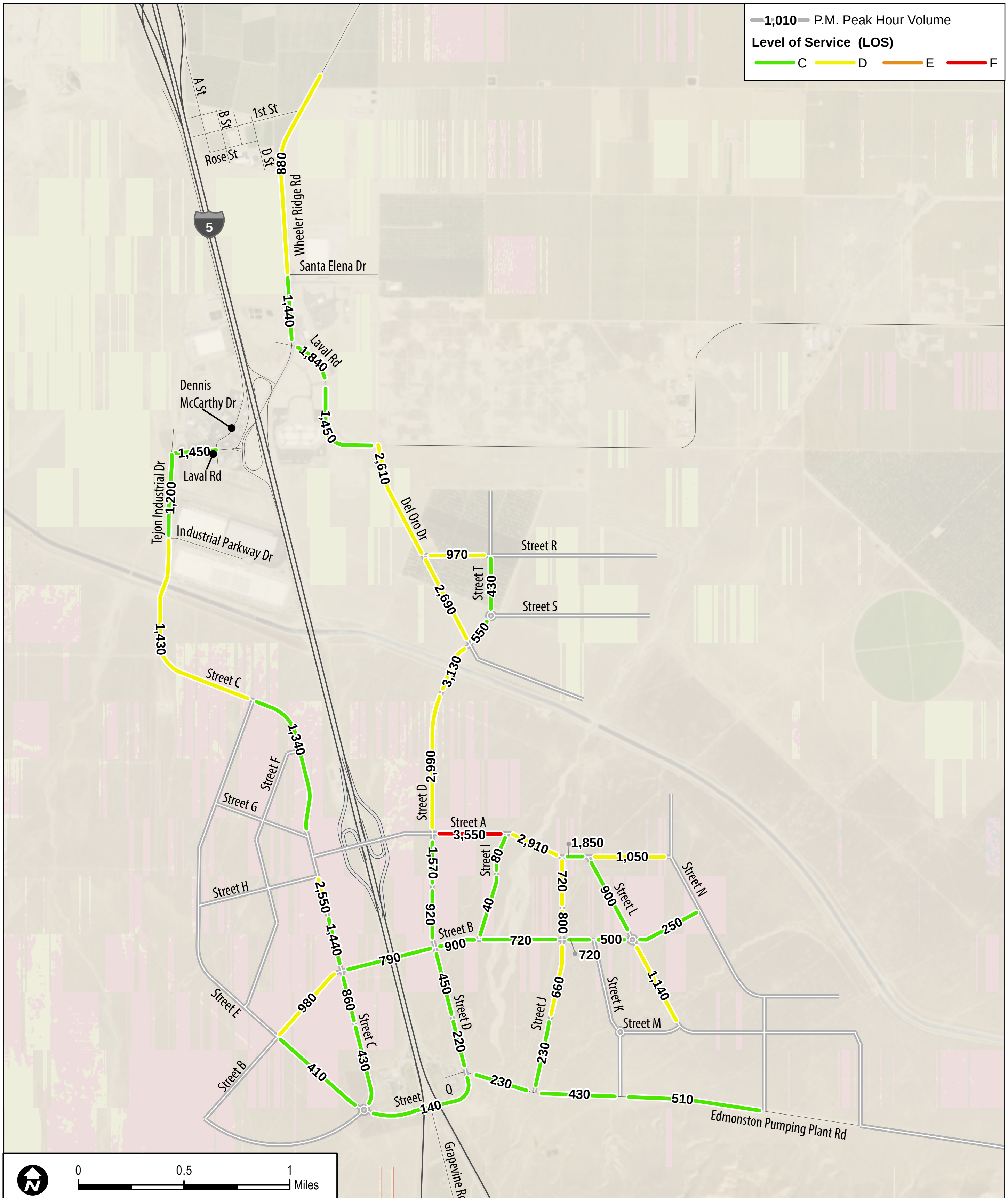


SOURCES: USGS, ESRI

Figure 27
Study Roadway Segments - Number of Lanes - Cumulative Conditions (2040)

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK



SOURCES: USGS, ESRI

Figure 28
P.M. Peak Hour Roadway Volumes & LOS – Cumulative Conditions (2040)

INTENTIONALLY LEFT BLANK

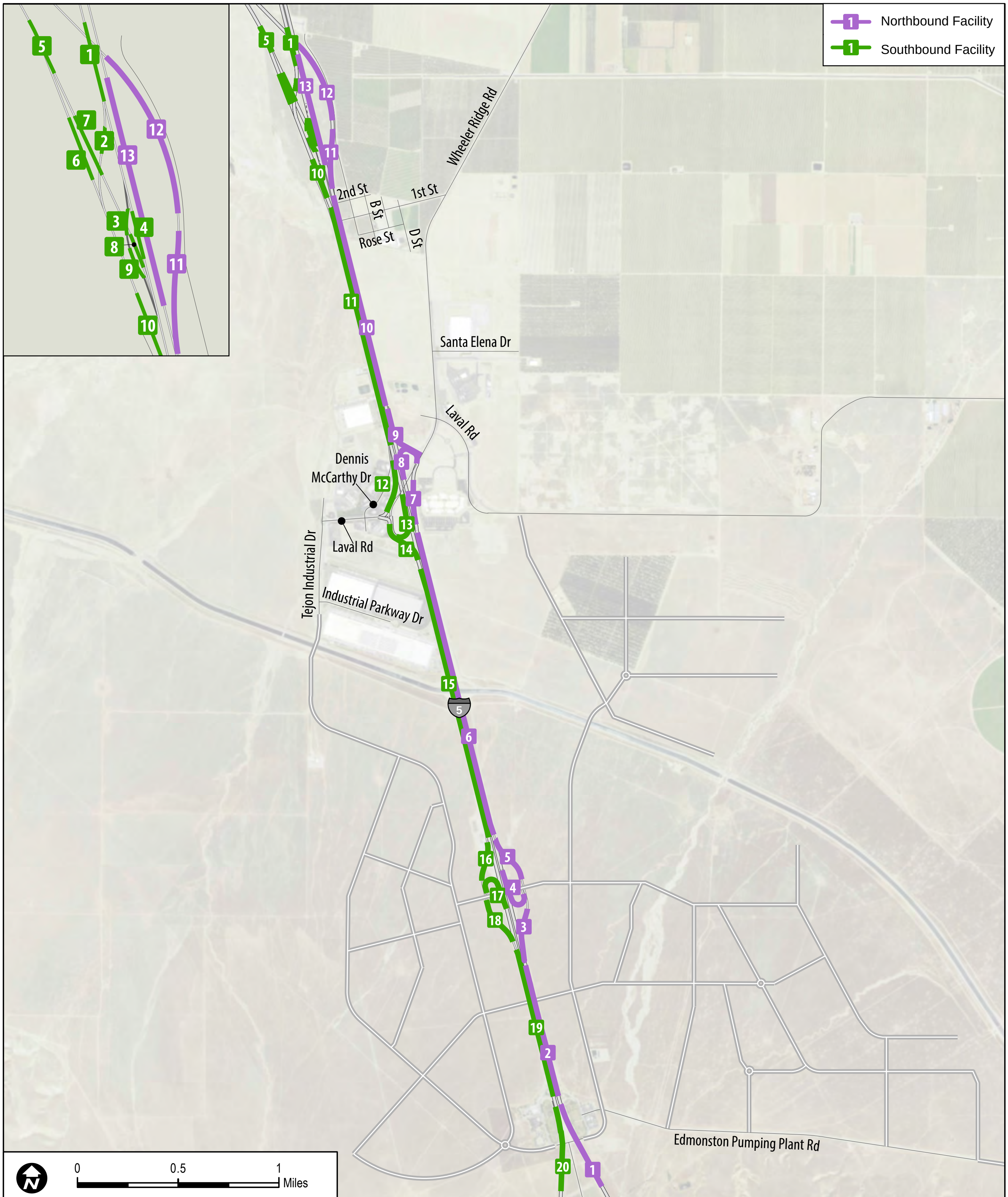
4.3.2 Freeway Operations under Cumulative Conditions

As discussed in Section 1.6, freeway operations under cumulative conditions within the vicinity of the project, including the Grapevine Grade to the south and up to the junction of SR 99 with I-5 to the north were evaluated by using the HCM methodology. The locations of these freeway segments are shown on Figure 29. Freeway operations further south along I-5 in Los Angeles County and further north to Bakersfield along SR-99 were evaluated by using volume to capacity ratios based on Kern COG 2040 projections for segments in Kern County and SCAG 2035 projections for segments in Los Angeles County. The locations of the freeway segments analyzed north of the project area to Bakersfield are shown in Figure 16. The locations of the freeway segments analyzed south of the project area in Los Angeles County are shown in Figure 17.

Project Area Freeway Segment Operations Under Cumulative Conditions

Table 26 summarizes the a.m. and p.m. peak hour LOS on the project area freeway segments under cumulative without and cumulative with project conditions (see Appendix J). Table 26 shows that all project area freeway segments would operate LOS D or better under cumulative plus project conditions except I-5 northbound and southbound during the p.m. peak hour on the Grapevine Grade. Figure 30 presents the a.m. and p.m. peak hour freeway volumes and lane configurations at the study freeway segments under cumulative conditions.

INTENTIONALLY LEFT BLANK



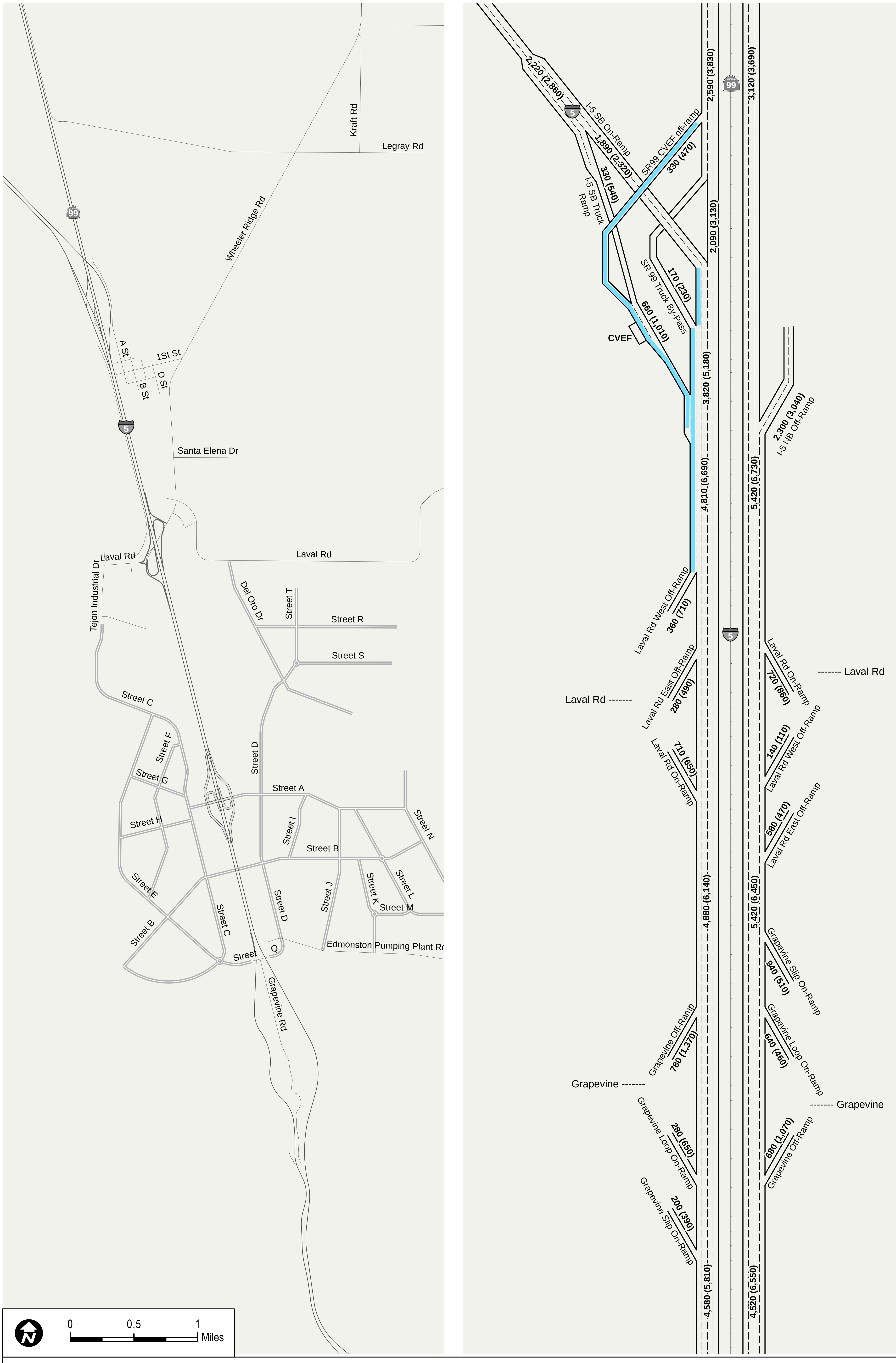
SOURCES: USGS, ESRI

Figure 29

Study Freeway Facilities - Cumulative Conditions (2040)

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK



AM (PM) AM and PM Traffic Volume

Relocated CVEF

Figure 30

Peak Hour Traffic Volumes Freeway & Ramp Configurations - Cumulative Conditions (2040)

GRAPEVINE PROJECT

SOURCES: USGS, ESRI

INTENTIONALLY LEFT BLANK

Table 26
Peak Hour Freeway Operations – Cumulative Conditions (2040)

Segment	Segment Type	Peak Hour	Existing (2015)		Existing + Project (2015)		Cumulative No Project (2040)		Cumulative (2040)	
			Density[1]	*LOS*[2]	*Density*[1]	*LOS*[2]	*Density*[1]	*LOS*[2]	*Density*[1]	*LOS*[2]
I-5 Northbound										
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	9	A	13	B	26	D	28	D
		P.M.	13	B	18	C	44	E	51	F
2. Base of Grapevine Grade to Relocated Grapevine Interchange[3]	Basic	A.M.	N/A		10	A	N/A		21	C
		P.M.			14	B			32	D
3. Grapevine Off-Ramp	Diverge	A.M.	10	B	14	B	23	C	24	C
		P.M.	13	B	20	B	31	D	35	D
4. Grapevine Loop On-Ramp[3]	Merge	A.M.	Does Not Exist		14	B	Does Not Exist		22	C
		P.M.			15	B			27	C
5. Grapevine Slip On-Ramp	Merge	A.M.	9	A	19	B	20	B	27	C
		P.M.	11	B	19	B	26	C	29	D
6. Grapevine to Laval Road	Basic	A.M.	7	A	13	B	18	C	23	C
		P.M.	9	A	14	B	28	C	30	D
7. Laval Road East Off-Ramp	Diverge	A.M.	11	B	19	B	27	C	30	D
		P.M.	14	B	19	B	36	E	34	D
8. Laval Road West Off-Ramp	Diverge	A.M.	9	A	15	B	19	B	25	C
		P.M.	12	B	16	B	27	C	30	D
9. Laval Road On-Ramp	Merge	A.M.	9	A	18	B	22	C	26	C
		P.M.	13	B	21	C	31	D	31	D
10. Laval Road to SR-99	Basic	A.M.	7	A	14	B	17	B	23	C
		P.M.	9	A	16	B	27	D	31	D
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	7	A	14	B	17	B	23	C
		P.M.	9	A	16	B	27	D	31	D
12. North of SR 99 Junction	Basic	A.M.	5	A	10	A	17	B	20	C
		P.M.	8	A	11	A	32	D	28	D

Table 26
Peak Hour Freeway Operations – Cumulative Conditions (2040)

Segment	Segment Type	Peak Hour	Existing (2015)		Existing + Project (2015)		Cumulative No Project (2040)		Cumulative (2040)	
			Density[1]	*LOS*[2]	*Density*[1]	*LOS*[2]	*Density*[1]	*LOS*[2]	*Density*[1]	*LOS*[2]
SR 99 Northbound										
13. North of I-5 Junction	Basic	A.M.	6	A	12	B	12	B	17	B
		P.M.	7	A	13	B	17	B	21	C
SR 99 Southbound										
1. North of I-5 Junction	Basic	A.M.	6	A	10	A	13	B	15	B
		P.M.	7	A	15	B	16	B	23	C
2. CVEF Off-Ramp[3]	Diverge	A.M.	Does Not Exist		15	B	Does Not Exist		22	C
		P.M.			21	C			29	D
3. Truck Bypass Off-Ramp[3]	Basic (Major Diverge)	A.M.	6	A	8	A	13	B	13	B
		P.M.	7	A	13	B	16	B	19	C
4. SR 99 Auto Lanes to I-5 Southbound[3]	Basic (2 Lanes)	A.M.	7	A	11	B	14	B	17	B
		P.M.	7	A	19	C	17	B	26	C
I-5 Southbound										
5. North of SR 99 Junction	Basic	A.M.	5	A	6	A	18	B	18	B
		P.M.	9	A	11	B	23	C	23	C
6. CVEF Off-Ramp[3]	Basic (Major Diverge)	A.M.	Does Not Exist		3	A	Does Not Exist		9	A
		P.M.			6	A			12	B
7. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction[3]	Basic (2 lanes)	A.M.	Does Not Exist		4	A	Does Not Exist		15	B
		P.M.			9	A			19	C
8. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	6	A	8	A	19	C	16	B
		P.M.	9	A	14	B	22	C	22	C
9. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	6	A	7	A	17	B	14	B
		P.M.	8	A	12	B	22	C	19	C
10. I-5/SR 99 CVEF On-Ramp[3]	Merge	A.M.	Does Not Exist		8	A	Does Not Exist		17	B
		P.M.			13	B			25	C

Table 26
Peak Hour Freeway Operations – Cumulative Conditions (2040)

Segment	Segment Type	Peak Hour	Existing (2015)		Existing + Project (2015)		Cumulative No Project (2040)		Cumulative (2040)	
			Density[1]	*LOS[2]*	*Density[1]*	*LOS[2]*	*Density[1]*	*LOS[2]*	*Density[1]*	*LOS[2]*
11. SR 99 to Laval Road	Basic	A.M.	7	A	8	A	19	C	17	B
		P.M.	9	A	14	B	24	C	24	C
12. Laval Road West Off-Ramp	Diverge	A.M.	12	B	8	A	24	C	16	B
		P.M.	14	B	14	B	30	D	22	C
13. Laval Road East Off-Ramp	Diverge	A.M.	10	A	14	B	20	C	24	C
		P.M.	10	B	20	B	24	C	32	D
14. Laval Road On-Ramp	Merge	A.M.	9	A	13	B	23	C	23	C
		P.M.	10	B	16	B	29	D	28	C
15. Laval Road to Grapevine[4]	Basic	A.M.	7	A	10	A	20	C	22	C
		P.M.	8	A	14	B	25	C	29	D
16. Grapevine Off-Ramp	Diverge	A.M.	10	A	15	B	22	C	26	C
		P.M.	11	B	23	C	27	C	34	D
17. Grapevine Loop On-Ramp	Merge	A.M.	9	A	11	B	16	B	20	B
		P.M.	7	A	15	B	21	C	26	C
18. Grapevine Slip On-Ramp[3]	Merge	A.M.	Does Not Exist		11	B	Does Not Exist		20	C
		P.M.			15	B			26	C
19. Relocated Grapevine Interchange to Base of Grapevine Grade[3]	Basic	A.M.	Exists as Laval Road to Grapevine		9	A	Exists as Laval Road to Grapevine		21	C
		P.M.			12	B			27	D
20. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	12	B	16	B	32	D	34	D
		P.M.	14	B	20	C	<u>46</u>	<u>F</u>	<u>51</u>	<u>F</u>

Notes: [1]Density is reported in passenger car equivalents per mile per lane (pcpmpl).
[2]Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).
[3]These segments are re-configured with build out of the proposed project to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.
[4]This table reports the "existing conditions" results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.
BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.
<u>UNDERLINED</u> text indicates a potentially significant impact based on the significance criteria.
Source: Fehr & Peers, 2016.

The Grapevine Grade extends for approximately five miles and consists of four travel lanes in both the northbound and southbound directions with an approximate 6% upgrade from north to south. The outside travel lane is a dedicated truck lane to separate slower moving trucks as they climb and descend the grade. Trucks also frequently use the lane adjacent to the dedicated truck lane to pass slower moving trucks in both directions.

Cumulative conditions on the Grapevine Grade reflect the fact that trucks are heavily concentrated in these outside two lanes and travel at significantly lower speed than passenger vehicle traffic in both directions. Cumulative conditions without and with the project were analyzed in more detail to identify the project's share of future traffic within this segment.

Table 27 summarizes p.m. peak hour traffic volumes on the Grapevine Grade for heavy vehicles and passenger cars under cumulative conditions. Table 28 summarizes the number of autos and trucks using the outside two lanes versus the inside two lanes during the peak p.m. hour under cumulative conditions. Table 29 summarize p.m. peak hour LOS levels under cumulative conditions for the inside and outside lanes in both directions of travel in the Grapevine Grade.

Table 27
P.M. Peak Hour Grapevine Grade Traffic Volumes by Vehicle Type – Cumulative Conditions (2040)

Segment	Vehicle Type	Cumulative No Project (2040)	Net New Trips	Cumulative Plus Project (2040)
I-5 Northbound				
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Autos	4,825	305	5,130
	Trucks	1,340	80	1,420
	Total	6,165	385	6,550
I-5 Southbound				
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Autos	4,040	290	4,330
	Trucks	1,400	80	1,480
	Total	5,440	370	5,810

Source: Fehr & Peers, 2016.

Table 28
P.M. Peak Hour Grapevine Grade Traffic Volumes by Lane Group & Vehicle Type – Cumulative Conditions (2040)

Segment	Lanes	Vehicle Type	Cumulative No Project (2040)	Cumulative Plus Project (2040)
I-5 Northbound				
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Inside Two Lanes	Autos[1]	4,150	4,430
	Outside Two Lanes	Autos[1]	675	700
		Trucks[2]	1340	1,420
I-5 Southbound				
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Inside Two Lanes	Autos[1]	3,465	3,730
	Outside Two Lanes	Autos[1]	575	600
		Trucks[2]	1,400	1,480

Notes: [1]Autos assumed to primarily use inside two lanes with some using the lane adjacent to dedicated truck lane.
[2]Two-thirds of trucks assumed to use dedicated truck lane and one-third assumed to use lane adjacent to dedicated truck lane.
Source: Fehr & Peers, 2016.

Table 29
P.M. Peak Hour Grapevine Grade Freeway Operations – Cumulative Conditions with Variant 1 or 2 (2040)

Segment	Lanes	Vehicle Composition	Cumulative No Project (2040)		Cumulative No Project – All Lanes (2040)		Cumulative Plus Project (2040)		Cumulative Plus Project – All Lanes (2040)[1]	
			Density[2]	*LOS[3]*	*Density[2]*	*LOS[3]*	*Density[2]*	*LOS[3]*	*Density[2]*	*LOS[3]*
I-5 Northbound										
Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Inside Two Lanes	Autos Only	39	E	44	E	44	E	51	F
	Outside Two Lanes	Autos & Trucks	51	F			59	F		
I-5 Southbound										
Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Inside Two Lanes	Autos Only	29	D	46	F	32	D	51	F
	Outside Two Lanes	Autos & Trucks	86	F			113	F		

Notes: [1]Results for all lanes applies the HCM methodology to the entire segment, as reported in Table 26.
[2]Density is reported in passenger car equivalents per mile per lane (pcpmpl).
[3]Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).
BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.
UNDERLINED text indicates a potentially significant impact based on the significance criteria.
Source: Fehr & Peers, 2016.

Tables 27-29 show that under cumulative conditions without the project, and during the p.m. peak hour, the inside two lanes would operate at LOS E on I-5 northbound and LOS D on I-5 southbound. The outside two lanes would operate at LOS F in both directions. Under cumulative conditions with the project, the inside two lanes on I-5 northbound change from would operate at a lower level within LOS E and LOS D levels would also be lower for the inside two lanes on I-5 southbound. The outside two lanes on I-5 northbound and southbound would operate at a lower range of LOS F.

As discussed in Section 1.2, Project Description, Variant 2 would result in the construction of the expanded and relocated interchange approximately 0.5 miles south of the location in Variant 1 and the existing CVEF would not be moved to the north. The CVEF currently operates on the southbound portion of I-5. Project area freeway operations were evaluated for southbound traffic under cumulative conditions for to evaluate operations that could be affected by the implementation of Variant 2. The results of this analysis are summarized in Table 30. With the configuration shown in Figure 7, all freeway segments in the southbound direction would operate at LOS D or better except for the within the Grapevine Grade. Conditions in the Grapevine Grade would be substantially the same as analyzed in Tables 27-29 for Variant 2.

Table 30
Peak Hour Freeway Operations – Southbound Segments –
Cumulative Conditions with Variant 2 (2040)

Segment	Segment Type	Peak Hour	Cumulative Conditions with Variant 2 (2040)	
			Density[1]	*LOS*[2]
SR 99 Southbound				
16. North of I-5 Junction	Basic	A.M.	15	B
		P.M.	23	C
I-5 Southbound				
17. North of SR 99 Junction	Basic	A.M.	19	C
		P.M.	26	C
18. I-5 Southbound Automobile On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	21	C
		P.M.	29	D
19. SR 99/I-5 Southbound Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	20	C
		P.M.	28	D
20. SR 99 to Laval Road	Basic	A.M.	22	C
		P.M.	32	D

Table 30
Peak Hour Freeway Operations – Southbound Segments –
Cumulative Conditions with Variant 2 (2040)

Segment	Segment Type	Peak Hour	Cumulative Conditions with Variant 2 (2040)	
			Density[1]	*LOS*[2]
21. Laval Road West Off-Ramp	Diverge	A.M.	26	C
		P.M.	34	D
22. Laval Road East Off-Ramp	Diverge	A.M.	24	C
		P.M.	32	D
23. Laval Road On-Ramp	Merge	A.M.	23	C
		P.M.	28	C
24. Laval Road to CVEF	Basic	A.M.	22	C
		P.M.	29	D
25. CVEF Off-Ramp	Diverge	A.M.	22	C
		P.M.	27	C
26. Grapevine Off-Ramp	Diverge	A.M.	23	C
		P.M.	31	D
27. CVEF On-Ramp	Merge	A.M.	23	C
		P.M.	27	C
28. Grapevine Loop On-Ramp	Merge	A.M.	21	C
		P.M.	27	C
29. Grapevine Diagonal On-Ramp	Merge	A.M.	21	C
		P.M.	27	C
30. Grapevine to Fort Tejon (Grapevine Grade)	Basic	A.M.	34	D
		P.M.	<u>51</u>	<u>F</u>

Notes: [1]Density is reported in passenger car equivalents per mile per lane (pcpmpl).
[2]Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).
BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.
<u>UNDERLINED</u> text indicates a potentially significant impact based on the significance criteria.
Source: Fehr & Peers, 2016

Project Area Freeway Off-Ramp Queuing Under Cumulative Conditions

Table 31 summarizes the results of the a.m. and p.m. peak hour queuing analysis at each off-ramp intersection in the project area (see also Appendix I) under cumulative plus project conditions. Table 31 shows that the proposed project would not cause the 95th percentile queues to extend back onto the freeway and create safety issues at any off-ramp in the project area.

Table 31
Peak Hour Off-Ramp Queuing – Cumulative Conditions (2040)

Freeway Ramp	Traffic Control at Ramp Terminal	Available Storage[1]	Peak Hour	95th Percentile Queue[2]		
				Existing Conditions (2015)	*Existing Plus Project (2015)*	*Cumulative Conditions (2040)*
I-5 Northbound						
Grapevine off-ramp[3]	Traffic Signal	2,300 ft.	A.M.	N/A	225 ft.	250 ft.
			P.M.	N/A	450 ft.	350 ft.
Laval Road east off-ramp	Free	2,800 ft.	A.M.	50 ft.	100 ft.	175 ft.
			P.M.	50 ft.	75 ft.	175 ft.
Laval Road west off-ramp	Free	2,100 ft.	A.M.	50 ft.	75 ft.	75 ft.
			P.M.	75 ft.	175 ft.	225 ft.
I-5 Southbound						
Laval Road west off-ramp	Free	3,400 ft.	A.M.	50 ft.	75 ft.	75 ft.
			P.M.	75 ft.	175 ft.	225 ft.
Laval Road east off-ramp	Traffic Signal	1,700 ft.	A.M.	25 ft.	75 ft.	75 ft.
			P.M.	25 ft.	125 ft.	250 ft.
Grapevine off-ramp[3]	Traffic Signal	2,300 ft.	A.M.	N/A	225 ft.	225 ft.
			P.M.	N/A	375 ft.	300 ft.

Notes: [1]Available storage based on total available queue space shown in Table 22. Based on a combination of off-ramp length and distance to nearest downstream controlled intersection for free-flow off-ramps.
[2]95th percentile vehicle queue results are based on output from the Synchro traffic operations model; taken from controlling intersection (i.e., ramp terminal intersection with signal; or nearest downstream controlled intersection when ramp terminal operates free).
[3]N/A = not applicable. The traffic using the existing Grapevine off-ramps never reach a controlled intersection. Therefore, no queues exist at the existing Grapevine off-ramps.
Source: Fehr & Peers, 2015.

Freeway Operations North of the Project Area under Cumulative Conditions

Table 32 summarizes the volume to capacity analysis of freeway segments and ramps located north of the project area from the SR-99/I-5 junction to Bakersfield under cumulative without and cumulative with project conditions (see Figure 16). The analysis is based on the most recently available 2040 Kern COG RTP/SCS projections and the reasonably foreseeable or funded project listed in Appendix H. The results show that all of the freeway segments would operate at applicable LOS levels under cumulative with project conditions.

Table 32
Cumulative Freeway Level of Service Analysis – North of Project Area

	Location	ADT Volume	NORTHBOUND/EASTBOUND Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	SOUTHBOUND/WESTBOUND Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
SR-99																		
1	Btw . Jct Rte 58 W and California		4M							4M								
	2015 Count	104,110		2,246	8,985	3,848	0.43	6,276	0.70		2,246	8,985	4,004	0.45	6,694	0.75		
	2040 Without Project	127,150		2,246	8,985	4,824	0.54	7,415	0.83		2,246	8,985	5,372	0.60	7,782	0.87	LOS D	
	2040 With Project	127,890		2,246	8,985	4,948	0.55	7,452	0.83		2,246	8,985	5,413	0.60	7,802	0.87		
	Grapevine Specific Plan Project Impact	740				124	0.01	37	0.00				41	0.00	20	0.00		
2	Btw. California and Jct Rte 58 E		4M							4M								
	2015 Count	89,700		2,246	8,985	3,392	0.38	5,263	0.59		2,246	8,985	3,390	0.38	5,895	0.66		
	2040 Without Project	106,340		2,246	8,985	3,950	0.44	6,231	0.69		2,246	8,985	4,326	0.48	6,761	0.75	LOS D	
	2040 With Project	107,855		2,246	8,985	4,120	0.46	6,255	0.70		2,246	8,985	4,374	0.49	6,822	0.76		
	Grapevine Specific Plan Project Impact	1,515				170	0.02	24	0.00				48	0.01	61	0.01		
3	Btw. Jct Rte 58 E & Ming Ave		5M							5M								
	2015 Count	88,820		2,246	10,107	3,406	0.34	5,478	0.54		2,246	10,107	3,217	0.32	5,663	0.56		
	2040 Without Project	134,395		2,246	10,107	4,865	0.48	7,754	0.77		2,246	10,107	5,602	0.55	8,658	0.86	LOS D	
	2040 With Project	137,885		2,246	10,107	5,334	0.53	7,807	0.77		2,246	10,107	5,693	0.56	8,743	0.87		
	Grapevine Specific Plan Project Impact	3,490				469	0.05	53	0.01				91	0.01	85	0.01		
4	Btw. Ming Ave & White Lane		4M							4M								
	2015 Count	69,755		2,246	8,985	2,614	0.29	4,435	0.49		2,296	9,186	2,394	0.26	4,508	0.49		
	2040 Without Project	119,800		2,246	8,985	4,994	0.56	7,099	0.79		2,296	9,186	4,737	0.52	7,130	0.78	LOS D	
	2040 With Project	123,880		2,246	8,985	5,522	0.61	7,139	0.79		2,296	9,186	4,863	0.53	7,252	0.79		
	Grapevine Specific Plan Project Impact	4,080				528	0.06	40	0.00				126	0.01	122	0.01		
5	Btw. White Lane & Panama Lane		4M							4M								
	2015 Count	57,090		2,296	9,186	2,165	0.24	3,616	0.39		2,296	9,186	2,072	0.23	3,565	0.39		
	2040 Without Project	101,775		2,296	9,186	4,191	0.46	6,111	0.67		2,296	9,186	3,793	0.41	6,260	0.68	LOS D	
	2040 With Project	108,660		2,296	9,186	4,890	0.53	6,289	0.68		2,296	9,186	3,977	0.43	6,576	0.72		
	Grapevine Specific Plan Project Impact	6,885				699	0.08	178	0.02				184	0.02	316	0.03		
6	Btw. Panama Lane & Jct Rte 119 W		4M							4M								
	2015 Count	44,450		2,296	9,186	1,622	0.18	2,890	0.31		2,296	9,186	1,797	0.20	2,581	0.28		
	2040 Without Project	84,820		2,296	9,186	3,379	0.37	5,264	0.57		2,296	9,186	3,270	0.36	5,051	0.55	LOS D	
	2040 With Project	93,405		2,296	9,186	4,154	0.45	5,481	0.60		2,296	9,186	3,481	0.38	5,565	0.61		
	Grapevine Specific Plan Project Impact	8,585				775	0.08	217	0.02				211	0.02	514	0.06		

Table 32
Cumulative Freeway Level of Service Analysis – North of Project Area

		NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND								
Location	ADT Volume	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
7 Btw. Jct Rte 119 W & Houghton Rd		3M							3M								
2015 Count	35,470		2,296	6,889	1,229	0.18	2,345	0.34		2,141	6,422	1,533	0.24	1,987	0.31		
2040 Without Project	62,960		2,296	6,889	2,334	0.34	4,037	0.59		2,141	6,422	2,683	0.42	3,538	0.55	LOS D	
2040 With Project	72,590		2,296	6,889	3,174	0.46	4,287	0.62		2,141	6,422	2,923	0.46	4,134	0.64		
Grapevine Specific Plan Project Impact	9,630				840	0.12	250	0.04				240	0.04	596	0.09		
8 Btw. Houghton Rd & Jct Rte 223 E		3M							3M								
2015 Count	33,360		2,141	6,422	1,158	0.18	2,176	0.34		2,141	6,422	1,473	0.23	1,865	0.29		
2040 Without Project	60,280		2,141	6,422	2,229	0.35	3,856	0.60		2,141	6,422	2,588	0.40	3,383	0.53	LOS D	
2040 With Project	70,150		2,141	6,422	3,091	0.48	4,112	0.64		2,141	6,422	2,836	0.44	3,991	0.62		
Grapevine Specific Plan Project Impact	9,870				862	0.13	256	0.04				248	0.04	608	0.09		
9 Btw. Jct Rte 223 E & Old U.S. 99		3M							3M								
2015 Count	27,270		2,141	6,422	945	0.15	1,788	0.28		2,133	6,400	1,233	0.19	1,488	0.23		
2040 Without Project	54,555		2,141	6,422	1,964	0.31	3,513	0.55		2,133	6,400	2,390	0.37	3,044	0.48	LOS D	
2040 With Project	64,975		2,141	6,422	2,832	0.44	3,790	0.59		2,133	6,400	2,645	0.41	3,728	0.58		
Grapevine Specific Plan Project Impact	10,420				868	0.14	277	0.04				255	0.04	684	0.11		
10 Btw. Old U.S. 99 & Herring Rd		3M							3M								
2015 Count	28,585		2,133	6,400	987	0.15	1,860	0.29		2,133	6,400	1,284	0.20	1,586	0.25		
2040 Without Project	57,525		2,133	6,400	2,065	0.32	3,664	0.57		2,133	6,400	2,484	0.39	3,292	0.51	LOS D	
2040 With Project	69,340		2,133	6,400	2,982	0.47	3,982	0.62		2,133	6,400	2,771	0.43	4,133	0.65		
Grapevine Specific Plan Project Impact	11,815				917	0.14	318	0.05				287	0.04	841	0.13		
11 Btw. Herring Rd & Sandrini Rd.		3M							3M								
2015 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51	LOS D	
2040 With Project	68,985		2,133	6,400	2,969	0.46	3,958	0.62		2,133	6,400	2,758	0.43	4,112	0.64		
Grapevine Specific Plan Project Impact	11,850				917	0.14	322	0.05				289	0.05	842	0.13		
12 Btw. Sandrini Rd & David Rd		3M							3M								
2015 Count	27,775		2,133	6,400	960	0.15	1,805	0.28		2,133	6,400	1,253	0.20	1,537	0.24		
2040 Without Project	57,135		2,133	6,400	2,052	0.32	3,636	0.57		2,133	6,400	2,469	0.39	3,270	0.51	LOS D	
2040 With Project	68,985		2,133	6,400	2,969	0.46	3,958	0.62		2,133	6,400	2,758	0.43	4,112	0.64		
Grapevine Specific Plan Project Impact	11,850				917	0.14	322	0.05				289	0.05	842	0.13		

Table 32
Cumulative Freeway Level of Service Analysis – North of Project Area

	Location	ADT Volume	NORTHBOUND/EASTBOUND Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	SOUTHBOUND/WESTBOUND Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
13	Btw. David Rd & Valpredo		3M							3M								
	2015 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,133	6,400	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,133	6,400	2,364	0.37	3,104	0.49	LOS D	
	2040 With Project	66,995		2,133	6,400	2,901	0.45	3,832	0.60		2,133	6,400	2,680	0.42	3,986	0.62		
	Grapevine Specific Plan Project Impact	12,480				938	0.15	360	0.06				316	0.05	882	0.14		
14	Btw. Valpredo & Jct Rte 166 W		3M							3M								
	2015 Count	27,740		2,133	6,400	959	0.15	1,803	0.28		2,096	6,288	1,251	0.20	1,535	0.24		
	2040 Without Project	54,515		2,133	6,400	1,963	0.31	3,472	0.54		2,096	6,288	2,364	0.38	3,104	0.49	LOS D	
	2040 With Project	66,995		2,133	6,400	2,901	0.45	3,832	0.60		2,096	6,288	2,680	0.43	3,986	0.63		
	Grapevine Specific Plan Project Impact	12,480				938	0.15	360	0.06				316	0.05	882	0.14		
15	Btw. Jct Rte 166 W & Jct I-5		3M							3M								
	2015 Count	26,965		2,096	6,288	934	0.15	1,733	0.28		2,054	6,162	1,219	0.20	1,507	0.24		
	2040 Without Project	54,150		2,096	6,288	1,926	0.31	3,373	0.54		2,054	6,162	2,363	0.38	3,168	0.51	LOS D	
	2040 With Project	69,375		2,096	6,288	2,903	0.46	3,987	0.63		2,054	6,162	2,766	0.45	4,219	0.68		
	Grapevine Specific Plan Project Impact	15,225				977	0.16	614	0.10				403	0.07	1,051	0.17		

Notes:

Bold – denotes LOS exceeds the threshold
ADT – annual average daily traffic
L – Lanes
Cap/Ln – Capacity per lane
Vol – Volume

V/C – Volume/Capacity
M = Multi-flow lane
HOV = High Occupancy Vehicle Lane
T = Truck Lane
NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F		>	1

INTENTIONALLY LEFT BLANK

Freeway Operations South of the Project Area under Cumulative Conditions

Table 33 summarizes the volume to capacity analysis of freeway segments and ramps located south of the project area in Los Angeles County under cumulative without and cumulative with project conditions (see Figure 17). The analysis is based on the most recently available 2035 SCAG RTP/SCS projections and the reasonably foreseeable or funded project listed in Appendix H. The results show that all of the freeway segments would operate at applicable LOS levels except the following:

I-5 Northbound:

- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – PM peak hour

SR-138 Eastbound:

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

SR-138 Westbound:

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

.

INTENTIONALLY LEFT BLANK

Table 33
Cumulative Freeway Level of Service Analysis – South of Project Area (I-5, SR 14, SR 138, and SR 126)

		NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND								
Location	ADT Volume	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
I-5																	
1 Btw. Fort Tejon Rd & Lebec Rd		4M							4M								
2014 Count	72,000		1,839	7,355	1,390	0.19	2,426	0.33		2,036	8,143	1,346	0.17	2,304	0.28		
2035 Without Project	119,850		1,839	7,355	2,895	0.39	4,255	0.58		2,036	8,143	3,170	0.39	3,640	0.45	LOS D	
2035 With Project	126,000		1,839	7,355	3,140	0.43	4,640	0.63		2,036	8,143	3,400	0.42	4,010	0.49		
Grapevine Specific Plan Net New Project Impacts	6,150				245	0.04	385	0.05				230	0.03	370	0.04		
2 Btw. Lebec Rd & Frazier Mtn Park		4M							4M								
2014 Count	73,000		1,839	7,355	1,409	0.19	2,460	0.33		2,036	8,143	1,365	0.17	2,336	0.29		
2035 Without Project	120,850		1,839	7,355	2,915	0.40	4,285	0.58		2,036	8,143	3,190	0.39	3,680	0.45	LOS D	
2035 With Project	127,000		1,839	7,355	3,160	0.43	4,670	0.63		2,036	8,143	3,420	0.42	4,050	0.50		
Grapevine Specific Plan Net New Project Impacts	6,150				245	0.03	385	0.05				230	0.03	370	0.05		
3 Btw. Frazier Mtn Park & Gorman Rd		4M							4M								
2014 Count	70,000		2,036	8,143	1,351	0.17	2,359	0.29		1,401	5,606	1,309	0.23	2,240	0.40		
2035 Without Project	114,850		2,036	8,143	2,775	0.34	4,015	0.49		1,401	5,606	3,020	0.54	3,380	0.60	LOS D	
2035 With Project	121,000		2,036	8,143	3,020	0.37	4,400	0.54		1,401	5,606	3,250	0.58	3,750	0.67		
Grapevine Specific Plan Net New Project Impacts	6,150				245	0.03	385	0.05				230	0.04	370	0.07		
4 Btw. Gorman Rd & N Jct SR-138		4M							4M								
2014 Count	70,000		1,849	7,398	1,351	0.18	2,359	0.32		2,042	8,169	1,309	0.16	2,240	0.27		
2035 Without Project	117,850		1,849	7,398	2,745	0.37	4,405	0.60		2,042	8,169	3,280	0.40	3,350	0.41	LOS D	
2035 With Project	124,000		1,849	7,398	2,990	0.40	4,790	0.65		2,042	8,169	3,510	0.43	3,720	0.46		
Grapevine Specific Plan Net New Project Impacts	6,150				245	0.03	385	0.05				230	0.03	370	0.05		
5 Btw. N Jct SR-138 & Quail Lake Rd		4M							4M								
2014 Count	67,000		1,849	7,398	1,293	0.17	2,258	0.31		2,042	8,169	1,253	0.15	2,144	0.26		
2035 Without Project	89,175		1,849	7,398	1,750	0.24	3,140	0.42		2,042	8,169	2,055	0.25	2,360	0.29	LOS D	
2035 With Project	93,000		1,849	7,398	1,900	0.26	3,380	0.46		2,042	8,169	2,200	0.27	2,590	0.32		
Grapevine Specific Plan Net New Project Impacts	3,825				150	0.02	240	0.04				145	0.02	230	0.03		
6 Btw. Quail Lake Rd & S Jct SR-138		4M							4M								
2014 Count	67,000		1,375	5,500	1,293	0.24	2,258	0.41		1,375	5,500	1,253	0.23	2,144	0.39		
2035 Without Project	90,175		1,375	5,500	1,750	0.32	3,590	0.65		1,375	5,500	2,055	0.37	2,360	0.43	LOS D	
2035 With Project	94,000		1,375	5,500	1,900	0.35	3,830	0.70		1,375	5,500	2,200	0.40	2,590	0.47		
Grapevine Specific Plan Net New Project Impacts	3,825				150	0.03	240	0.05				145	0.03	230	0.04		
7 Btw. S Jct SR-138 & Smokey Bear Rd		4M							4M								
2014 Count	69,000		1,375	5,500	1,332	0.24	2,325	0.42		1,375	5,500	1,290	0.23	2,208	0.40		
2035 Without Project	123,175		1,375	5,500	2,240	0.41	5,170	0.94		1,375	5,500	4,145	0.75	3,240	0.59	LOS D	Yes
2035 With Project	127,000		1,375	5,500	2,390	0.43	5,410	0.98		1,375	5,500	4,290	0.78	3,470	0.63		Yes
Grapevine Specific Plan Net New Project Impacts	3,825				150	0.02	240	0.04				145	0.03	230	0.04		
8 Btw. Smokey Bear Rd & Vista Del Lago Rd		4M							4M								
2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57	LOS D	
2035 With Project	129,000		1,489	5,957	2,490	0.42	5,500	0.92		1,489	5,957	4,390	0.74	3,610	0.61		Yes
Grapevine Specific Plan Net New Project Impacts	3,825				150	0.03	240	0.04				145	0.03	230	0.04		
9 Btw. Vista Del Lago Rd & Templin Hwy		4M							4M								
2014 Count	70,000		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
2035 Without Project	125,175		1,489	5,957	2,340	0.39	5,260	0.88		1,489	5,957	4,245	0.71	3,380	0.57	LOS D	
2035 With Project	129,000		1,489	5,957	2,490	0.42	5,500	0.92		1,489	5,957	4,390	0.74	3,610	0.61		Yes
Grapevine Specific Plan Net New Project Impacts	3,825				150	0.03	240	0.04				145	0.03	230	0.04		

Table 33
Cumulative Freeway Level of Service Analysis – South of Project Area (I-5, SR 14, SR 138, and SR 126)

		NORTHBOUND/EASTBOUND								SOUTHBOUND/WESTBOUND									
	Location	ADT Volume	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
10	Btw. Templin Hwy & Lake Hughes Rd		4M							4M								
	2014 Count	700,00		1,489	5,957	1,351	0.23	2,359	0.40		1,489	5,957	1,309	0.22	2,240	0.38		
	2035 Without Project	126,175		1,489	5,957	2,380	0.40	5,260	0.88		1,489	5,957	4,205	0.71	3,410	0.57	LOS D	
	2035 With Project	130,000		1,489	5,957	2,530	0.42	5,500	0.92		1,489	5,957	4,350	0.73	3,640	0.61		Yes
	Grapevine Specific Plan Net New Project Impacts	3,825				150	0.02	240	0.04				145	0.02	230	0.04		
11	Btw. Lake Hughes Rd & Parker Rd		4M + 1 AUX							4M + 1 AUX								
	2014 Count	73,000		1,856	7,422	1,504	0.2	1,949	0.26		1,856	7,422	1,854	0.25	2,519	0.34		
	2035 Without Project	154,175		1,856	8,422	5,360	0.64	8,080	0.96		1,856	8,422	8,405	1.00	5,020	0.60	LOS E	
	2035 With Project	158,000		1,856	8,422	5,510	0.65	8,320	0.99		1,856	8,422	8,550	1.02	5,250	0.62		Yes
	Grapevine Specific Plan Net New Project Impacts	3,825				150	0.02	240	0.03				145	0.02	230	0.03		
12	Btw. Parker Rd & Hasley Cyn Rd		4M (+1H)							4M (+1H)								
	2014 Count	108,000		1,856	7,422	2,225	0.3	2,884	0.39		1,856	7,422	2,743	0.37	3,726	0.5		
	2035 Without Project	171,175		1,856	9,022	5,360	0.59	7,030	0.78		1,856	9,022	7,285	0.81	5,120	0.57	LOS E	
	2035 With Project	175,000		1,856	9,022	5,510	0.61	7,270	0.81		1,856	9,022	7,430	0.82	5,350	0.59		
	Grapevine Specific Plan Net New Project Impacts	3,825				150	0.02	240	0.03				145	0.02	230	0.03		
13	Btw. Hasley Cyn Rd & N Jct SR-126 (NB)		4M (+1H + 1A)							4M (+1H)								
	2014 Count	114,000		1,856	8,422	2,348	0.28	3,044	0.36		1,856	8,422	2,896	0.34	3,933	0.47		
	2035 Without Project	170,175		1,856	10,022	5,180	0.52	6,800	0.68		1,856	9,022	7,085	0.79	5,120	0.57	LOS E	
	2035 With Project	174,000		1,856	10,022	5,330	0.53	7,040	0.70		1,856	9,022	7,230	0.80	5,350	0.59		
	Grapevine Specific Plan Net New Project Impacts	3,825				150	0.01	240	0.02				145	0.02	230	0.03		
14	Btw. N Jct SR-126 & Rye Cyn Rd		4M (+1H)							4M (+1H + 1A)								
	2014 Count	130,000		1,867	7,470	2,678	0.36	3,471	0.46		1,867	7,470	3,302	0.44	4,485	0.6		
	2035 Without Project	175,375		1,867	9,070	4,615	0.51	6,450	0.71		1,867	10,070	6,865	0.68	5,565	0.55	LOS E	
	2035 With Project	179,000		1,867	9,070	4,760	0.52	6,680	0.74		1,867	10,070	7,000	0.70	5,780	0.57		
	Grapevine Specific Plan Net New Project Impacts	3,625				145	0.02	230	0.03				135	0.01	215	0.02		
15	Btw. Rye Cyn Rd & Magic Mountain Pkwy		4M (+1H)							4M (+1H + 1A)								
	2014 Count	154,000		1,918	7,670	3,172	0.41	4,112	0.54		1,918	7,670	3,912	0.51	5,313	0.69		
	2035 Without Project	181,375		1,918	9,270	4,615	0.50	6,450	0.70		1,918	10,270	6,875	0.67	5,395	0.53	LOS E	
	2035 With Project	185,000		1,918	9,270	4,760	0.51	6,680	0.72		1,918	10,270	7,010	0.68	5,610	0.55		
	Grapevine Specific Plan Net New Project Impacts	3,625				145	0.02	230	0.02				135	0.01	215	0.02		
16	Btw. Magic Mountain Pkwy & Valencia Blvd		4M (+1H + 1A)							4M (+1H)								
	2014 Count	165,000		1,918	7,670	3,399	0.44	4,406	0.57		1,918	7,670	4,191	0.55	5,693	0.74		
	2035 Without Project	194,375		1,918	10,270	5,615	0.55	6,980	0.68		1,918	9,270	6,815	0.74	5,735	0.62	LOS E	
	2035 With Project	198,000		1,918	10,270	5,760	0.56	7,210	0.70		1,918	9,270	6,950	0.75	5,950	0.64		
	Grapevine Specific Plan Net New Project Impacts	3,625				145	0.01	230	0.02				135	0.01	215	0.02		
17	Btw. Valencia Blvd & McBean Pkwy		4M (+1H)							4M (+1H + 1A)								
	2014 Count	175,000		1,918	7,670	3,605	0.47	4,673	0.61		1,918	7,670	4,445	0.58	6,038	0.79		
	2035 Without Project	218,375		1,918	9,270	6,475	0.70	7,290	0.79		1,918	10,270	8,135	0.79	6,615	0.64	LOS E	
	2035 With Project	222,000		1,918	9,270	6,620	0.71	7,520	0.81		1,918	10,270	8,270	0.81	6,830	0.67		
	Grapevine Specific Plan Net New Project Impacts	3,625				145	0.02	230	0.02				135	0.01	215	0.02		
18	Btw. McBean Pkwy & Lyons Ave/Pico Cyn Rd		4M (+1H)							4M (+1H)								
	2014 Count	186,000		1,990	7,960	3,832	0.48	4,966	0.62		1,990	7,960	4,724	0.59	6,417	0.81		
	2035 Without Project	222,375		1,990	9,560	6,555	0.69	8,640	0.90		1,990	9,560	9,105	0.95	6,685	0.70	LOS E	
	2035 With Project	226,000		1,990	9,560	6,700	0.70	8,870	0.93		1,990	9,560	9,240	0.97	6,900	0.72		
	Grapevine Specific Plan Net New Project Impacts	3,625				145	0.02	230	0.02				135	0.01	215	0.02		

Table 33
Cumulative Freeway Level of Service Analysis – South of Project Area (I-5, SR 14, SR 138, and SR 126)

Location	ADT Volume	NORTHBOUND/EASTBOUND Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	SOUTHBOUND/WESTBOUND Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
19 Btw. Lyons Ave & Calgrove Blvd		4M (+1H + 1A)							4M (+1H + 1T)								
2015 Count	199,000		1,990	7,960	4,099	0.52	5,313	0.67		1,990	9,560	5,055	0.53	6,866	0.72		
2040 Without Project	252,375		1,990	10,560	6,855	0.65	10,070	0.95		1,990	11,160	9,175	0.82	6,705	0.60	LOS E	
2040 With Project	256,000		1,990	10,560	7,000	0.66	10,300	0.98		1,990	11,160	9,310	0.83	6,920	0.62		
Grapevine Specific Plan Net New Project Impacts	3,625				145	0.01	230	0.02				135	0.01	215	0.02		
20 Btw. Calgrove Blvd & SR-14		4M (+1H + 1T[C])							4M (+1H + 2T[C])								
2014 Count	200,000		1,990	9,160	4,120	0.45	5,340	0.58		1,990	10,360	5,080	0.49	6,900	0.67		
2035 Without Project	253,375		1,990	10,760	5,725	0.53	9,190	0.85		1,990	11,960	9,805	0.82	6,845	0.57	LOS E	
2035 With Project	257,000		1,990	10,760	5,870	0.55	9,420	0.88		1,990	11,960	9,940	0.83	7,060	0.59		
Grapevine Specific Plan Net New Project Impacts	3,625				145	0.01	230	0.02				135	0.01	215	0.02		
21 Btw. SR-14 & SR-210		3M (+1H+3A[F]+2T)							4M (+1H+2A[F]+2T)								
2014 Count	329,000		1,997	16,791	7,863	0.47	12,930	0.77		1,997	16,788	14,213	0.85	9,409	0.56		
2035 Without Project	383,650		1,997	16,791	9,130	0.54	15,005	0.89		1,997	16,788	16,580	0.99	10,885	0.65	LOS E	
2035 With Project	386,000		1,997	16,791	9,220	0.55	15,160	0.90		1,997	16,788	16,660	0.99	11,030	0.66		
Grapevine Specific Plan Net New Project Impacts	2,350				90	0.01	155	0.01				80	0.00	145	0.01		
22 Btw. SR-210 & Roxford St		4M (+1H+1A[F])							5M (+1H)								
2014 Count	266,000		2,212	12,449	6,357	0.51	10,454	0.84		2,212	12,661	11,491	0.91	7,608	0.60		
2035 Without Project	304,650		2,212	12,449	7,240	0.58	11,905	0.96		2,212	12,661	13,170	1.04	8,625	0.68	LOS E	Yes
2035 With Project	307,000		2,212	12,449	7,330	0.59	12,060	0.97		2,212	12,661	13,250	1.05	8,770	0.69		Yes
Grapevine Specific Plan Net New Project Impacts	2,350				90	0.01	155	0.01				80	0.01	145	0.01		
23 Btw. Roxford Rd St & I-405		5M (+1H+1A[F])							5M (+1H+1A[F])								
2014 Count	283,000		2,212	14,661	6,764	0.46	11,122	0.76		2,212	14,661	12,226	0.83	8,094	0.55		
2035 Without Project	318,650		2,212	14,661	7,580	0.52	12,465	0.85		2,212	14,661	13,790	0.94	9,035	0.62	LOS E	
2035 With Project	321,000		2,212	14,661	7,670	0.52	12,620	0.86		2,212	14,661	13,870	0.95	9,180	0.63		
Grapevine Specific Plan Net New Project Impacts	2,350				90	0.00	155	0.01				80	0.01	145	0.01		
24 Btw. I-405 & San Fernando Mission Blvd		3M (+1H)							3M (+1H)								
2014 Count	141,000		2,190	8,171	3,370	0.41	5,541	0.68		2,190	8,171	6,091	0.75	4,033	0.49		
2035 Without Project	161,650		2,190	8,171	3,830	0.47	6,295	0.77		2,190	8,171	7,010	0.86	4,545	0.56	LOS E	
2035 With Project	164,000		2,190	8,171	3,920	0.48	6,450	0.79		2,190	8,171	7,090	0.87	4,690	0.57		
Grapevine Specific Plan Net New Project Impacts	2,350				90	0.01	155	0.02				80	0.01	145	0.01		
SR-14																	
25 Btw Dawn Rd & Rosamond Blvd		2M							2M								
2014 Count	23,000		2,332	4,665	1,083	0.23	849	0.18		2,332	4,665	499	0.11	1,323	0.28		
2035 Without Project	29,825		2,332	4,665	1,345	0.29	1,095	0.23		2,332	4,665	610	0.13	1,535	0.33	LOS D	
2035 With Project	30,000		2,332	4,665	1,350	0.29	1,100	0.24		2,332	4,665	620	0.13	1,550	0.33		
Grapevine Specific Plan Net New Project Impacts	175				5	0.00	5	0.01				10	0.00	15	0.00		
26 Btw. Rosamond Blvd & Ave A		2M							2M								
2014 Count	30,000		2,339	4,679	1,413	0.30	1,107	0.24		2,339	4,679	651	0.14	1,725	0.37		
2035 Without Project	34,825		2,339	4,679	1,715	0.37	1,335	0.29		2,339	4,679	720	0.15	1,855	0.40	LOS D	
2035 With Project	35,000		2,339	4,679	1,720	0.37	1,340	0.29		2,339	4,679	730	0.16	1,870	0.40		
Grapevine Specific Plan Net New Project Impacts	175				5	0.00	5	0.00				10	0.01	15	0.00		
27 Ave A & N Jct Rte 138/Ave D		2M							2M								
2014 Count	34,000		2,339	4,679	1,129	0.24	1,261	0.27		2,339	4,679	1,244	0.27	1,567	0.34		
2035 Without Project	55,825		2,339	4,679	2,115	0.45	2,125	0.45		2,339	4,679	1,950	0.42	2,335	0.50	LOS D	
2035 With Project	56,000		2,339	4,679	2,120	0.45	2,130	0.46		2,339	4,679	1,960	0.42	2,350	0.50		
Grapevine Specific Plan Net New Project Impacts	175				5	0.00	5	0.01				10	0.00	15	0.00		

Table 33
Cumulative Freeway Level of Service Analysis – South of Project Area (I-5, SR 14, SR 138, and SR 126)

			NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND								
	Location	ADT Volume	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
28	Btw. Jct Rte 138/Ave D & Ave F		2M							2M								
	2014 Count	36,000		2,332	4,665	1,195	0.26	1,336	0.29		2,332	4,665	1,318	0.28	1,660	0.36		
	2035 Without Project	87,650		2,332	4,665	3,525	0.76	3,685	0.79		2,332	4,665	3,360	0.72	3,720	0.80	LOS D	
	2035 With Project	89,000		2,332	4,665	3,590	0.77	3,780	0.81		2,332	4,665	3,410	0.73	3,780	0.81		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.02				50	0.01	60	0.01		
29	Btw. Ave F & Ave G		2M							2M								
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.30		2,332	4,665	1,391	0.30	1,752	0.38		
	2035 Without Project	102,650		2,332	4,665	4,235	0.91	3,835	0.82		2,332	4,665	3,690	0.79	4,460	0.96	LOS D	Yes
	2035 With Project	104,000		2,332	4,665	4,300	0.92	3,930	0.84		2,332	4,665	3,740	0.80	4,520	0.97		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.02				50	0.01	60	0.01		
30	Btw. Ave G & Ave H		2M							2M								
	2014 Count	38,000		2,332	4,665	1,262	0.27	1,410	0.30		2,332	4,665	1,391	0.30	1,752	0.38		
	2035 Without Project	107,650		2,332	4,665	4,385	0.94	3,815	0.82		2,332	4,665	3,810	0.82	4,600	0.99	LOS D	Yes
	2035 With Project	109,000		2,332	4,665	4,450	0.95	3,910	0.84		2,332	4,665	3,860	0.83	4,660	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.02				50	0.01	60	0.01		
31	Btw. Ave H & Ave I		2M							2M								
	2014 Count	40,000		2,332	4,665	1,328	0.28	1,484	0.32		2,332	4,665	1,464	0.31	1,844	0.40		
	2035 Without Project	108,650		2,332	4,665	4,345	0.93	4,025	0.86		2,332	4,665	3,880	0.83	4,530	0.97	LOS E	
	2035 With Project	110,000		2,332	4,665	4,410	0.95	4,120	0.88		2,332	4,665	3,930	0.84	4,590	0.98		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.02	95	0.02				50	0.01	60	0.01		
32	Btw. Ave I & Ave J		3M							3M								
	2014 Count	47,000		2,332	6,997	1,560	0.22	1,744	0.25		2,332	6,997	1,720	0.25	2,167	0.31		
	2035 Without Project	114,650		2,332	6,997	4,605	0.66	4,365	0.62		2,332	6,997	3,950	0.56	4,890	0.70	LOS E	
	2035 With Project	116,000		2,332	6,997	4,670	0.67	4,460	0.64		2,332	6,997	4,000	0.57	4,950	0.71		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.02				50	0.01	60	0.01		
33	Btw. Ave J & 20th St W		3M							3M								
	2014 Count	42,000		2,339	7,016	1,394	0.20	1,558	0.22		2,339	7,016	1,537	0.22	1,936	0.28		
	2035 Without Project	99,650		2,339	7,016	4,105	0.59	3,905	0.56		2,339	7,016	3,500	0.50	4,370	0.62	LOS E	
	2035 With Project	101,000		2,339	7,016	4,170	0.59	4,000	0.57		2,339	7,016	3,550	0.51	4,430	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.00	95	0.01				50	0.01	60	0.01		
34	Btw. 20th St W & Ave K		3M							3M								
	2014 Count	59,000		2,339	7,016	1,959	0.28	2,189	0.31		2,339	7,016	2,159	0.31	2,720	0.39		
	2035 Without Project	118,650		2,339	7,016	4,715	0.67	4,585	0.65		2,339	7,016	4,160	0.59	5,180	0.74	LOS E	
	2035 With Project	120,000		2,339	7,016	4,780	0.68	4,680	0.67		2,339	7,016	4,210	0.60	5,240	0.75		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.02				50	0.01	60	0.01		
35	Btw. Ave K & Ave L		3M							3M								
	2014 Count	74,000		2,339	7,016	2,457	0.35	2,745	0.39		2,339	7,016	2,708	0.39	3,411	0.49		
	2035 Without Project	127,650		2,339	7,016	4,975	0.71	4,835	0.69		2,339	7,016	4,440	0.63	5,650	0.81	LOS E	
	2035 With Project	129,000		2,339	7,016	5,040	0.72	4,930	0.70		2,339	7,016	4,490	0.64	5,710	0.81		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.01	60	0.00		
36	Btw. Ave L & Ave M		3M							3M								
	2014 Count	89,000		2,339	7,016	2,955	0.42	3,302	0.47		2,339	7,016	3,257	0.46	4,103	0.58		
	2035 Without Project	100,650		2,339	7,016	3,875	0.55	3,435	0.49		2,339	7,016	3,630	0.52	4,540	0.65	LOS E	
	2035 With Project	102,000		2,339	7,016	3,940	0.56	3,530	0.50		2,339	7,016	3,680	0.52	4,600	0.66		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.00	60	0.01		

Table 33
Cumulative Freeway Level of Service Analysis – South of Project Area (I-5, SR 14, SR 138, and SR 126)

			NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND								
	Location	ADT Volume	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
37	Btw. Ave M & Ave N		3M							3M								
	2014 Count	92,000		2,339	7,016	3,054	0.44	3,413	0.49		2,339	7,016	3,367	0.48	4,241	0.60		
	2035 Without Project	100,650		2,339	7,016	3,895	0.56	3,365	0.48		2,339	7,016	3,550	0.51	4,710	0.67	LOS E	
	2035 With Project	102,000		2,339	7,016	3,960	0.56	3,460	0.49		2,339	7,016	3,600	0.51	4,770	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.00	95	0.01				50	0.00	60	0.01		
38	Btw. Ave N & 10th St W		3M							3M								
	2014 Count	87,000		2,339	7,016	2,888	0.41	3,228	0.46		2,339	7,016	3,184	0.45	4,011	0.57		
	2035 Without Project	98,650		2,339	7,016	4,085	0.58	3,215	0.46		2,339	7,016	3,280	0.47	4,700	0.67	LOS E	
	2035 With Project	100,000		2,339	7,016	4,150	0.59	3,310	0.47		2,339	7,016	3,330	0.47	4,760	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.00	60	0.01		
39	Btw. 10th St W & Rancho Vista Blvd		3M							3M								
	2014 Count	87,000		2,225	6,675	2,888	0.43	3,228	0.48		2,225	6,675	3,184	0.48	4,011	0.60		
	2035 Without Project	93,650		2,225	6,675	3,965	0.59	3,165	0.47		2,225	6,675	3,170	0.47	4,510	0.68	LOS E	
	2035 With Project	95,000		2,225	6,675	4,030	0.60	3,260	0.49		2,225	6,675	3,220	0.48	4,570	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.02				50	0.01	60	0.00		
40	Btw. Rancho Vista Blvd & S Jct Rte 138		3M							3M								
	2014 Count	84,000		2,225	6,675	2,789	0.42	3,116	0.47		2,225	6,675	3,074	0.46	3,872	0.58		
	2035 Without Project	94,650		2,225	6,675	4,015	0.60	3,085	0.46		2,225	6,675	3,140	0.47	4,570	0.68	LOS E	
	2035 With Project	96,000		2,225	6,675	4,080	0.61	3,180	0.48		2,225	6,675	3,190	0.48	4,630	0.69		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.02				50	0.01	60	0.01		
41	Btw. S Jct Rte 138 & Ave S		2M (+1H)							3M (+1H)								
	2014 Count	81,000		2,225	6,050	2,689	0.44	3,005	0.50		2,225	8,275	2,965	0.36	3,734	0.45		
	2035 Without Project	91,650		2,225	6,050	3,535	0.58	3,475	0.57		2,225	8,275	3,260	0.39	4,590	0.55	LOS E	
	2035 With Project	93,000		2,225	6,050	3,600	0.60	3,570	0.59		2,225	8,275	3,310	0.40	4,650	0.56		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.02	95	0.02				50	0.01	60	0.01		
42	Btw. Ave S & Pearlblossom/Sierra Hwy		2M (+1H)							3M (+1H)								
	2014 Count	71,000		2,225	6,050	2,357	0.39	2,634	0.44		2,225	8,275	2,599	0.31	3,273	0.40		
	2035 Without Project	75,650		2,225	6,050	3,015	0.50	2,655	0.44		2,225	8,275	2,660	0.32	3,820	0.46	LOS E	
	2035 With Project	77,000		2,225	6,050	3,080	0.51	2,750	0.45		2,225	8,275	2,710	0.33	3,880	0.47		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.01	60	0.01		
43	Btw. Pearblossom/Sierra Hwy & Angeles Forest		2M (+1H)							3M (+1H)								
	2014 Count	83,000		2,225	6,050	2,756	0.46	3,079	0.51		2,225	8,275	3,038	0.37	3,826	0.46		
	2035 Without Project	88,650		2,225	6,050	3,225	0.53	3,065	0.51		2,225	8,275	3,100	0.37	4,380	0.53	LOS E	
	2035 With Project	90,000		2,225	6,050	3,290	0.54	3,160	0.52		2,225	8,275	3,150	0.38	4,440	0.54		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.01	60	0.01		
44	Btw. Angeles Forest Hwy & Soledad		3M (+1H)							2M (+1H)								
	2014 Count	144,000		2,225	8,275	3,154	0.38	3,525	0.43		2,225	6,050	3,477	0.57	4,380	0.72		
	2035 Without Project	114,650		2,225	8,275	3,845	0.46	3,875	0.47		2,225	6,050	3,620	0.60	6,000	0.99	LOS E	
	2035 With Project	116,000		2,225	8,275	3,910	0.47	3,970	0.48		2,225	6,050	3,670	0.61	6,060	1.00		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.01	60	0.01		
45	Btw. Soledad & Santiago Rd		2M (+1H)							2M (+1H)								
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	113,650		2,236	6,071	3,845	0.63	3,905	0.64		2,236	6,071	3,430	0.56	5,640	0.93	LOS E	
	2035 With Project	115,000		2,236	6,071	3,910	0.64	4,000	0.66		2,236	6,071	3,480	0.57	5,700	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.02				50	0.01	60	0.01		

Table 33
Cumulative Freeway Level of Service Analysis – South of Project Area (I-5, SR 14, SR 138, and SR 126)

			NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND								
	Location	ADT Volume	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
46	Btw. Santiago Rd & Crown Valley Rd		2M (+1H)							2M (+1H)								
	2014 Count	94,000		2,236	6,071	3,121	0.51	3,487	0.57		2,236	6,071	3,440	0.57	4,333	0.71		
	2035 Without Project	108,650		2,236	6,071	3,625	0.60	3,955	0.65		2,236	6,071	3,430	0.56	5,420	0.89	LOS E	
	2035 With Project	110,000		2,236	6,071	3,690	0.61	4,050	0.67		2,236	6,071	3,480	0.57	5,480	0.90		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.02				50	0.01	60	0.01		
47	Btw. Crown Valley Rd & Ward Rd		2M (+1H)							2M (+1H)								
	2014 Count	95,000		2,236	6,071	3,154	0.52	3,525	0.58		2,236	6,071	3,477	0.57	4,380	0.72		
	2035 Without Project	138,650		2,236	6,071	3,765	0.62	3,875	0.64		2,236	6,071	3,460	0.57	5,670	0.93	LOS E	
	2035 With Project	140,000		2,236	6,071	3,830	0.63	3,970	0.65		2,236	6,071	3,510	0.58	5,730	0.94		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.01	60	0.01		
48	Btw. Ward Rd & Escondido Cyn Rd		3M (+1H)							2M (+1H)								
	2014 Count	93,000		2,189	8,167	3,088	0.38	3,450	0.42		2,189	5,978	3,404	0.57	4,287	0.72		
	2035 Without Project	115,650		2,189	8,167	3,745	0.46	4,445	0.54		2,189	5,978	3,650	0.61	5,720	0.96	LOS E	
	2035 With Project	117,000		2,189	8,167	3,810	0.47	4,540	0.56		2,189	5,978	3,700	0.62	5,780	0.97		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.02				50	0.01	60	0.01		
49	Btw. Escondido Cyn Rd & Agua Dulce Cyn Rd		2M (+1H)							3M (+1H)								
	2014 Count	93,000		2,236	8,307	1,776	0.21	4,669	0.56		2,236	6,071	4,994	0.82	2,613	0.43		
	2035 Without Project	114,650		2,236	8,307	2,285	0.28	5,555	0.67		2,236	6,071	5,320	0.88	3,950	0.65	LOS E	
	2035 With Project	116,000		2,236	8,307	2,350	0.28	5,650	0.68		2,236	6,071	5,370	0.88	4,010	0.66		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.00	95	0.01				50	0.00	60	0.01		
50	Btw. Agua Dulce Cyn Rd & Soledad Rd		3M (+1H)							2M (+1H)								
	2014 Count	96,000		2,236	8,307	1,834	0.22	4,819	0.58		2,236	6,071	5,155	0.85	2,698	0.44		
	2035 Without Project	116,650		2,236	8,307	2,415	0.29	5,565	0.67		2,236	6,071	5,220	0.86	4,070	0.67	LOS E	
	2035 With Project	118,000		2,236	8,307	2,480	0.30	5,660	0.68		2,236	6,071	5,270	0.87	4,130	0.68		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.01	60	0.01		
51	Btw. Shadow Pines/Soledad Rd & Sand Cyn Rd		2M (+1H)							2M (+1H)								
	2014 Count	99,000		2,236	6,071	1,891	0.31	4,970	0.82		2,236	6,071	5,316	0.88	2,782	0.46		
	2035 Without Project	115,650		2,236	6,071	2,395	0.39	5,205	0.86		2,236	6,071	5,380	0.89	3,820	0.63	LOS E	
	2035 With Project	117,000		2,236	6,071	2,460	0.41	5,300	0.87		2,236	6,071	5,430	0.89	3,880	0.64		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.02	95	0.01				50	0.00	60	0.01		
52	Btw. Sand Cyn Rd & Via Princessa		3M (+1H)							3M (+1H)								
	2014 Count	112,000		2,215	8,246	2,139	0.26	5,622	0.68		2,215	8,246	6,014	0.73	3,147	0.38		
	2035 Without Project	135,650		2,215	8,246	2,575	0.31	6,365	0.77		2,215	8,246	6,840	0.83	4,770	0.58	LOS E	
	2035 With Project	137,000		2,215	8,246	2,640	0.32	6,460	0.78		2,215	8,246	6,890	0.84	4,830	0.59		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.01	60	0.01		
53	Btw. Via Princessa & Golden Valley Rd		3M (+1H+1A)							3M (+1H+1A)								
	2014 Count	144,000		2,215	9,246	2,750	0.30	7,229	0.78		2,215	9,246	7,733	0.84	4,046	0.44		
	2035 Without Project	172,650		2,215	9,246	3,255	0.35	7,895	0.85		2,215	9,246	8,590	0.93	5,470	0.59	LOS E	
	2035 With Project	174,000		2,215	9,246	3,320	0.36	7,990	0.86		2,215	9,246	8,640	0.93	5,530	0.60		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.00	60	0.01		
54	Btw. Golden Valley Rd & Placerita Cyn Rd		3M (+1H)							3M (+1H)								
	2014 Count	144,000		2,215	8,246	2,750	0.33	7,229	0.88		2,215	8,246	7,733	0.94	4,046	0.49		
	2035 Without Project	169,650		2,215	8,246	3,105	0.38	7,645	0.93		2,215	8,246	8,520	1.03	5,140	0.62	LOS E	Yes
	2035 With Project	171,000		2,215	8,246	3,170	0.38	7,740	0.94		2,215	8,246	8,570	1.04	5,200	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.00	95	0.01				50	0.01	60	0.01		

Table 33
Cumulative Freeway Level of Service Analysis – South of Project Area (I-5, SR 14, SR 138, and SR 126)

			NORTHBOUND/EASTBOUND							SOUTHBOUND/WESTBOUND								
	Location	ADT Volume	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
55	Btw. Placerita Cyn Rd & San Fernando Rd		3M (+1H)							3M (+1H)								
	2014 Count	151,000		2,215	8,246	2,884	0.35	7,580	0.92		2,215	8,246	8,109	0.98	4,243	0.51		
	2035 Without Project	173,650		2,215	8,246	3,155	0.38	7,995	0.97		2,215	8,246	8,520	1.03	5,110	0.62	LOS E	Yes
	2035 With Project	175,000		2,215	8,246	3,220	0.39	8,090	0.98		2,215	8,246	8,570	1.04	5,170	0.63		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.01	95	0.01				50	0.01	60	0.01		
56	Btw. San Fernando Rd//Newhall Ave & Jct I-5		5M (+1H)							5M (+1H)								
	2014 Count	166,000		2,215	12,676	3,171	0.25	8,333	0.66		2,215	12,676	8,914	0.70	4,665	0.37		
	2035 Without Project	180,650		2,215	12,676	3,145	0.25	8,625	0.68		2,215	12,676	9,310	0.73	5,050	0.40	LOS E	
	2035 With Project	182,000		2,215	12,676	3,210	0.25	8,720	0.69		2,215	12,676	9,360	0.74	5,110	0.40		
	Grapevine Specific Plan Net New Project Impacts	1,350				65	0.00	95	0.01				50	0.01	60	0.00		
SR-138																		
57	Between Jct I-5 and Gorman Post Rd		2M							2M								
	2014 Count	4,500		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	71,675		1,904	3,808	2,525	0.66	3,830	1.01		1,904	3,808	3,855	1.01	2,725	0.72	LOS D	Yes
	2035 With Project	74,000		1,904	3,808	2,610	0.69	3,970	1.04		1,904	3,808	3,950	1.04	2,870	0.75		Yes
	Grapevine Specific Plan Net New Project Impacts	2,325				85	0.02	140	0.04				95	0.02	145	0.04		
58	Between Gorman Post Rd and Old Ridge Route Rd		1M							1M								
	2014 Count	4,900		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	83,675		1,904	1,904	2,785	1.46	4,680	2.46		1,904	1,904	4,525	2.38	3,055	1.60	LOS D	Yes
	2035 With Project	86,000		1,904	1,904	2,870	1.51	4,820	2.53		1,904	1,904	4,620	2.43	3,200	1.68		Yes
	Grapevine Specific Plan Net New Project Impacts	2,325				85	0.04	140	0.07				95	0.05	145	0.08		
59	Between Old Ridge Route Rd and 300th St West		1M							1M								
	2014 Count	4,700		1,700	1,700	73	0.04	154	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	87,225		1,904	1,904	2,855	1.50	4,805	2.52		1,904	1,904	4,645	2.44	3,130	1.64	LOS D	Yes
	2035 With Project	89,000		1,904	1,904	2,920	1.53	4,910	2.58		1,904	1,904	4,720	2.48	3,240	1.70		Yes
	Grapevine Specific Plan Net New Project Impacts	1,775				65	0.03	105	0.06				75	0.04	110	0.06		
60	Between 300th St West and 245TH St		1M							1M								
	2014 Count	4,700		1,700	1,700	73	0.04	152	0.09			1,700	122	0.07	87	0.05		
	2035 Without Project	72,225		1,904	1,904	3,495	1.84	2,885	1.52		1,904	1,904	2,915	1.53	3,830	2.01	LOS D	Yes
	2035 With Project	74,000		1,904	1,904	3,560	1.87	2,990	1.57		1,904	1,904	2,990	1.57	3,940	2.07		Yes
	Grapevine Specific Plan Net New Project Impacts	1,775				65	0.03	105	0.06				75	0.04	110	0.06		
61	Between 245th St West and 190th St West		1M							1M								
	2014 Count	4,700		1,700	1,700	89	0.05	147	0.09			1,700	113	0.07	87	0.05		
	2035 Without Project	62,225		1,904	1,904	2,595	1.36	2,325	1.22		1,904	1,904	2,465	1.29	3,050	1.60	LOS D	Yes
	2035 With Project	64,000		1,904	1,904	2,660	1.40	2,430	1.28		1,904	1,904	2,540	1.33	3,160	1.66		Yes
	Grapevine Specific Plan Net New Project Impacts	1,775				65	0.03	105	0.06				75	0.04	110	0.06		
62	Between 190th St West and 110th St West		1M							1M								
	2014 Count	4,700		1,700	1,700	82	0.05	149	0.09			1,700	106	0.06	95	0.06		
	2035 Without Project	50,225		1,962	1,962	1,995	1.02	1,755	0.89		1,962	1,962	2,015	1.03	2,420	1.23	LOS D	Yes
	2035 With Project	52,000		1,962	1,962	2,060	1.05	1,860	0.95		1,962	1,962	2,090	1.07	2,530	1.29		Yes
	Grapevine Specific Plan Net New Project Impacts	1,775				65	0.03	105	0.05				75	0.04	110	0.06		
63	Between 110th St West and 60th St West		1M							1M								
	2014 Count	4,700		1,700	1,700	139	0.08	180	0.11			1,700	113	0.07	105	0.06		
	2035 Without Project	48,225		1,962	1,962	2,205	1.12	1,615	0.82		1,962	1,962	1,785	0.91	2,460	1.25	LOS D	Yes
	2035 With Project	50,000		1,962	1,962	2,270	1.16	1,720	0.88		1,962	1,962	1,860	0.95	2,570	1.31		Yes
	Grapevine Specific Plan Net New Project Impacts	1,775				65	0.03	105	0.05				75	0.04	110	0.06		

Table 33
Cumulative Freeway Level of Service Analysis – South of Project Area (I-5, SR 14, SR 138, and SR 126)

Location	ADT Volume	NORTHBOUND/EASTBOUND Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	SOUTHBOUND/WESTBOUND Lanes	Cap/ Lane	Total Cap	AM Vol	AM V/C	PM Vol	PM V/C	LOS Threshold	Exceeds Threshold?
64 Between 60th St West and Jct Rte 14 North		1M							1M								
2014 Count	4,700		1,700	1,700	141	0.08	177	0.1			1,700	123	0.07	148	0.09		
2035 Without Project	55,225		1,962	1,962	2,355	1.20	1,895	0.97		1,962	1,962	1,985	1.01	2,700	1.38	LOS D	Yes
2035 With Project	57,000		1,962	1,962	2,420	1.23	2,000	1.02		1,962	1,962	2,060	1.05	2,810	1.43		Yes
Grapevine Specific Plan Net New Project Impacts	1,775				65	0.03	105	0.05				75	0.04	110	0.06		
SR-126																	
65 Btw. N Jct SR-126 & Henry Mayo Dr		3M							3M								
2014 Count	29,025			6,288	1,264	0.20	1,618	0.26			6,288	1,406	0.22	1,517	0.24		
2035 Without Project	31,145			6,288	1,369	0.22	1,802	0.29			6,288	1,518	0.24	1,540	0.24	LOS D	
2035 With Project	31,345			6,288	1,374	0.22	1,812	0.29			6,288	1,528	0.24	1,555	0.25		
Project Impact	200			6288	5	0.00	10	0.00			6288	10	0.00	15	0.00		
66 Btw. Henry Mayo Dr & Commerce Center Dr	0	2M							2M								
2014 Count	29,025			4,665	1,264	0.27	1,618	0.35			4,665	1,406	0.30	1,517	0.33		
2035 Without Project	31,145			4,665	1,369	0.29	1,802	0.39			4,665	1,518	0.33	1,540	0.33	LOS D	
2035 With Project	31,345			4,665	1,374	0.29	1,812	0.39			4,665	1,528	0.33	1,555	0.33		
Grapevine Specific Plan Net New Project Impacts	200			4665	5	0.00	10	0.00			4665	10	0.00	15	0.00		

Notes:

Bold – denotes LOS exceeds the threshold	V/C – Volume/Capacity
ADT – annual average daily traffic	M = Multi-flow lane
L – Lanes	HOV = High Occupancy Vehicle Lane
Cap/Ln – Capacity per lane	T = Truck Lane
Vol – Volume	NC = No Change

LOS	Freeway Segment V/C Ranges		
A	0	-	0.3
B	0.31	-	0.56
C	0.57	-	0.76
D	0.77	-	0.9
E	0.91	-	1
F		>	1

4.3.3 Transportation Operations under Interim I-5 Access Conditions

As discussed in Section 1.2, Project Description, interim access to the project area would be provided by the existing I-5 / Laval Road interchange (Interim A) until the expanded and relocated I-5 / Grapevine interchange considered in Variant 1 or Variant 2 is constructed. Subject to Caltrans approval, certain operational enhancements could be made to the existing I-5 / Grapevine interchange to provide additional interim access to the project area (Interim B). As shown in Figure 31, operational enhancements would include:

- I-5 auxiliary lane between CVEF and southbound Grapevine off ramp;
- I-5 northbound on-ramp acceleration lane;
- enhanced lighting on all gores;
- enhanced overhead signage on I-5 for both northbound and southbound off-ramps;
- enhanced signage on northbound off ramp horseshoe curve; and
- enhanced super elevation rate on northbound off ramp horseshoe curve.

Potential project impacts from interim access conditions were evaluated by using the facilities shown in Figure 5 and by interpolating the cumulative with project traffic growth though 2040 to the approximate year (2025) in which at one of the existing interchanges used for interim project would operate below LOS D or on-freeway queuing would occur. The analysis considered interim cumulative conditions without the Interim B project, and interim cumulative conditions with the Interim B project. For reference, the analysis also considered roadway and freeway operations under existing plus full buildout project traffic conditions as discussed in Section 4.2 above.

INTENTIONALLY LEFT BLANK

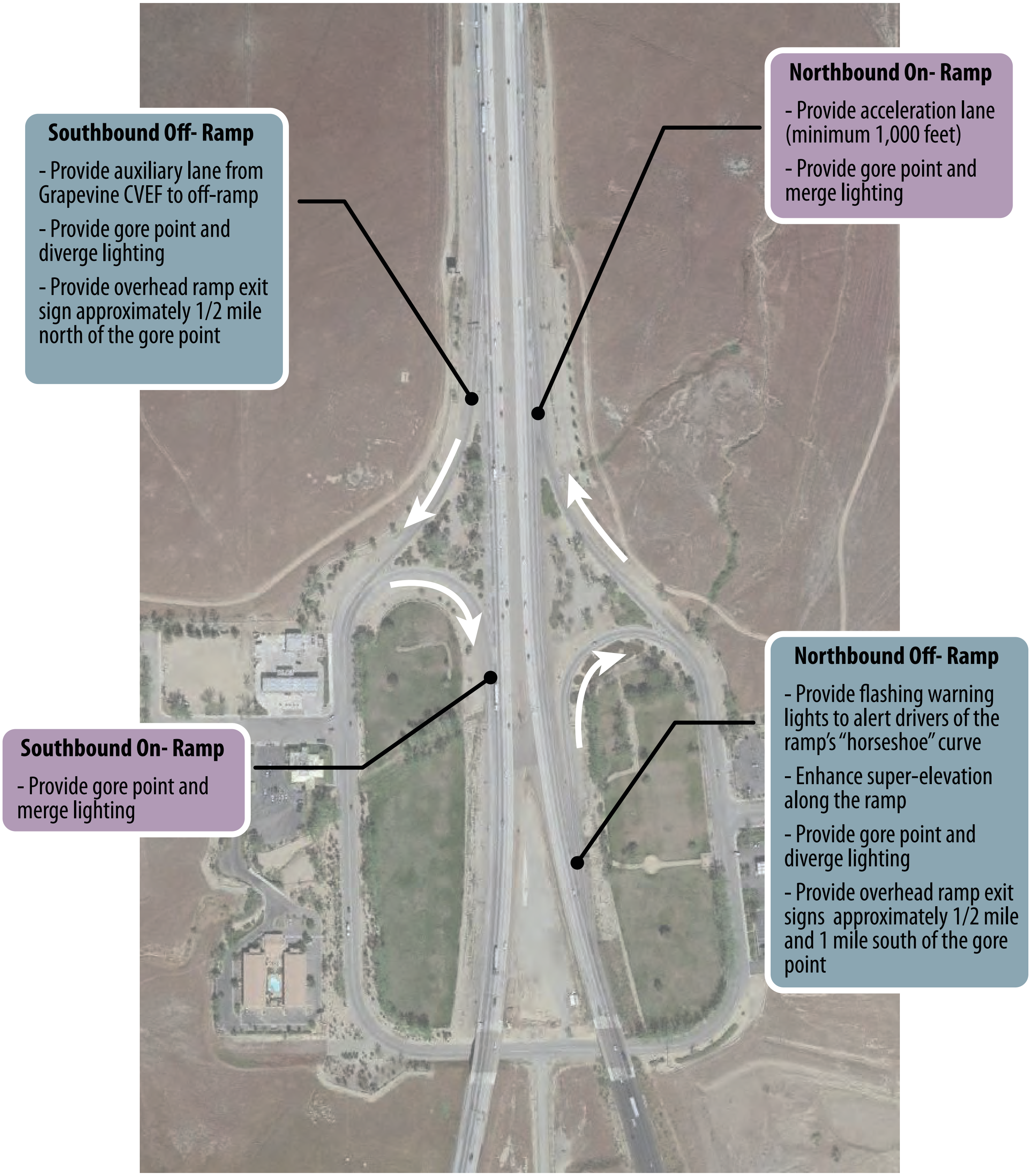


Figure 31
Existing I-5 / Grapevine Conceptual Operational Enhancements

INTENTIONALLY LEFT BLANK

Roadway Intersections Under Interim Conditions

Table 34 presents the anticipated a.m. and p.m. peak hour delay and LOS at the study intersections under interim cumulative without Interim B and interim cumulative with Interim B conditions (see also Appendix ____) using the interpolated cumulative traffic volume methodology described above. For reference, the table also shows the existing plus full buildout project conditions, including intersections that would not be constructed under Interim B prior to the completion of the expanded and relocated interchange. The results show that all intersections would operate at LOS D or better under interim cumulative with Interim B conditions.

Table 34
Peak Hour Intersection Operations – Interim B with Interpolated Cumulative Traffic Volumes (2025)

Intersection	Traffic Control	Peak Hour	Existing		Existing + Full Buildout of Project, Variant 1 (see Section 2)		Interim Cumulative Conditions, No Interim B		Interim Cumulative Conditions plus Interim B	
			Delay[2]	*LOS*[3]	*Delay*[2]	*LOS*[3]	*Delay*[2]	*LOS*[3]	*Delay*[2]	*LOS*[3]
1. Dennis McCarthy Drive / Laval Road	Traffic Signal	A.M.	13	B	16	B	14	B	14	B
		P.M.	17	B	18	B	18	B	18	B
2. I-5 Southbound Ramps / S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	9	A	11	B	10	A	9	A
		P.M.	12	B	15	B	12	B	13	B
3. S. Wheeler Ridge Road / I-5 Northbound Ramps[1]	Traffic Signal	A.M.	3	A	3	A	3	A	3	A
		P.M.	3	A	3	A	3	A	3	A
4. S. Wheeler Ridge Road / Laval Road	Traffic Signal	A.M.	13	B	18	B	22	C	54	D
		P.M.	10	B	26	C	38	D	54	D

Notes: [1]Intersection configuration is not compatible with 2010 HCM methodology in Synchro 8. 2000 HCM methodology is used.
[2]The overall average intersection control delay is reported in seconds per vehicle at signalized, all-way stop, and roundabout controlled intersections.
[3]Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2000/2010).
BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.
UNDERLINED text indicates a potentially significant impact based on the significance criteria.
Source: Fehr & Peers, 2016.

A queuing analysis was also conducted for interim cumulative plus Interim B conditions. The results show that no freeway ramp queuing would occur at either of the interim-use interchanges.

Project Area Freeway Segment Operations Under Interim Cumulative Conditions

Table 35 summarizes the a.m. and p.m. peak hour LOS on the project area freeway segments under interim cumulative without Interim B and interim cumulative conditions with Interim B (see also Appendix ____) using the interpolated cumulative traffic volume methodology described above. For reference, the table also shows the existing plus full buildout project conditions, including freeway segments and the relocated CVEF facilities that would not be constructed under Interim B prior to the completion of the expanded and relocated interchange in Variant 1 (see Figure 6). The results show that all freeway segments would operate at LOS D or better under interim cumulative conditions with Interim B, including the northbound and southbound portions of I-5 within the Grapevine Grade.

Table 35
Peak Hour Freeway Operations –
Interim B with Interpolated Cumulative Traffic Volumes (2025)

Segment	Segment Type	Peak Hour	Existing		Existing + Full Buildout of Project, Variant 1 (see Section 4.2)		Interim Cumulative No Project Conditions		Interim Cumulative Conditions Plus Interim B	
			Density[1]	*LOS*[2]	*Density*[1]	*LOS*[2]	*Density*[1]	*LOS*[2]	*Density*[1]	*LOS*[2]
I-5 Northbound										
1. Fort Tejon to Base of Grapevine Grade (6% Downgrade)	Basic	A.M.	9	A	13	B	22	C	26	C
		P.M.	13	B	18	C	16	B	20	C
2. Base of Grapevine Grade to Relocated Grapevine Interchange[3]	Basic	A.M.	N/A		10	A	N/A		N/A	
		P.M.			14	B				
3. Grapevine Off-Ramp	Diverge	A.M.	10	B	14	B	15	B	22	C
		P.M.	13	B	20	B	21	C	31	D
4. Grapevine Loop On-Ramp[3]	Merge	A.M.	Does Not Exist		14	B	Does Not Exist		Does Not Exist	
		P.M.			15	B				
5. Grapevine Slip On-Ramp	Merge	A.M.	9	A	19	B	13	B	24	C
		P.M.	11	B	19	B	18	B	31	D
6. Grapevine to Laval Road	Basic	A.M.	7	A	13	B	11	B	16	B
		P.M.	9	A	14	B	16	B	23	C
7. Laval Road East Off-Ramp	Diverge	A.M.	11	B	19	B	18	B	25	C
		P.M.	14	B	19	B	23	C	31	D

Table 35
Peak Hour Freeway Operations –
Interim B with Interpolated Cumulative Traffic Volumes (2025)

Segment	Segment Type	Peak Hour	Existing		Existing + Full Buildout of Project, Variant 1 (see Section 4.2)		Interim Cumulative No Project Conditions		Interim Cumulative Conditions Plus Interim B	
			Density[1]	*LOS[2]*	*Density[1]*	*LOS[2]*	*Density[1]*	*LOS[2]*	*Density[1]*	*LOS[2]*
8. Laval Road West Off-Ramp	Diverge	A.M.	9	A	15	B	13	B	17	B
		P.M.	12	B	16	B	18	B	24	C
9. Laval Road On-Ramp	Merge	A.M.	9	A	18	B	15	B	23	C
		P.M.	13	B	21	C	21	C	29	D
10. Laval Road to SR-99	Basic	A.M.	7	A	14	B	11	A	17	B
		P.M.	9	A	16	B	16	B	24	C
11. I-5 Northbound Off-Ramp	Basic (Major Diverge)	A.M.	7	A	14	B	11	A	17	B
		P.M.	9	A	16	B	16	B	24	C
12. North of SR 99 Junction	Basic	A.M.	5	A	10	A	10	A	23	C
		P.M.	8	A	11	A	17	B	34	D
SR 99 Northbound										
13. North of I-5 Junction	Basic	A.M.	6	A	12	B	8	A	8	A
		P.M.	7	A	13	B	11	B	11	B
SR 99 Southbound										
21. North of I-5 Junction	Basic	A.M.	6	A	10	A	9	A	16	B
		P.M.	7	A	15	B	11	B	20	C
22. CVEF Off-Ramp[3]	Diverge	A.M.	Does Not Exist		15	B	Does Not Exist		Does Not Exist	
		P.M.			21	C				
23. Truck Bypass Off-Ramp[3]	Basic (Major Diverge)	A.M.	6	A	8	A	9	A	16	B
		P.M.	7	A	13	B	11	B	20	C
24. SR 99 Auto Lanes to I-5 Southbound[3]	Basic (2 Lanes)	A.M.	7	A	11	B	10	A	19	C
		P.M.	7	A	19	C	12	B	24	C
I-5 Southbound										
25. North of SR 99 Junction	Basic	A.M.	5	A	6	A	11	B	14	B
		P.M.	9	A	11	B	16	B	19	C

Table 35
Peak Hour Freeway Operations –
Interim B with Interpolated Cumulative Traffic Volumes (2025)

Segment	Segment Type	Peak Hour	Existing		Existing + Full Buildout of Project, Variant 1 (see Section 4.2)		Interim Cumulative No Project Conditions		Interim Cumulative Conditions Plus Interim B	
			Density[1]	*LOS[2]*	*Density[1]*	*LOS[2]*	*Density[1]*	*LOS[2]*	*Density[1]*	*LOS[2]*
26. CVEF Off-Ramp[3]	Basic (Major Diverge)	A.M.	Does Not Exist		3	A	Does Not Exist		Does Not Exist	
		P.M.			6	A				
27. I-5 Auto/Truck Bypass Lanes to I-5 Southbound at SR 99 Junction[3]	Basic (2 lanes)	A.M.	Does Not Exist		4	A	Does Not Exist		Does Not Exist	
		P.M.			9	A				
28. I-5 Southbound Auto/Truck Bypass On-Ramp at SR 99 Junction	Basic (Major Merge)	A.M.	6	A	8	A	12	B	20	C
		P.M.	9	A	14	B	15	B	25	C
29. SR 99 Southbound Truck Bypass On-Ramp at I-5/SR 99 Junction	Basic (Major Merge)	A.M.	6	A	7	A	11	B	17	B
		P.M.	8	A	12	B	15	B	22	C
30. I-5/SR 99 CVEF On-Ramp[3]	Merge	A.M.	Does Not Exist		8	A	Does Not Exist		Does Not Exist	
		P.M.			13	B				
31. SR 99 to Laval Road	Basic	A.M.	7	A	8	A	13	B	20	C
		P.M.	9	A	14	B	15	B	23	C
32. Laval Road West Off-Ramp	Diverge	A.M.	12	B	8	A	19	B	25	C
		P.M.	14	B	14	B	22	C	29	D
33. Laval Road East Off-Ramp	Diverge	A.M.	10	A	14	B	15	B	26	C
		P.M.	10	B	20	B	16	B	26	C
34. Laval Road On-Ramp	Merge	A.M.	9	A	13	B	16	B	22	C
		P.M.	10	B	16	B	18	B	25	C
35. Laval Road to Grapevine[4]	Basic	A.M.	7	A	10	A	13	B	19	C
		P.M.	8	A	14	B	15	B	22	C
36. Grapevine Off-Ramp	Diverge	A.M.	10	A	15	B	16	B	28	D
		P.M.	11	B	23	C	18	B	31	D

Table 35
Peak Hour Freeway Operations –
Interim B with Interpolated Cumulative Traffic Volumes (2025)

Segment	Segment Type	Peak Hour	Existing		Existing + Full Buildout of Project, Variant 1 (see Section 4.2)		Interim Cumulative No Project Conditions		Interim Cumulative Conditions Plus Interim B	
			Density[1]	*LOS*[2]	*Density*[1]	*LOS*[2]	*Density*[1]	*LOS*[2]	*Density*[1]	*LOS*[2]
37. Grapevine Loop On-Ramp	Merge	A.M.	9	A	11	B	11	B	18	B
		P.M.	7	A	15	B	12	B	20	B
38. Grapevine Slip On-Ramp[3]	Merge	A.M.	Does Not Exist		11	B	Does Not Exist		Does Not Exist	
		P.M.			15	B				
39. Relocated Grapevine Interchange to Base of Grapevine Grade[3]	Basic	A.M.	Exists as Laval Road to Grapevine		9	A	Exists as Laval Road to Grapevine		Exists as Laval Road to Grapevine	
		P.M.			12	B				
40. Base of Grapevine Grade to Fort Tejon (6% Upgrade)	Basic	A.M.	12	B	16	B	19	C	23	C
		P.M.	14	B	20	C	22	C	27	D

Notes: [1]Density is reported in passenger car equivalents per mile per lane (pcpmpl).
[2]Level of Service based on *Highway Capacity Manual* (Transportation Research Board, 2010).
[3]These segments are re-configured with build out of the proposed project to account for the relocated I-5 / Grapevine interchange and relocated CVEF. Therefore, they do not have existing conditions results.
[4]This table reports the "existing conditions" results for Laval Road to the existing CVEF location at the Laval Road to Grapevine segment.
BOLD text indicates the intersection operates at an unacceptable LOS based on the presiding jurisdiction's level of service policy.
UNDERLINED text indicates a potentially significant impact based on the significance criteria.
Source: Fehr & Peers, 2016.

4.4 Impacts and Mitigation Measures

4.4.1 Thresholds of Significance

The Kern County CEQA Implementation Document and Kern County Environmental Checklist include the following thresholds for evaluating potentially significant traffic and transportation impacts under CEQA. A project would be considered to have a significant impact if it would:

(1) Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;

(2) Conflict with an applicable congestion management program, including, but not limited to LOS standards and travel demand measures, or other standards established by the County congestion management agency for designated roads or highways;

(3) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;

(4) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);

(5) Result in inadequate emergency access; or

(6) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Analysis thresholds (1), (2) and (6) were refined during consultations with Caltrans and Kern County to reflect applicable roadway and circulation performance standards and recent Kern County General Plan amendments pertaining to multimodal transit and smart growth communities.

To facilitate the analysis of CEQA threshold (1), the project would be considered to have a significant impact if it would:

i. Cause an intersection or roadway under Kern County jurisdiction to degrade from LOS D or better to LOS E or worse unless the intersection or roadway is subject to the smart growth and multimodal performance provisions of Kern County General Plan Section 1.10.8, Policy 49, implementation measure CC as amended;

ii. Cause an intersection, highway, or freeway under Caltrans jurisdiction within Kern County to degrade from LOS D or better to LOS E or worse;

iii. Cause a freeway under Caltrans jurisdiction within Los Angeles County to degrade from LOS D or better to LOS E or worse on SR 126, SR 138, I-5 north of Lake Hughes Road, or SR 14 north of Avenue H;

iv. Cause a freeway under Caltrans jurisdiction within Los Angeles County to degrade from LOS E or better to LOS F on I-5 south of Lake Hughes Road or SR 14 south of Avenue H;

v. Cause an increase in traffic that would exacerbate an existing LOS deficiency by:

- Further increasing the delay or vehicle/capacity ratio at a local Kern County intersection or roadway operating at LOS E or F conditions under existing conditions without the project; or
- Increasing the delay or density on a Caltrans facility that operates at LOS E or F under existing conditions without the project
- Increasing the vehicle to capacity ratio by 0.02 or more on a Caltrans facility that operates at an unacceptable LOS

To facilitate the analysis of CEQA threshold (2), the project would be considered to have a significant impact if it would:

i. Cause a Kern COG Congestion Management Program roadway operating at LOS E or better under existing conditions without the project to operate at LOS F; or

ii. Cause an increase in traffic that would exacerbate LOS F conditions on a Kern COG Congestion Management Program roadway operating at LOS F under existing conditions without the project.

To facilitate the analysis of Kern County CEQA threshold (6), the project would be considered to have a significant impact if it would:

i. Disrupt or interfere with existing or planned public transit services or facilities;

ii. Create an inconsistency with policies concerning transit systems set forth in the Kern County General Plan or other applicable adopted policy document;

iii. Disrupt or interfere with existing or planned bicycle/pedestrian facilities;

iv. Result in unsafe conditions for pedestrians, including unsafe pedestrian/bicycle or pedestrian/vehicle conflicts;

v. Result in unsafe conditions for bicycles, including unsafe bicycle/pedestrian or bicycle/vehicle conflicts; or

vi. Create an inconsistency with policies related to bicycle or pedestrian systems set forth in the Kern County General Plan or other applicable regulatory plans.

Based on these standards, the effects of the project are categorized as either a "less than significant impact" or a "potentially significant impact." Consistent with CEQA, feasible mitigation measures are identified to reduce potentially significant impacts to less than significant levels. Potentially significant impacts that cannot be mitigated to less than significant levels are considered to be "significant and unavoidable impacts" under CEQA. As discussed in more detail below, all potentially significant traffic and transportation impacts will be mitigated to less than significant levels.

4.4.2 Impact Analysis and Mitigation

Threshold 1: Would the project conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

Potential impacts to pedestrian and bicycle paths and mass transit are discussed in Threshold 6. Potential impacts to freeway traffic on the Grapevine Grade are discussed in Threshold 2. Potential project impacts to Kern County intersections and roadways, I-5 interchanges that provide project access, freeway impacts in Los Angeles County, and freeway impacts on SR-99 to Bakersfield are discussed separately below.

A. Kern County intersections and roadways

Potential impacts to Kern County intersections and roadways were evaluated by using the operational analysis methodologies in the Caltrans Highway Capacity Manual (HCM) under existing plus project, interim cumulative (Interim B) and cumulative plus project conditions. As shown in Tables 19 and 24, with the relocation of the I-5 / Grapevine interchange to connect to planned Street A (Variant 1), the Street A/Street D intersection would operate at LOS E during the p.m. peak hour under existing plus project conditions and LOS F during the p.m. peak hour under cumulative plus project conditions. The Street A/Street I intersection would operate at LOS F during the p.m. peak hour under existing plus project conditions. If the expanded and relocated interchange connects with planned Street B (Variant 2), the Street B/Street D intersection and Street B/Street I intersections would also be expected to operate below LOS D during p.m. peak hours based on the results of the Variant 1 analysis. All other Kern County intersections and roadways would operate at LOS D or better under existing plus project and cumulative plus project conditions. All Kern County intersections and roadways would also operate at LOS D or better under interim cumulative conditions.

As discussed above, in 2015 Kern County amended the General Plan Land Use and Circulation element to provide that development proposed as part of a community plan or specific plan which utilizes smart growth policies that encourage efficient multi-modal movements is allowed the flexibility to assess traffic and safety impacts through other means than LOS. The purpose of the General Plan amendments is to prioritize non-automotive movement in new developments by, among other means, allowing for intersection or roadway performance to fall below LOS D to encourage pedestrian, bike, transit and other multi-modal movement options. The project has been specifically designed to encourage efficient multi-modal movement consistent with the General Plan amendments and is not required to implement mitigation measures for roadways or intersections that would operate below LOS D at buildout. The following mitigation measures ensure that multi-model movement measures will be implemented by the project consistent with the General Plan amendments:

MM-X.1 Implement Multi-Modal Project Transportation Measures for Onsite Circulation System.

a. In preparation of each tract map submittal package, the Master Developer shall implement the multimodal transportation and project design measures in the Specific Plan, including: (a) the development of housing near the Tejon Ranch Commerce Center to create a jobs/housing balance that reduces external vehicle trips; (b) locating housing, retail, service, and employment in close proximity to reduce the number and length of vehicle trips; (c) extending existing regional transit to serve the project and constructing park and ride lots to facilitate ride sharing and transit use to reduce local and freeway vehicle traffic; and (d) locating Village Centers approximately ½ mile apart with a comprehensive network of pedestrian, bicycle and transit routes that connect transit hubs, residential areas and major employment and activity centers to encourage walking and cycling.

b. In preparation of each tract map submittal package, the Master Developer shall implement the arterial, collector, local street design, and pedestrian, biking and multi-use trail standards in the Specific Plan, including design standards that reduce vehicular speeds by narrowing street widths, minimize pedestrian, cycling and other collision risks by separating and buffering non-vehicular from vehicular movement with special paving, pockets of on-street loading and parking, wider bike lanes, buffered bike lanes, and multi-use trails. All roadways and movement facilities within the project must be approved by and meet or exceed applicable standards adopted by Caltrans and Kern County.

c. Prior to the issuance of the first occupancy permit, a Transportation Management Association shall be formed and funded to implement transportation demand management measures that reduce vehicle trips and encourage multi-model movement in a phased manner as development occurs within the project area, including such measures as: (a) coordinating transit schedules to align with employer work schedules; (b) providing discounted transit passes; (c) organizing ridesharing, bike-share or car-share programs; and (d) Transportation Management Association-sponsored shuttle/vanpool services, in collaboration with employers, to serve major employment centers. The Transportation Management Association shall also implement a commute trip reduction program including that includes such measures as: (a) vanpool service; (b) preferential carpool parking; (c) end of trip facilities for bicyclists; (d) encouraging flexible work schedules/telecommuting; (e) funding a transportation coordinator for the project area; and (f) conducting marketing campaigns to encourage non-automotive modes for commuting and other movement requirements.

d. In the preparation of each tract map submittal package, the Master Developer shall reserve sufficient rights of way at intersections within the Grapevine Specific Plan development that could fall below Level of Service D under cumulative plus project conditions to implement additional improvements that would maintain LOS D at these locations as shown in Figures 6 and 7. A traffic study shall be conducted by a master developer and submitted to the Kern County Planning Department prior to the issuance of the 10,000th occupancy permit for the project to determine the level of service at the intersections. If the study determines that any such intersection is operating within LOS E or LOS F, the Master Developer and the County as part of biennial monitoring will review whether intersection performance is consistent with County criteria, and at such time, County and Master Developer may determine that expansion of intersection is required to ensure the ongoing functioning of the intersection.

MM-X.1a-b require the implementation of the multi-modal movement measures described in the Specific Plan that will discourage automotive use and encourage non-automotive walking, biking, transit and other transportation options consistent with Section 1.10.8 and related provisions of the Kern County General Plan Land Use and Circulation element. MM-X.1c requires the creation and funding of a TMA and implementation of transportation demand measures that will also encourage multi-modal movement. These mitigation measures ensure that the project will incorporate the multi-model movement design and operational measures described in the General Plan that allow for non-LOS roadway and intersection performance and mitigation criteria. MM-X.1d requires a study of intersections that could operate below LOS D prior to project buildout and a determination by the Master Developer and Kern County of whether potential improvements at any such location, consistent with the project and General

Plan multi-modal movement measures and objectives, should be implemented. With these mitigation measures, potential project impacts to Kern County intersections and roadways will be less than significant.

B. I-5 interchanges that provide project access

Potential impacts to Kern County intersections and roadways were evaluated by using the operational analysis methodologies in the Caltrans HCM under interim, existing plus project and cumulative plus project conditions. As discussed above, the existing Laval Road interchange will be used for access to the first phases of the project ("Interim A"). The existing I-5 / Grapevine interchange could also be used for access following the completion of certain operational enhancements approved by Caltrans ("Interim B"). As shown in Table 34, if Interim B is implemented, both existing interchanges would operate at LOS D or better and no freeway off-ramp queuing would occur under interim cumulative plus Interim B conditions.

Interim A or Interim B would not provide sufficient capacity to meet project demand during latter development phases without exceeding LOS D at an interchange or causing off-ramp queuing on the freeway. An expanded and relocated I-5 interchange must be constructed to meet full buildout demand. Variant 1, the preferred alternative, would construct the interchange approximately one mile north of the existing I-5 / Grapevine interchange and relocate an existing Commercial Vehicle Enforcement Facility (CVEF) operated by the California Highway Patrol (CHP) to a parcel owned by Tejon Ranchcorp on the west side of the junction of I-5 and SR-99.

Variant 2 would construct the expanded and relocated interchange approximately 0.5 mile north of the existing I-5 / Grapevine intersection and the existing CVEF would not be relocated. The expanded and relocated interchange would include a 4-lane overpass with sufficient reserved rights of way for expansion to 6-lanes if required to meet applicable standards.

Impacts from the exceedance of LOS D and queuing requirements at any existing interchange serving the project, the expanded and relocated interchange after construction, or at the I-5 / Laval Road interchange would potentially be significant without mitigation. The following mitigation measures are required to reduce these potential impacts to less than significant levels:

MM X.2 Interstate 5 Interchange Improvements for Project Access.

a. The Master Developer shall complete operational enhancements, as approved by Caltrans, at the existing I-5 / Grapevine Interchange as depicted in Figure 31, prior to occupancy of project development that would use the existing I-5 / Grapevine interchange.

b. The Master Developer shall implement a biennial traffic monitoring program at the existing I-5 / Laval Road interchange and, following the completion of operational enhancements approved by Caltrans at the existing I-5 / Grapevine interchange, the I-5 / Grapevine interchange, to monitor level of service and queuing conditions. The biennial traffic monitoring program shall be initiated within one year from the first occupancy of any project residential, commercial or industrial development and will continue until an expanded and relocated I-5 interchange with sufficient capacity to meet full buildout project access demand has been constructed. The interchange ramps and intersections shall operate within Level of Service D, and no off-ramp queues will extend onto the freeway, at either location.

c. Prior to the construction of an expanded and relocated I-5 / Grapevine interchange with sufficient capacity to meet full buildout project access demand, a traffic evaluation study will be submitted with each project tract map or parcel map application to the Kern County Planning Department. The study will include an evaluation of the level of service and queuing conditions at any existing I-5 interchange that serves the project at the time that the application is submitted.

d. The Master Developer shall, upon approval, work with Caltrans and secure Caltrans approval for an expanded and relocated I-5 / Grapevine interchange that will have sufficient capacity to meet full buildout project access demand, such as interchange Variants 1 or 2. At such time as the biennial traffic monitoring program or a traffic evaluation study required by Mitigation Measure-X.2b or Mitigation Measure-X.2c determines that a 10% increase in traffic utilization would cause an interchange ramp or intersection to operate below Level of Service D or off-ramp queuing that extends onto the freeway, the Master Developer shall cause construction of the expanded and relocated interchange approved by Caltrans to commence and shall work with Caltrans to timely complete the expanded and relocated interchange.

e. The Master Developer shall reserve sufficient rights of way to construct a 6-lane overpass at the expanded and relocated interchange as shown in Figure 3. A traffic study shall be conducted by the Master Developer and submitted to Caltrans prior to the issuance of the 10,000th occupancy permit for the project to determine the level of service at the expanded and relocated interchange. If the study determines that the interchange is operating at or below 10% of the lower range of Level of Service D, the Master Developer shall cause construction as approved by Caltrans to commence, and shall work with Caltrans to complete the expansion of the overpass from 4 to 6 lanes.

f. A traffic study shall be conducted by the Master Developer and submitted to Caltrans prior to the issuance of the 10,000th occupancy permit for the project, and in the preparation of each tract map submittal package thereafter, to determine the a.m. and p.m. internalization rates for project-related trips. If any such study determines that the internalization rates are more than 10% below projected levels, Caltrans and the Master Developer will jointly review the study and, if required, shall identify and implement additional transportation demand management or other measures as necessary to ensure that Caltrans facilities serving the project operate within applicable level of service standards..

MM-X.2a requires that operational enhancements approved by Caltrans be implemented before interim project access can be provided at the existing I-5 / Grapevine interchange. MM-X.2a and MM-X.2c require that the performance of any existing interchange be monitored during development to ensure that LOS D and queuing requirements are maintained at any such location. MM-X.2d requires that an expanded and relocated interchange approved by Caltrans must be constructed before any existing interchange providing project access would exceed LOS D or cause on-freeway queuing. MM-X.2e requires that the need for potential interchange overpass expansion from 4 lanes to 6 lanes be evaluated and that any such improvement be implemented before LOS D levels would be exceeded. MM-X.2f requires confirmation of the project internalization rates prior to buildout and additional measures if necessary to address potential Caltrans facility impacts from higher than projected internalization rates. With the implementation of these mitigation measures, potential project impacts to I-5 interchanges that serve the project would be less than significant.

C. SR-99 from the junction with I-5 to Bakersfield

Potential impacts to SR-99 north of the I-5 junction were evaluated by calculating the volume to capacity ratios of segments and ramps under cumulative no project and cumulative with project conditions based on the KernCOG RTP/SCS volume projections for 2040. The applicable LOS performance standard for these freeway segments and ramps is LOS D. As shown in Table 32, no LOS exceedances would occur on SR-99 freeway segments or ramps north of the I-5 junction through Bakersfield under cumulative plus project conditions. Potential project impacts to SR-99 north of the junction with I-5 would be less than significant and no mitigation is required.

D. Freeways and roadways south of the project, including I-5, SR-138, SR-14 and SR-126

Potential impacts to freeways and roadways south of the project, including I-5, SR-138, SR-14 and SR-126, were evaluated by calculating the volume to capacity ratios of roadway segments and ramps under cumulative no project and cumulative with project conditions based on the SCAG RTP/SCS volume projections for 2035. The applicable LOS performance standard for these roadway segments is LOS D in rural areas north of Castaic and Lancaster, and LOS E within the urbanized areas of Santa Clarita, Palmdale, and Lancaster. The results show that the project would contribute to cumulative LOS exceedances at the following locations (see Figure 33):

<u>I-5 Northbound:</u>

- S. Jct SR-138 to Smokey Bear Road – PM peak hour
- Smokey Bear Road to Vista Del Lago Road – PM peak hour
- Vista Del Lago Road to Templin Highway – PM peak hour
- Templin Highway to Lake Hughes Road – PM peak hour
- Lake Hughes Road to Parker Road – PM peak hour

<u>SR-138 Eastbound:</u>

- Jct I-5 to Gorman Post Road – PM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street West – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM peak hour
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

<u>SR-138 Westbound:</u>

- Jct I-5 to Gorman Post Road – AM peak hour
- Gorman Post Road to Old Ridge Route Road – AM & PM peak hours
- Old Ridge Route Road to 300th Street West – AM & PM peak hours
- 300th Street West to 245th Street – AM & PM peak hours
- 245th Street West to 190th Street West – AM & PM peak hours
- 190th Street West to 110th Street West – AM & PM peak hours
- 110th Street West to 60th Street West – AM & PM peak hours
- 60th Street West to Jct Rte 14 North – AM & PM peak hours

As discussed in Threshold 2, the project would also contribute to peak p.m. hour impacts within the two inside northbound auto lanes and the two outside truck/auto lanes in both directions under cumulative plus project conditions. The following mitigation measure is required to reduce these potential impacts to less than significant levels:

MM X.3. **Highway Improvement Fair Share Contributions.** The Master Developer shall either: (i) execute a traffic impact mitigation agreement with Caltrans that identifies project funding that will be paid to Caltrans to mitigate the project's incremental contribution to I-5 cumulative impacts to the Grapevine Grade in Kern County and Los Angeles County and cumulative impacts to SR-138 in Los Angeles County; or (ii) provide for mitigation funding equal to the fair share of the project's incremental contribution for I-5 cumulative impacts to the Grapevine Grade in Kern County and Los Angeles County and to cumulative impacts to SR-138 in Los Angeles County, including fair share funding for the following projects:

a. Kern COG RTP/SCS improvement projects on SR-58 between I-5 and I-15;

b. Strengthening and widening the inside and outside shoulders of I-5 between the Fort Tejon and Grapevine Road interchanges and State Route 138 to Lake Hughes Road interchange;

c. Other intelligent transportation systems (ITS) on freight corridors in Kern and Los Angeles counties that currently exist and/or that may become available in the future;

d. A northbound auxiliary lane from Lake Hughes Road to Parker Road; and

e. The Caltrans SR-138 Northwest Corridor Improvement Project.

The project shall also implement transportation demand measures in accordance with Mitigation Measure MM-X1c and shall implement monitoring in accordance with Mitigation Measure MM-X2f.

MM-X.3 requires that, by agreement with Caltrans or by utilizing another appropriate calculation method, the project will provide fair share funding for offsite Caltrans facility improvements that will maintain LOS standards at potentially affected along I-5 and SR-138 locations under cumulative plus project conditions. With the implementation MM-X.3, potential incremental project impacts to Caltrans roadways along I-5 and SR-138 would be less than significant.

Threshold 2: Would the project conflict with an applicable congestion management program, including, but not limited to LOS standards and travel demand measures, or other standards established by the County congestion management agency for designated roads or highways?

Potential impacts to the Grapevine Grade (I-5 from the existing I-5 / Grapevine interchange to the I-5 / Ft. Tejon interchange) were analyzed using the operational analysis methodologies in the Caltrans HCM under interim cumulative, cumulative without project and cumulative plus project conditions. The Grapevine Grade extends for approximately 5 miles and consists of two outside truck/auto lanes and two inside auto lanes in the northbound and southbound directions with an approximate 6% upgrade from north to south.

As shown in Tables 21 and 35, no impacts would occur to the Grapevine Grade under interim or existing plus project conditions. As shown in Table 29, under cumulative plus project conditions, all lanes in both directions would operate at or above LOS D during the a.m. peak hour, and potential project incremental impacts to the Grapevine Grade could occur during the p.m. peak hour. Under cumulative without project conditions, the two inside southbound (upgradient) auto lanes would operate at LOS D, the two inside northbound (downgradient) auto lanes would operate at LOS E, and the two outside northbound truck/auto lanes in both directions would operate at LOS F. Under cumulative plus project conditions, the two inside southbound auto lanes would operate at a lower level of LOS D, the two inside northbound auto lanes would operate at a lower level of LOS E, and the two northbound and southbound truck/auto lanes would operate at a lower level of LOS F. During the p.m. peak hour under cumulative plus project conditions, the project would contribute to a lower level of LOS E performance within the two inside northbound auto lanes and lower levels of LOS F conditions in the two northbound and southbound truck/auto lanes. These impacts would be significant without mitigation.

MM-X.3 requires that, by agreement with Caltrans or by another applicable method, the project will provide fair share funding for offsite Caltrans facility improvements within the Grapevine Grade segment of I-5 that will result in acceptable p.m. peak hour LOS performance in the northbound auto and northbound and southbound truck/auto lanes under cumulative plus project conditions. With the implementation MM-X.3, potential incremental project impacts to the Grapevine Grade would be less than significant.

Threshold 3: Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

The project's consistency with the Kern County Airport Land Use Compatibility Plan (ALUCP) is analyzed in detail in the Land Use section of the project EIR. The ALUCP is intended to ensure the compatibility of new development with public use airports, including the minimization of safety hazards and noise. The nearest public use airports are Bakersfield Municipal Airport located approximately 25 miles north of the project site, Taft Airport located approximately 30 miles northwest of the project site, and the Tehachapi Municipal Airport located approximately 30 miles east of the project site. The project is outside the areas that are subject to ALUCP policies and would have no impact related to air traffic levels, locations or safety risks at each of these public use airports.

An existing private use airstrip designated on aeronautical charts as Tejon Ag Airport (97CA) is located on property on the north side of Laval Road between Grapevine Specific Plan Planning Areas 6c and 6d (see Figure 8). The airstrip is an unimproved dirt facility and has no association with the Tejon Ranch Company or its affiliates. The runway is approximately 3,200 feet in length and 50 feet in width and has a northwest to southeast orientation. Existing land uses surrounding the airstrip include a chipping/recycling business, storage buildings, and several residences immediately to the east; agriculture to the north; oil and gas production facilities, an oil tank farm, and TRCC to the west; and agriculture/open land to the south. The runway is approximately one-half mile from the nearest designated mixed-use portion of the project. The nearest planned school location is approximately 1 mile to the southeast. Most of the project's village and mixed-use areas are more than 1.5 miles south of the airstrip and south of the California Aqueduct.

The Tejon Ag Airport is infrequently used, has no aircraft support services and would only be utilized by small single-engine aircraft. Takeoffs would be to the northwest from the Grapevine Community residential areas, and aircraft noise would not be expected to have an adverse effect on project residential occupants. Approaches and departures would be predominantly over agricultural and planned industrial areas, and the extended approach/departure area for the runway has substantial open areas available in the event of emergencies. Planned project development near the runway will be limited to a 135-foot maximum height. Airport overflights would largely occur over existing agricultural, industrial and commercial land uses, and planned project residential areas are predominantly located south of the California Aqueduct. The continued presence of substantial open areas north of the California Aqueduct will minimize potential noise and safety concerns related to the infrequent use of the Tejon Ag Airport, including takeoffs, landings, and overflights, and potential project impacts will be less than significant.

The U.S. Department of the Navy military training route (MTR) VR-1262 originates from Lemoore Naval Air Station near Fresno and passes over the project site. This route is approximately 5 nautical miles on either side of the centerline with a total width of approximately 10 nautical miles. Military aircraft occasionally operate within MTRs at high speed and low altitude in support of recurring and ongoing air crew training (below 10,000 feet and in excess of 250 knots per hour). The MTR program is a joint venture by the Federal Aviation Administration (FAA) and the U.S. Department of Defense, which have coordinated rules for low-altitude, high-speed training to ensure the greatest safety for both military and general aviation. Several existing MTRs are located over populated areas in Kern County without causing conflict, including Taft, Maricopa, Lebec, Frazier Park, Rosamond, Gorman and Mojave. Recent flight data presented in an environmental impact statement document prepared by the U.S. Navy indicates there have been approximately 38 operations within MTR VR 1262 in recent years and no project area accidents related to such use have ever been reported. Consistent with Section 19.08.160 of the County Zoning Ordinance the maximum building and structure height allowed within the project will be lower than 200 feet.

MTR VR 1262 use is infrequent, military aircraft would be over the project site for only a short time when the MTR is in use, and there is a minimal risk of a single-aircraft accident related to MTR use. As a result, the proposed project would not conflict with military air traffic and potential impacts would be less than significant.

Potential project impacts from a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks, will be less than significant and no mitigation is required.

Threshold 4: Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

All roadways and movement facilities within the project must meet or exceed applicable Caltrans and Kern County safety and performance standards for vehicular and transit operations, cyclists, and pedestrians applicable to the Specific Plan area. Caltrans and Kern County design approval will be required as applicable prior to construction. The Specific Plan includes design standards for arterials and collectors that emphasize pedestrian safety and compatibility by providing reduced crossing widths, street bulb-outs, shade trees, and street furniture. Project roads are optimized for slow traffic safety and compatibility (e.g., looking for parking or destinations, watching for pedestrians), cycling, and pedestrian crossings, while also accommodating larger vehicles. The local street network will incorporate public rights-of-way designed for pedestrian use and compatible vehicles and bicycle use. Local streets will incorporate narrower design to limit vehicular access and vehicle speeds and will include shared public ways with special paving, pockets of on-street loading and parking, and other constructed amenities to encourage pedestrian and cycling use. The severity of potential collisions will be reduced by providing narrower vehicle travel lanes and pedestrians will be further protected by reduced intersection crossing widths. Wider bike lanes, buffered bike lanes, and multi-use trails will be constructed to provide more space between vehicles and cyclists, reduce potential vehicle-bicycle collisions and improve bicycle user safety. During construction, heavy vehicles would access the site and could cause temporary road closures, movement facility (e.g., roadway) damage, or other hazards to bicyclists, pedestrians or vehicular and transit movement.

MM-X.2a requires that operational enhancements approved by Caltrans, including safety-related improvements, must be completed prior to occupancy of project development that would use the existing I-5 / Grapevine interchange. MM-X.2a reduces potential hazard impacts at the existing I-5 / Grapevine interchange to less than significant levels. MM-X.1a requires the implementation of the multi-modal transportation, section of the Specific Plan, including measures that will encourage safe non-automotive walking, cycling and transit movement. MM-X.1b requires implementation of the arterial, collector, local street design, and pedestrian, biking and multi-use trail standards in the Specific Plan. These standards include designs that reduce vehicular speeds by narrowing street widths, minimize pedestrian, cycling and other collision risks by separating and buffering non-vehicular from vehicular movement with special paving, pockets of on-street loading and parking, wider bike lanes, buffered bike lanes, and multi-use trails. The following mitigation measures will further reduce potential project design or compatibility hazard impacts during construction and operations:

MM X.4 **Safety Design – Construction.** A Construction Traffic Management Plan shall be submitted with each application for a project tract or parcel map to ensure that safe operating conditions are maintained on local roadways, freeway facilities and for all pedestrian, cycling, trail and transit facilities. At a minimum, the plan shall include: (a) the number and arrival and departure timing of construction truck and equipment trips; (b) the time and day of construction related street closures; (c) the circulation pattern that will be implemented to ensure compatibility with and the safety of other movement activities; (d) identification of detour routes and a signing plan for street closures; (e) the maintenance of safe and efficient emergency vehicle access routes; (f) manual traffic controls when necessary for safety or compatibility; (g) advance warning and posted signage concerning street closures; and (h) provisions for pedestrian and bicycle safety. The Construction Traffic Management Plan shall be subject to the review and approval of the Kern County Department of Public Works in consultation with Caltrans, as applicable. A copy of the plan shall be submitted to local emergency response agencies and transit providers i as directed by Kern County, and to Caltrans. These agencies shall be notified at least 30 days before the commencement of construction that would partially or fully obstruct public roadways.

MM X.5. **Safety Design - Operations.** The Master Developer shall implement MM X.1(b), requiring the completion of the arterial, collector, local street design, and pedestrian, biking and multi-use trail standards in the Specific Plan, including design standards that reduce vehicular speeds by narrowing street widths, minimize pedestrian, cycling and other collision risks by separating and buffering non-vehicular from vehicular movement with special paving, pockets of on-street loading and parking, wider bike lanes, buffered bike lanes, and multi-use trails. All roadways and movement facilities within the project must be approved by and meet or exceed applicable standards adopted by Caltrans and Kern County.

MM-X.4 requires the development of a construction traffic management plan approved by Kern County with each tract or parcel map application to ensure that construction period multi-modal movement hazards are minimized. MM-X.5 requires that, in addition to the potential I-5 / Grapevine interchange and multimodal movement improvements, the project will also implement the Specific Plan design standards pertaining to multi-modal movement safety and compatibility. The improvements must be approved by Caltrans and Kern County as applicable and meet or exceed applicable Specific Plan area standards. MM-X.1a, MM-X.1b, MM-X.2a, MM-X.4 and MM-X.5 ensure that potential hazards related to design features or incompatible uses will be minimized, and potential project impacts would be less than significant.

Threshold 5: Would the project result in inadequate emergency access?

At buildout, the project will include fire stations, a sheriff substation, and medical facilities that are sufficient to serve the project area, and sufficient emergency access will be provided within the project roadway network in accordance with Kern County requirements. As discussed in Threshold 4, during construction certain roadways may be temporarily closed, and planned project emergency services may not be available during earlier development phases. These conditions could affect the adequacy of emergency services during construction.

MM-X.4 requires the development of a construction traffic management plan approved by Kern County with each tract or parcel map application. The plan must include measures that will maintain safe and efficient emergency vehicle access routes during construction. The adequacy of emergency access will be confirmed by the County in conjunction with the review and approval of the construction traffic management prior to the commencement of construction. With MM-X.4, potential project construction period emergency access impacts will be less than significant.

Threshold 6: Would the project conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

The project's potential impacts to the performance or safety of public transit, bicycle, or pedestrian facilities is discussed in Threshold 4 and would be less than significant with mitigation. The project's consistency with Kern County General Plan policies, goals and implementation measures related to public transit, bicycle, or pedestrian facilities is discussed in detail in the Land Use section of this EIR. The project Specific Plan incorporates smart growth policies consistent with the General Plan, including: (a) walkable mixed-use development supported by neighborhood commercial uses; (b) the provision of employment uses and proximity to existing employment opportunities; (c) alternative transportation modes; and (d) provision of pedestrian and bicycle trails and facilities. As discussed in the Land Use section of this EIR, potential project impacts from inconsistency with Kern County General Plan policies, goals and implementation measures related to public transit, bicycle, or pedestrian facilities would be less than significant.

The project area is identified in the approved 2014 RTP/SCS as a "Planned Transit Priority Area" and a "Strategic Employment Center" and is intended to be an activity node around which future transit, vanpooling services, and mixed-use development patterns would be planned to be support forecasted development patterns. The Specific Plan provides for walkable, mixed-use land use and circulation patterns and the integration of transit and other sustainable development designs to ensure that the proposed project is consistent with the policies and programs of the 2014 RTP/SCS. As discussed in the Land Use section of this EIR, potential project impacts from inconsistency with the approved RTP/SCS for the project area related to public transit, bicycle, or pedestrian facilities would be less than significant.

MM-X.1a requires the implementation of the multimodal transportation and project design measures in the Specific Plan, including: (a) the development of housing near TRCC to create a jobs/housing balance that reduces external vehicle trips; (b) locating housing, retail, service, and employment in close proximity to reduce the number and length of vehicle trips; (c) extending existing regional transit to serve the project and constructing park and ride lots to facilitate ride sharing and transit use to reduce local and freeway vehicle traffic; and (d) locating Village Centers approximately ½ mile apart with a comprehensive network of pedestrian, bicycle and transit routes that connect transit hubs, residential areas and major employment and activity centers to encourage walking and cycling. MM-X.1b requires implementation of the arterial, collector, local street design, and pedestrian, biking and multi-use trail standards in the Specific Plan. MM-X.1c requires the formation and funding of a Transportation Management Association (TMA) to implement transportation demand management measures that reduce vehicle trips and encourage multi-model movement within the project area, including such measures as: (a) coordinating transit schedules to align with employer work schedules; (b) providing discounted transit passes; (c) organizing ridesharing, bike-share or car-share programs; (d) TMA-sponsored shuttle/vanpool services, in collaboration with employers, to serve major employment centers; and (e) a commute trip reduction program the includes vanpool service; preferential carpool parking; end of trip facilities for bicyclists; encouraging flexible work schedules/telecommuting; funding a transportation coordinator for the project area; and conducting marketing campaigns to encourage non-automotive modes for commuting and other movement requirements.

MM-X.5 requires the implementation of Specific Plan arterial, collector and local street design standards related to pedestrian, cycling and transit movement safety and compatibility, including design standards that reduce vehicular speeds by narrowing street widths, minimize pedestrian, cycling and other collision risks by separating and buffering non-vehicular from vehicular movement with special paving, pockets of on-street loading and parking, wider bike lanes, buffered bike lanes, and multi-use trails. All roadways and movement facilities within the project must be approved by and meet or exceed applicable standards adopted by Caltrans and Kern County.

MM-X.1a, MM-X.1b, MM-X.1c and MM X.5 further ensure that the project is consistent with the smart growth development policies, goals and implementation measures in the Kern County General Plan, including policies, goals and implementation measures related to public transit, bicycle, or pedestrian facilities. These mitigation measures also ensure that the project will be developed to promote multi-modal movement in a manner consistent with the General Plan and the RTP/SCS designations for the project area. The project will facilitate the achievement of adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities. With the implementation of MM-X.1a, MM-X.1b, MM-X.1c and MM X.5, potential project impacts related to conflicts with such policies, plans, or programs will be less than significant.

INTENTIONALLY LEFT BLANK

TRANSPORTATION IMPACT STUDY TECHNICAL APPENDIX

APPENDICES A THROUGH O

for the
Grapevine Specific and
Community Plan Project

APRIL 1, 2016

Printed on 30% post-consumer recycled material.

Printed on 30% post-consumer recycled material.

TABLE OF CONTENTS

Acronym/Abbreviation	Definition
ACS	American Community Survey
ALUCP	Airport Land Use Compatibility Plan
AWSC	All-Way Stop-Control
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CHP	California Highway Patrol
CMP	Congestion Management Program
CTC	California Transportation Commission
CVEF	Commercial Vehicle Enforcement Facility
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTIP	Federal Transportation Improvement Plan
GET	Golden Empire Transit District
GHG	Greenhouse Gases
HCM	Highway Capacity Manual
HDM	Highway Design Manual
I-5	Interstate 5
ITE	Institute of Transportation Engineers
Kern COG	Kern Council of Governments
LEHD	Longitudinal Employer-Household Dynamics
LID	Low Impact Development
LOS	Level of Service
MXD	Mixed-Use Development
PSR-PDS	Project Study Report-Project Development Support
RTP	Regional Transportation Plan
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
SB 375	Senate Bill 375
SB 743	Senate Bill 743
SCAG	Southern California Association of Governments
SHOPP	State Highway Operations and Protection Program
SR 58	State Route 58
SR 99	State Route 99
SR 138	State Route 138
SR 166	State Route 166
SR 184	State Route 184
SR 223	State Route 223

Acronym/Abbreviation	Definition
SSSC	Side-Street Stop-Control
STIP	State Transportation Improvement Program
TAZ	Traffic Analysis Zone
TCR	Transportation Concept Report
TDF	Travel Demand Forecasting
TDM	Transportation Demand Management
TMA	Transportation Management Association
TRC	Tejon Ranchcorp
TRCC	Tejon Ranch Commerce Center
USGS	United States Geological Survey
UTM	Universal Transverse Mercator

INTENTIONALLY LEFT BLANK

Appendix A:

Traffic Count Data

Intersection 1

ALL TRAFFIC DATA

(916) 771-8700
orders@atdtraffic.com

City of Lebec
All Vehicles on Unshifted
HT on Bank 1
RTOR on Bank 2

File Name : 15-8074 Tejon Indutrial Dr-Laval Rd.ppd
Date : 6/23/2015

Unshifted Count = All Vehicles

	Tejon Industrial Dr Southbound					Laval Rd Westbound					Tejon Industrial Dr Northbound					Laval Rd Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
07:00	18	1	0	0	19	4	0	0	0	4	0	0	5	0	5	0	0	0	0	0	28	0
07:15	15	1	0	0	16	7	0	2	1	9	0	2	3	0	5	0	0	0	0	0	30	1
07:30	20	0	0	0	20	15	0	0	0	15	0	2	3	0	5	0	0	0	0	0	40	0
07:45	18	1	0	0	19	20	0	1	0	21	0	1	4	1	5	0	0	0	0	0	45	1
Total	71	3	0	0	74	46	0	3	1	49	0	5	15	1	20	0	0	0	0	0	143	2
08:00	20	3	0	0	23	6	0	0	0	6	0	1	4	3	5	0	0	0	0	0	34	3
08:15	24	0	0	0	24	6	0	0	0	6	0	1	4	1	5	0	0	0	0	0	35	1
08:30	18	0	0	0	18	7	0	0	0	7	0	1	4	4	5	0	0	0	0	0	30	4
08:45	22	0	0	0	22	7	0	2	1	9	0	4	5	2	9	0	0	0	0	0	40	3
Total	84	3	0	0	87	26	0	2	1	28	0	7	17	10	24	0	0	0	0	0	139	11
16:00	14	1	0	0	15	8	0	2	3	10	0	2	12	0	14	0	0	0	0	0	39	3
16:15	19	0	0	0	19	8	0	0	1	8	0	2	7	0	9	0	0	0	0	0	36	1
16:30	15	1	0	0	16	32	0	0	0	32	0	1	11	1	12	0	0	0	0	0	60	1
16:45	18	0	0	0	18	29	0	1	0	30	0	3	17	1	20	0	0	0	0	0	68	1
Total	66	2	0	0	68	77	0	3	4	80	0	8	47	2	55	0	0	0	0	0	203	6
17:00	16	0	0	0	16	1	0	0	2	1	0	2	17	0	19	0	0	0	0	0	36	2
17:15	13	1	0	0	14	4	0	3	3	7	0	2	8	0	10	0	0	0	0	0	31	3
17:30	21	0	0	0	21	5	0	0	0	5	0	1	11	0	12	0	0	0	0	0	38	0
17:45	19	0	0	0	19	11	0	1	2	12	0	0	10	1	10	0	0	0	0	0	41	3
Total	69	1	0	0	70	21	0	4	7	25	0	5	46	1	51	0	0	0	0	0	146	8
Grand Total	290	9	0	0	299	170	0	12	13	182	0	25	125	14	150	0	0	0	0	0	631	27
Apprch %	97.0%	3.0%	0.0%			93.4%	0.0%	6.6%			0.0%	16.7%	83.3%			0.0%	0.0%	0.0%				
Total %	46.0%	1.4%	0.0%		47.4%	26.9%	0.0%	1.9%		28.8%	0.0%	4.0%	19.8%		23.8%	0.0%	0.0%	0.0%		0.0%	100.0%	

AM PEAK HOUR	Tejon Industrial Dr Southbound					Laval Rd Westbound					Tejon Industrial Dr Northbound					Laval Rd Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 07:30 to 08:30																					
Peak Hour For Entire Intersection Begins at 07:30																					
07:30	20	0	0		20	15	0	0		15	0	2	3		5	0	0	0		0	40
07:45	18	1	0		19	20	0	1		21	0	1	4		5	0	0	0		0	45
08:00	20	3	0		23	6	0	0		6	0	1	4		5	0	0	0		0	34
08:15	24	0	0		24	6	0	0		6	0	1	4		5	0	0	0		0	35
Total Volume	82	4	0		86	47	0	1		48	0	5	15		20	0	0	0		0	154
% App Total	95.3%	4.7%	0.0%			97.9%	0.0%	2.1%			0.0%	25.0%	75.0%			0.0%	0.0%	0.0%			
PHF	.854	.333	.000		.896	.588	.000	.250		.571	.000	.625	.938		1.000	.000	.000	.000		.000	.856

PM PEAK HOUR	Tejon Industrial Dr Southbound					Laval Rd Westbound					Tejon Industrial Dr Northbound					Laval Rd Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 16:00 to 17:00																					
Peak Hour For Entire Intersection Begins at 16:00																					
16:00	14	1	0		15	8	0	2		10	0	2	12		14	0	0	0		0	39
16:15	19	0	0		19	8	0	0		8	0	2	7		9	0	0	0		0	36
16:30	15	1	0		16	32	0	0		32	0	1	11		12	0	0	0		0	60
16:45	18	0	0		18	29	0	1		30	0	3	17		20	0	0	0		0	68
Total Volume	66	2	0		68	77	0	3		80	0	8	47		55	0	0	0		0	203
% App Total	97.1%	2.9%	0.0%			96.3%	0.0%	3.8%			0.0%	14.5%	85.5%			0.0%	0.0%	0.0%			
PHF	.868	.500	.000		.895	.602	.000	.375		.625	.000	.667	.691		.688	.000	.000	.000		.000	.746

ALL TRAFFIC DATA

Intersection 2

City of Lebec
All Vehicles on Unshifted
HT on Bank 1
RTOR on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 15-8074 Dennis McCarthy Dr-Laval Rd.ppd
Date : 6/23/2015

Unshifted Count = All Vehicles

	Dennis McCarthy Dr Southbound					Laval Rd Westbound					Dennis McCarthy Dr Northbound					Laval Rd Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
07:00	43	2	0	0	45	10	14	38	0	62	0	2	8	0	10	1	26	1	0	28	145	0
07:15	33	2	4	0	39	8	17	53	1	78	0	1	4	0	5	1	18	0	0	19	141	1
07:30	47	2	2	0	51	6	26	51	1	83	0	1	11	0	12	2	21	0	0	23	169	1
07:45	39	2	2	0	43	15	33	46	1	94	0	1	9	0	10	0	25	0	0	25	172	1
Total	162	8	8	0	178	39	90	188	3	317	0	5	32	0	37	4	90	1	0	95	627	3
08:00	40	1	0	0	41	7	14	52	0	73	0	0	7	1	7	0	27	0	0	27	148	1
08:15	51	6	1	0	58	7	16	60	0	83	0	4	5	0	9	0	29	1	0	30	180	0
08:30	50	3	0	0	53	15	15	33	0	63	0	2	5	0	7	1	25	2	0	28	151	0
08:45	43	3	1	0	47	18	19	59	2	96	0	3	11	0	14	2	26	0	0	28	185	2
Total	184	13	2	0	199	47	64	204	2	315	0	9	28	1	37	3	107	3	0	113	664	3
16:00	71	2	6	0	79	32	19	67	2	118	1	3	20	0	24	5	22	1	1	28	249	3
16:15	71	9	3	0	83	22	20	63	4	105	0	5	31	0	36	2	25	2	0	29	253	4
16:30	62	5	2	0	69	32	52	69	0	153	1	4	26	0	31	0	26	1	0	27	280	0
16:45	74	4	3	0	81	24	41	58	1	123	0	2	19	0	21	1	32	1	0	34	259	1
Total	278	20	14	0	312	110	132	257	7	499	2	14	96	0	112	8	105	5	1	118	1041	8
17:00	60	6	0	0	66	22	22	62	0	106	0	1	24	0	25	2	32	1	0	35	232	0
17:15	52	9	0	0	61	24	27	52	0	103	1	5	29	0	35	1	25	4	0	30	229	0
17:30	60	3	0	0	63	25	22	70	0	117	1	3	31	0	35	1	27	2	0	30	245	0
17:45	51	3	2	0	56	23	33	67	1	123	1	2	17	0	20	3	29	1	0	33	232	1
Total	223	21	2	0	246	94	104	251	1	449	3	11	101	0	115	7	113	8	0	128	938	1
Grand Total	847	62	26	0	935	290	390	900	13	1580	5	39	257	1	301	22	415	17	1	454	3270	15
Apprch %	90.6%	6.6%	2.8%			18.4%	24.7%	57.0%			1.7%	13.0%	85.4%			4.8%	91.4%	3.7%				
Total %	25.9%	1.9%	0.8%		28.6%	8.9%	11.9%	27.5%		48.3%	0.2%	1.2%	7.9%		9.2%	0.7%	12.7%	0.5%		13.9%	100.0%	

AM PEAK HOUR	Dennis McCarthy Dr Southbound					Laval Rd Westbound					Dennis McCarthy Dr Northbound					Laval Rd Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 07:30 to 08:30																					
Peak Hour For Entire Intersection Begins at 07:30																					
07:30	47	2	2		51	6	26	51		83	0	1	11		12	2	21	0		23	169
07:45	39	2	2		43	15	33	46		94	0	1	9		10	0	25	0		25	172
08:00	40	1	0		41	7	14	52		73	0	0	7		7	0	27	0		27	148
08:15	51	6	1		58	7	16	60		83	0	4	5		9	0	29	1		30	180
Total Volume	177	11	5		193	35	89	209		333	0	6	32		38	2	102	1		105	669
% App Total	91.7%	5.7%	2.6%			10.5%	26.7%	62.8%			0.0%	15.8%	84.2%			1.9%	97.1%	1.0%			
PHF	.868	.458	.625		.832	.583	.674	.871		.886	.000	.375	.727		.792	.250	.879	.250		.875	.929

PM PEAK HOUR	Dennis McCarthy Dr Southbound					Laval Rd Westbound					Dennis McCarthy Dr Northbound					Laval Rd Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 16:00 to 17:00																					
Peak Hour For Entire Intersection Begins at 16:00																					
16:00	71	2	6		79	32	19	67		118	1	3	20		24	5	22	1		28	249
16:15	71	9	3		83	22	20	63		105	0	5	31		36	2	25	2		29	253
16:30	62	5	2		69	32	52	69		153	1	4	26		31	0	26	1		27	280
16:45	74	4	3		81	24	41	58		123	0	2	19		21	1	32	1		34	259
Total Volume	278	20	14		312	110	132	257		499	2	14	96		112	8	105	5		118	1041
% App Total	89.1%	6.4%	4.5%			22.0%	26.5%	51.5%			1.8%	12.5%	85.7%			6.8%	89.0%	4.2%			
PHF	.939	.556	.583		.940	.859	.635	.931		.815	.500	.700	.774		.778	.400	.820	.625		.868	.929

ALL TRAFFIC DATA

Intersection 3

City of Lebec
All Vehicles on Unshifted
HT on Bank 1
RTOR on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 15-8074 Wheeler Ridge Rd-Laval Rd.ppd
Date : 6/23/2015

Unshifted Count = All Vehicles

	Wheeler Ridge Rd Southbound					Laval Rd Westbound					Wheeler Ridge Rd Northbound					Laval Rd Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
07:00	0	12	22	0	34	0	0	0	0	0	0	9	0	0	9	38	0	40	0	78	121	0
07:15	0	12	32	0	44	0	0	0	0	0	1	8	0	0	9	23	0	32	0	55	108	0
07:30	0	13	38	1	51	0	0	0	0	0	0	15	0	0	15	34	0	47	0	81	147	1
07:45	0	9	29	1	38	0	0	0	0	0	1	29	0	0	30	38	0	39	0	77	145	1
Total	0	46	121	2	167	0	0	0	0	0	2	61	0	0	63	133	0	158	0	291	521	2
08:00	0	19	24	0	43	0	0	0	0	0	0	19	0	0	19	28	0	44	0	72	134	0
08:15	0	13	27	0	40	0	0	0	0	0	0	15	0	0	15	31	0	55	0	86	141	0
08:30	0	22	26	0	48	0	0	0	0	0	1	16	0	0	17	29	0	51	0	80	145	0
08:45	0	16	23	0	39	0	0	0	0	0	0	40	0	0	40	33	0	48	0	81	160	0
Total	0	70	100	0	170	0	0	0	0	0	1	90	0	0	91	121	0	198	0	319	580	0
16:00	0	13	38	0	51	0	0	0	0	0	0	13	0	0	13	53	0	59	0	112	176	0
16:15	0	20	43	0	63	0	0	0	0	0	1	26	0	0	27	60	0	74	0	134	224	0
16:30	0	17	53	0	70	0	0	0	0	0	1	31	0	0	32	55	0	57	0	112	214	0
16:45	0	26	47	0	73	0	0	0	0	0	0	23	0	0	23	62	0	66	0	128	224	0
Total	0	76	181	0	257	0	0	0	0	0	2	93	0	0	95	230	0	256	0	486	838	0
17:00	0	18	40	0	58	0	0	0	0	0	0	20	0	0	20	68	0	48	0	116	194	0
17:15	0	6	18	1	24	0	0	0	0	0	0	30	0	0	30	47	0	57	0	104	158	1
17:30	0	19	35	0	54	0	0	0	0	0	2	14	0	0	16	51	0	68	1	119	189	1
17:45	0	14	37	0	51	0	0	0	0	0	2	29	0	0	31	41	0	59	0	100	182	0
Total	0	57	130	1	187	0	0	0	0	0	4	93	0	0	97	207	0	232	1	439	723	2
Grand Total	0	249	532	3	781	0	0	0	0	0	9	337	0	0	346	691	0	844	1	1535	2662	4
Apprch %	0.0%	31.9%	68.1%			0.0%	0.0%	0.0%			2.6%	97.4%	0.0%			45.0%	0.0%	55.0%				
Total %	0.0%	9.4%	20.0%		29.3%	0.0%	0.0%	0.0%		0.0%	0.3%	12.7%	0.0%		13.0%	26.0%	0.0%	31.7%		57.7%	100.0%	

AM PEAK HOUR	Wheeler Ridge Rd Southbound				Laval Rd Westbound				Wheeler Ridge Rd Northbound				Laval Rd Eastbound				
START TIME	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																	
Peak Hour For Entire Intersection Begins at 08:00																	
08:00	0	19	24	43	0	0	0	0	0	19	0	19	28	0	44	72	134
08:15	0	13	27	40	0	0	0	0	0	15	0	15	31	0	55	86	141
08:30	0	22	26	48	0	0	0	0	1	16	0	17	29	0	51	80	145
08:45	0	16	23	39	0	0	0	0	0	40	0	40	33	0	48	81	160
Total Volume	0	70	100	170	0	0	0	0	1	90	0	91	121	0	198	319	580
% App Total	0.0%	41.2%	58.8%		0.0%	0.0%	0.0%		1.1%	98.9%	0.0%		37.9%	0.0%	62.1%		
PHF	.000	.795	.926	.885	.000	.000	.000	.000	.250	.563	.000	.569	.917	.000	.900	.927	.906

PM PEAK HOUR	Wheeler Ridge Rd Southbound				Laval Rd Westbound				Wheeler Ridge Rd Northbound				Laval Rd Eastbound				
START TIME	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	Total
Peak Hour Analysis From 16:15 to 17:15																	
Peak Hour For Entire Intersection Begins at 16:15																	
16:15	0	20	43	63	0	0	0	0	1	26	0	27	60	0	74	134	224
16:30	0	17	53	70	0	0	0	0	1	31	0	32	55	0	57	112	214
16:45	0	26	47	73	0	0	0	0	0	23	0	23	62	0	66	128	224
17:00	0	18	40	58	0	0	0	0	0	20	0	20	68	0	48	116	194
Total Volume	0	81	183	264	0	0	0	0	2	100	0	102	245	0	245	490	856
% App Total	0.0%	30.7%	69.3%		0.0%	0.0%	0.0%		2.0%	98.0%	0.0%		50.0%	0.0%	50.0%		
PHF	.000	.779	.863	.904	.000	.000	.000	.000	.500	.806	.000	.797	.901	.000	.828	.914	.955

ALL TRAFFIC DATA

Intersection 4

City of Lebec
All Vehicles on Unshifted
HT on Bank 1
Nothing on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 15-8074 Wheeler Ridge Rd-I-5 NB Ramps.ppd
Date : 6/23/2015

Unshifted Count = All Vehicles

	Wheeler Ridge Rd Southbound					I-5 NB Ramps Westbound					Wheeler Ridge Rd Northbound					I-5 NB Ramps Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
07:00	0	13	35	0	48	0	0	0	0	0	31	61	0	4	92	0	0	14	0	14	154	4
07:15	0	19	36	0	55	0	0	0	0	0	22	48	0	7	70	0	0	15	0	15	140	7
07:30	0	22	29	0	51	0	0	0	0	0	25	66	0	4	91	0	0	25	0	25	167	4
07:45	0	27	31	0	58	0	0	0	0	0	28	64	0	3	92	0	0	12	0	12	162	3
Total	0	81	131	0	212	0	0	0	0	0	106	239	0	18	345	0	0	66	0	66	623	18
08:00	0	26	28	0	54	0	0	0	0	0	21	70	0	2	91	0	0	15	0	15	160	2
08:15	0	19	27	0	46	0	0	0	0	0	26	62	0	4	88	0	0	14	0	14	148	4
08:30	0	32	23	0	55	0	0	0	0	0	19	63	0	2	82	0	0	13	0	13	150	2
08:45	0	37	36	0	73	0	0	0	0	0	25	80	0	0	105	0	0	6	0	6	184	0
Total	0	114	114	0	228	0	0	0	0	0	91	275	0	8	366	0	0	48	0	48	642	8
16:00	0	30	90	0	120	0	0	0	0	0	35	99	0	9	134	0	0	11	0	11	265	9
16:15	0	36	51	0	87	0	0	0	0	0	40	106	0	5	146	0	0	23	0	23	256	5
16:30	0	45	65	0	110	0	0	0	0	0	41	102	0	5	143	0	0	22	0	22	275	5
16:45	0	42	73	0	115	0	0	0	0	0	45	85	0	9	130	0	0	19	0	19	264	9
Total	0	153	279	0	432	0	0	0	0	0	161	392	0	28	553	0	0	75	0	75	1060	28
17:00	0	31	60	0	91	0	0	0	0	0	46	87	0	6	133	0	0	20	0	20	244	6
17:15	0	20	64	0	84	0	0	0	0	0	35	84	0	5	119	0	0	9	0	9	212	5
17:30	0	33	53	0	86	0	0	0	0	0	40	64	0	2	104	0	0	11	0	11	201	2
17:45	0	23	45	0	68	0	0	0	0	0	32	88	0	7	120	0	0	18	0	18	206	7
Total	0	107	222	0	329	0	0	0	0	0	153	323	0	20	476	0	0	58	0	58	863	20
Grand Total	0	455	746	0	1201	0	0	0	0	0	511	1229	0	74	1740	0	0	247	0	247	3188	74
Apprch %	0.0%	37.9%	62.1%			0.0%	0.0%	0.0%			29.4%	70.6%	0.0%			0.0%	0.0%	100.0%				
Total %	0.0%	14.3%	23.4%		37.7%	0.0%	0.0%	0.0%		0.0%	16.0%	38.6%	0.0%		54.6%	0.0%	0.0%	7.7%		7.7%	100.0%	

AM PEAK HOUR	Wheeler Ridge Rd Southbound				I-5 NB Ramps Westbound				Wheeler Ridge Rd Northbound				I-5 NB Ramps Eastbound				
START TIME	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																	
Peak Hour For Entire Intersection Begins at 08:00																	
08:00	0	26	28	54	0	0	0	0	21	70	0	91	0	0	15	15	160
08:15	0	19	27	46	0	0	0	0	26	62	0	88	0	0	14	14	148
08:30	0	32	23	55	0	0	0	0	19	63	0	82	0	0	13	13	150
08:45	0	37	36	73	0	0	0	0	25	80	0	105	0	0	6	6	184
Total Volume	0	114	114	228	0	0	0	0	91	275	0	366	0	0	48	48	642
% App Total	0.0%	50.0%	50.0%		0.0%	0.0%	0.0%		24.9%	75.1%	0.0%		0.0%	0.0%	100.0%		
PHF	.000	.770	.792	.781	.000	.000	.000	.000	.875	.859	.000	.871	.000	.000	.800	.800	.872

PM PEAK HOUR	Wheeler Ridge Rd Southbound				I-5 NB Ramps Westbound				Wheeler Ridge Rd Northbound				I-5 NB Ramps Eastbound				
START TIME	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	Total
Peak Hour Analysis From 16:00 to 17:00																	
Peak Hour For Entire Intersection Begins at 16:00																	
16:00	0	30	90	120	0	0	0	0	35	99	0	134	0	0	11	11	265
16:15	0	36	51	87	0	0	0	0	40	106	0	146	0	0	23	23	256
16:30	0	45	65	110	0	0	0	0	41	102	0	143	0	0	22	22	275
16:45	0	42	73	115	0	0	0	0	45	85	0	130	0	0	19	19	264
Total Volume	0	153	279	432	0	0	0	0	161	392	0	553	0	0	75	75	1060
% App Total	0.0%	35.4%	64.6%		0.0%	0.0%	0.0%		29.1%	70.9%	0.0%		0.0%	0.0%	100.0%		
PHF	.000	.850	.775	.900	.000	.000	.000	.000	.894	.925	.000	.947	.000	.000	.815	.815	.964

ALL TRAFFIC DATA

Intersection 5

City of Lebec
All Vehicles on Unshifted
HT on Bank 1
RTOR on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 15-8074 Wheeler Ridge Rd-Del Sol Dr.ppd
Date : 6/23/2015

Unshifted Count = All Vehicles

	Wheeler Ridge Rd Southbound					Del Sol Dr Westbound					Wheeler Ridge Rd Northbound					Del Sol Dr Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
07:00	3	23	0	0	26	25	1	1	3	27	0	37	17	1	54	0	0	0	0	0	107	4
07:15	1	37	0	0	38	16	0	2	1	18	0	31	9	1	40	0	1	0	0	1	97	2
07:30	5	38	0	1	43	16	1	0	1	17	1	44	16	0	61	0	0	0	0	0	121	2
07:45	2	30	0	0	32	25	0	4	3	29	0	29	24	0	53	1	0	1	0	2	116	3
Total	11	128	0	1	139	82	2	7	8	91	1	141	66	2	208	1	1	1	0	3	441	11
08:00	0	33	0	1	33	23	0	0	2	23	0	39	17	0	56	0	0	0	0	0	112	3
08:15	1	22	0	0	23	21	1	0	0	22	0	32	21	1	53	0	0	0	0	0	98	1
08:30	6	28	0	0	34	23	0	4	0	27	1	23	22	2	46	0	1	0	0	1	108	2
08:45	7	42	0	0	49	29	0	0	1	29	0	31	26	1	57	0	0	0	0	0	135	2
Total	14	125	0	1	139	96	1	4	3	101	1	125	86	4	212	0	1	0	0	1	453	8
16:00	6	42	0	0	48	76	0	3	0	79	0	43	28	1	71	0	0	0	0	0	198	1
16:15	2	25	0	0	27	57	0	8	2	65	0	37	29	2	66	0	0	0	0	0	158	4
16:30	11	43	0	0	54	64	0	8	2	72	0	48	23	1	71	0	0	0	0	0	197	3
16:45	10	41	0	0	51	75	0	9	1	84	0	36	16	0	52	0	0	0	0	0	187	1
Total	29	151	0	0	180	272	0	28	5	300	0	164	96	4	260	0	0	0	0	0	740	9
17:00	4	28	0	0	32	60	0	5	0	65	0	38	18	2	56	0	0	0	0	0	153	2
17:15	4	31	0	0	35	55	0	7	0	62	0	32	26	0	58	0	0	0	0	0	155	0
17:30	2	31	0	0	33	56	0	1	3	57	0	25	20	0	45	0	0	0	0	0	135	3
17:45	4	27	0	0	31	46	0	2	3	48	0	40	9	1	49	0	0	0	0	0	128	4
Total	14	117	0	0	131	217	0	15	6	232	0	135	73	3	208	0	0	0	0	0	571	9
Grand Total	68	521	0	2	589	667	3	54	22	724	2	565	321	13	888	1	2	1	0	4	2205	37
Apprch %	11.5%	88.5%	0.0%			92.1%	0.4%	7.5%			0.2%	63.6%	36.1%			25.0%	50.0%	25.0%				
Total %	3.1%	23.6%	0.0%		26.7%	30.2%	0.1%	2.4%		32.8%	0.1%	25.6%	14.6%		40.3%	0.0%	0.1%	0.0%		0.2%	100.0%	

AM PEAK HOUR	Wheeler Ridge Rd Southbound					Del Sol Dr Westbound					Wheeler Ridge Rd Northbound					Del Sol Dr Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	0	33	0		33	23	0	0		23	0	39	17		56	0	0	0		0	112
08:15	1	22	0		23	21	1	0		22	0	32	21		53	0	0	0		0	98
08:30	6	28	0		34	23	0	4		27	1	23	22		46	0	1	0		1	108
08:45	7	42	0		49	29	0	0		29	0	31	26		57	0	0	0		0	135
Total Volume	14	125	0		139	96	1	4		101	1	125	86		212	0	1	0		1	453
% App Total	10.1%	89.9%	0.0%			95.0%	1.0%	4.0%			0.5%	59.0%	40.6%			0.0%	100.0%	0.0%			
PHF	.500	.744	.000		.709	.828	.250	.250		.871	.250	.801	.827		.930	.000	.250	.000		.250	.839

PM PEAK HOUR	Wheeler Ridge Rd Southbound					Del Sol Dr Westbound					Wheeler Ridge Rd Northbound					Del Sol Dr Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 16:00 to 17:00																					
Peak Hour For Entire Intersection Begins at 16:00																					
16:00	6	42	0		48	76	0	3		79	0	43	28		71	0	0	0		0	198
16:15	2	25	0		27	57	0	8		65	0	37	29		66	0	0	0		0	158
16:30	11	43	0		54	64	0	8		72	0	48	23		71	0	0	0		0	197
16:45	10	41	0		51	75	0	9		84	0	36	16		52	0	0	0		0	187
Total Volume	29	151	0		180	272	0	28		300	0	164	96		260	0	0	0		0	740
% App Total	16.1%	83.9%	0.0%			90.7%	0.0%	9.3%			0.0%	63.1%	36.9%			0.0%	0.0%	0.0%			
PHF	.659	.878	.000		.833	.895	.000	.778		.893	.000	.854	.828		.915	.000	.000	.000		.000	.934

ALL TRAFFIC DATA

Intersection 6

City of Lebec
All Vehicles on Unshifted
HT on Bank 1
RTOR on Bank 2

(916) 771-8700
orders@atdtraffic.com

File Name : 15-8074 Wheeler Ridge Rd-Santa Elena Dr.ppd
Date : 6/23/2015

Unshifted Count = All Vehicles

	Wheeler Ridge Rd Southbound					Santa Elena Dr Westbound					Wheeler Ridge Rd Northbound					Santa Elena Dr Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
07:00	0	7	0	0	7	19	0	4	0	23	0	18	13	0	31	0	0	0	0	0	61	0
07:15	0	12	0	0	12	19	0	1	0	20	0	16	6	9	22	0	0	0	0	0	54	9
07:30	2	17	0	0	19	19	0	3	0	22	1	13	20	10	34	0	0	0	0	0	75	10
07:45	1	19	0	0	20	19	0	2	0	21	0	9	19	1	28	0	0	0	0	0	69	1
Total	3	55	0	0	58	76	0	10	0	86	1	56	58	20	115	0	0	0	0	0	259	20
08:00	1	15	0	0	16	13	0	1	0	14	0	15	11	5	26	0	0	0	0	0	56	5
08:15	1	7	0	0	8	14	0	2	0	16	0	20	11	3	31	0	0	0	0	0	55	3
08:30	1	13	0	0	14	13	0	2	0	15	0	10	13	8	23	0	0	0	0	0	52	8
08:45	4	25	0	0	29	20	0	3	0	23	0	6	11	7	17	0	0	0	0	0	69	7
Total	7	60	0	0	67	60	0	8	0	68	0	51	46	23	97	0	0	0	0	0	232	23
16:00	0	19	0	0	19	20	0	3	0	23	0	25	13	12	38	0	0	0	0	0	80	12
16:15	1	16	0	0	17	11	0	6	0	17	0	17	15	5	32	0	0	0	0	0	66	5
16:30	2	31	0	0	33	20	0	1	0	21	0	23	18	13	41	0	0	0	0	0	95	13
16:45	7	25	0	0	32	15	0	3	0	18	0	26	17	12	43	0	0	0	0	0	93	12
Total	10	91	0	0	101	66	0	13	0	79	0	91	63	42	154	0	0	0	0	0	334	42
17:00	1	12	0	0	13	14	0	1	0	15	0	15	20	6	35	0	0	0	0	0	63	6
17:15	3	11	0	0	14	17	0	1	0	18	0	17	17	6	34	0	0	0	0	0	66	6
17:30	1	13	0	0	14	17	1	2	0	20	0	7	12	4	19	0	0	0	0	0	53	4
17:45	3	14	0	0	17	15	0	3	0	18	0	14	15	2	29	0	0	0	0	0	64	2
Total	8	50	0	0	58	63	1	7	0	71	0	53	64	18	117	0	0	0	0	0	246	18
Grand Total	28	256	0	0	284	265	1	38	0	304	1	251	231	103	483	0	0	0	0	0	1071	103
Apprch %	9.9%	90.1%	0.0%			87.2%	0.3%	12.5%			0.2%	52.0%	47.8%			0.0%	0.0%	0.0%				
Total %	2.6%	23.9%	0.0%		26.5%	24.7%	0.1%	3.5%		28.4%	0.1%	23.4%	21.6%		45.1%	0.0%	0.0%	0.0%		0.0%	100.0%	

AM PEAK HOUR	Wheeler Ridge Rd Southbound				Santa Elena Dr Westbound				Wheeler Ridge Rd Northbound				Santa Elena Dr Eastbound				
START TIME	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	Total
Peak Hour Analysis From 07:00 to 08:00																	
Peak Hour For Entire Intersection Begins at 07:00																	
07:00	0	7	0	7	19	0	4	23	0	18	13	31	0	0	0	0	61
07:15	0	12	0	12	19	0	1	20	0	16	6	22	0	0	0	0	54
07:30	2	17	0	19	19	0	3	22	1	13	20	34	0	0	0	0	75
07:45	1	19	0	20	19	0	2	21	0	9	19	28	0	0	0	0	69
Total Volume	3	55	0	58	76	0	10	86	1	56	58	115	0	0	0	0	259
% App Total	5.2%	94.8%	0.0%		88.4%	0.0%	11.6%		0.9%	48.7%	50.4%		0.0%	0.0%	0.0%		
PHF	.375	.724	.000	.725	1.000	.000	.625	.935	.250	.778	.725	.846	.000	.000	.000	.000	.863

PM PEAK HOUR	Wheeler Ridge Rd Southbound				Santa Elena Dr Westbound				Wheeler Ridge Rd Northbound				Santa Elena Dr Eastbound				
START TIME	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	Total
Peak Hour Analysis From 16:00 to 17:00																	
Peak Hour For Entire Intersection Begins at 16:00																	
16:00	0	19	0	19	20	0	3	23	0	25	13	38	0	0	0	0	80
16:15	1	16	0	17	11	0	6	17	0	17	15	32	0	0	0	0	66
16:30	2	31	0	33	20	0	1	21	0	23	18	41	0	0	0	0	95
16:45	7	25	0	32	15	0	3	18	0	26	17	43	0	0	0	0	93
Total Volume	10	91	0	101	66	0	13	79	0	91	63	154	0	0	0	0	334
% App Total	9.9%	90.1%	0.0%		83.5%	0.0%	16.5%		0.0%	59.1%	40.9%		0.0%	0.0%	0.0%		
PHF	.357	.734	.000	.765	.825	.000	.542	.859	.000	.875	.875	.895	.000	.000	.000	.000	.879

ALL TRAFFIC DATA

Laval Rd. SB Slip Off-Ramp

(916) 771-8700
orders@atdtraffic.com

City of Lebec
All Vehicles on Unshifted
HT on Bank 1
RTOR on Bank 2

File Name : 15-8074 I-5 SB Ramp-Laval Rd.ppd
Date : 6/23/2015

Unshifted Count = All Vehicles

	I-5 SB Ramp Southbound					Laval Rd Westbound					I-5 SB Ramp Northbound					Laval Rd Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
07:00	0	0	41	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	0
07:15	0	0	48	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0
07:30	0	0	44	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	0
07:45	0	0	67	0	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	0
Total	0	0	200	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0
08:00	0	0	47	0	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	0
08:15	0	0	53	0	53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0
08:30	0	0	40	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0
08:45	0	0	76	0	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	0
Total	0	0	216	0	216	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	216	0
16:00	0	0	75	0	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0
16:15	0	0	72	0	72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	72	0
16:30	0	0	103	0	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103	0
16:45	0	0	78	0	78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	0
Total	0	0	328	0	328	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	328	0
17:00	0	0	61	0	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61	0
17:15	0	0	84	0	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	0
17:30	0	0	80	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0
17:45	0	0	94	0	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	0
Total	0	0	319	0	319	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	319	0
Grand Total	0	0	1063	0	1063	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1063	0
Apprch %	0.0%	0.0%	100.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%				
Total %	0.0%	0.0%	100.0%		100.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	100.0%	

AM PEAK HOUR	I-5 SB Ramp Southbound					Laval Rd Westbound					I-5 SB Ramp Northbound					Laval Rd Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 08:00 to 09:00																					
Peak Hour For Entire Intersection Begins at 08:00																					
08:00	0	0	47		47	0	0	0		0	0	0	0		0	0	0	0		0	47
08:15	0	0	53		53	0	0	0		0	0	0	0		0	0	0	0		0	53
08:30	0	0	40		40	0	0	0		0	0	0	0		0	0	0	0		0	40
08:45	0	0	76		76	0	0	0		0	0	0	0		0	0	0	0		0	76
Total Volume	0	0	216		216	0	0	0		0	0	0	0		0	0	0	0		0	216
% App Total	0.0%	0.0%	100.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			
PHF	.000	.000	.711		.711	.000	.000	.000		.000	.000	.000	.000		.000	.000	.000	.000		.000	.711

PM PEAK HOUR	I-5 SB Ramp Southbound					Laval Rd Westbound					I-5 SB Ramp Northbound					Laval Rd Eastbound					
START TIME	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	LEFT	THRU	RIGHT		APP.TOTAL	Total
Peak Hour Analysis From 16:00 to 17:00																					
Peak Hour For Entire Intersection Begins at 16:00																					
16:00	0	0	75		75	0	0	0		0	0	0	0		0	0	0	0		0	75
16:15	0	0	72		72	0	0	0		0	0	0	0		0	0	0	0		0	72
16:30	0	0	103		103	0	0	0		0	0	0	0		0	0	0	0		0	103
16:45	0	0	78		78	0	0	0		0	0	0	0		0	0	0	0		0	78
Total Volume	0	0	328		328	0	0	0		0	0	0	0		0	0	0	0		0	328
% App Total	0.0%	0.0%	100.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			
PHF	.000	.000	.796		.796	.000	.000	.000		.000	.000	.000	.000		.000	.000	.000	.000		.000	.796

ALL TRAFFIC DATA

(916) 771-8700
orders@atdtraffic.com

Wheeler Ridge Rd. NB Slip Off-Ramp

City of Lebec
All Vehicles on Unshifted
HT on Bank 1
Nothing on Bank 2

File Name : 15-8074 Wheeler Ridge Rd-I-5 NB Ramp.ppd
Date : 6/23/2015

Unshifted Count = All Vehicles

	Wheeler Ridge Rd Southbound					I-5 NB Ramp Westbound					Wheeler Ridge Rd Northbound					I-5 NB Ramp Eastbound						
START TIME	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	LEFT	THRU	RIGHT	PEDS	APP.TOTAL	Total	Ped Total
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	48	48	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	0	47	47	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	0	44	44	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	28	28	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	0	167	167	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	0	46	46	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	48	48	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	0	37	37	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	35	35	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	166	0	166	166	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73	0	73	73	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	0	69	69	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	0	59	59	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	0	57	57	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	258	0	258	258	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	48	48	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	0	54	54	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42	0	42	42	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	0	56	56	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	0	200	200	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	791	0	791	791	0
Apprch %	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	0.0%			0.0%	0.0%	100.0%				
Total %	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	100.0%		100.0%	100.0%	

AM PEAK HOUR	Wheeler Ridge Rd Southbound				I-5 NB Ramp Westbound				Wheeler Ridge Rd Northbound				I-5 NB Ramp Eastbound				
START TIME	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	Total
Peak Hour Analysis From 07:00 to 08:00																	
Peak Hour For Entire Intersection Begins at 07:00																	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	48	48
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	47	47
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	44
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	28	28
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	167	167
% App Total	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	100.0%		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.870	.870	.870

PM PEAK HOUR	Wheeler Ridge Rd Southbound				I-5 NB Ramp Westbound				Wheeler Ridge Rd Northbound				I-5 NB Ramp Eastbound				
START TIME	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	LEFT	THRU	RIGHT	APP.TOTAL	Total
Peak Hour Analysis From 16:00 to 17:00																	
Peak Hour For Entire Intersection Begins at 16:00																	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73	73	73
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	69	69
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	59	59
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	57	57
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	258	258	258
% App Total	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	100.0%		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.884	.884	.884

I-5 Northbound north of SR 99 - A.M. Peak Period

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-8076-001

Day: Tuesday

TOTALS

City: Kern County

Date: 6/23/2015

AM

NS/EW Streets:	I-5 NB			I-5 NB			S_O Sabodan St Overcrossing			S_O Sabodan St Overcrossing			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	3	0	0	0	0	0	0	0	0	0	0	
7:00 AM	0	161	0	0	0	0	0	0	0	0	0	0	161
7:15 AM	0	173	0	0	0	0	0	0	0	0	0	0	173
7:30 AM	0	139	0	0	0	0	0	0	0	0	0	0	139
7:45 AM	0	165	0	0	0	0	0	0	0	0	0	0	165
8:00 AM	0	136	0	0	0	0	0	0	0	0	0	0	136
8:15 AM	0	163	0	0	0	0	0	0	0	0	0	0	163
8:30 AM	0	144	0	0	0	0	0	0	0	0	0	0	144
8:45 AM	0	142	0	0	0	0	0	0	0	0	0	0	142

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	1223	0	0	0	0	0	0	0	0	0	0	1223
APPROACH %'s :	0.00%	100.00%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	700 AM												TOTAL
PEAK HR VOL :	0	638	0	0	0	0	0	0	0	0	0	0	638
PEAK HR FACTOR :		0.922			0.000			0.000			0.000		0.922

CONTROL : No Control

I-5 Northbound north of SR 99 - P.M. Peak Period

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-8076-001

Day: Tuesday

TOTALS

City: Kern County

Date: 6/23/2015

PM

NS/EW Streets:	I-5 NB			I-5 NB			S_O Sabodan St Overcrossing			S_O Sabodan St Overcrossing			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	3	0	0	0	0	0	0	0	0	0	0	
4:00 PM	0	252	0	0	0	0	0	0	0	0	0	0	252
4:15 PM	0	219	0	0	0	0	0	0	0	0	0	0	219
4:30 PM	0	208	0	0	0	0	0	0	0	0	0	0	208
4:45 PM	0	196	0	0	0	0	0	0	0	0	0	0	196
5:00 PM	0	201	0	0	0	0	0	0	0	0	0	0	201
5:15 PM	0	180	0	0	0	0	0	0	0	0	0	0	180
5:30 PM	0	178	0	0	0	0	0	0	0	0	0	0	178
5:45 PM	0	145	0	0	0	0	0	0	0	0	0	0	145

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	1579	0	0	0	0	0	0	0	0	0	0	1579
APPROACH %'s :	0.00%	100.00%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	400 PM												TOTAL
PEAK HR VOL :	0	875	0	0	0	0	0	0	0	0	0	0	875
PEAK HR FACTOR :		0.868			0.000			0.000			0.000		0.868

CONTROL : No Control

I-5 Northbound north of Laval Rd Interchange - A.M. Peak Period

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-8076-002

Day: Tuesday

TOTALS

City: Kern County

Date: 6/23/2015

AM

NS/EW Streets:	I-5 NB			I-5 NB			N_O Laval Rd Interchange			N_O Laval Rd Interchange			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	4	0	0	0	0	0	0	0	0	0	0	
7:00 AM	0	406	0	0	0	0	0	0	0	0	0	0	406
7:15 AM	0	387	0	0	0	0	0	0	0	0	0	0	387
7:30 AM	0	372	0	0	0	0	0	0	0	0	0	0	372
7:45 AM	0	367	0	0	0	0	0	0	0	0	0	0	367
8:00 AM	0	380	0	0	0	0	0	0	0	0	0	0	380
8:15 AM	0	384	0	0	0	0	0	0	0	0	0	0	384
8:30 AM	0	394	0	0	0	0	0	0	0	0	0	0	394
8:45 AM	0	403	0	0	0	0	0	0	0	0	0	0	403

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	3093	0	0	0	0	0	0	0	0	0	0	3093
APPROACH %'s :	0.00%	100.00%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	0	1561	0	0	0	0	0	0	0	0	0	0	1561
PEAK HR FACTOR :		0.968			0.000			0.000			0.000		0.968

CONTROL : No Control

I-5 Northbound north of Laval Rd Interchange - P.M. Peak Period

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-8076-002

Day: Tuesday

TOTALS

City: Kern County

Date: 6/23/2015

PM

NS/EW Streets:	I-5 NB			I-5 NB			N_O Laval Rd Interchange			N_O Laval Rd Interchange			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	4	0	0	0	0	0	0	0	0	0	0	
4:00 PM	0	584	0	0	0	0	0	0	0	0	0	0	584
4:15 PM	0	546	0	0	0	0	0	0	0	0	0	0	546
4:30 PM	0	520	0	0	0	0	0	0	0	0	0	0	520
4:45 PM	0	508	0	0	0	0	0	0	0	0	0	0	508
5:00 PM	0	535	0	0	0	0	0	0	0	0	0	0	535
5:15 PM	0	493	0	0	0	0	0	0	0	0	0	0	493
5:30 PM	0	415	0	0	0	0	0	0	0	0	0	0	415
5:45 PM	0	295	0	0	0	0	0	0	0	0	0	0	295

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	3896	0	0	0	0	0	0	0	0	0	0	3896
APPROACH %'s :	0.00%	100.00%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	400 PM												TOTAL
PEAK HR VOL :	0	2158	0	0	0	0	0	0	0	0	0	0	2158
PEAK HR FACTOR :		0.924			0.000			0.000			0.000		0.924

CONTROL : No Control

Intersection Turning Movement

I-5 Southbound north of SR 99 - A.M. Peak Period

Prepared by:

National Data & Surveying Services

Project ID: 15-8076-003

Day: Tuesday

TOTALS

City: Kern County

Date: 6/23/2015

AM

NS/EW Streets:	I-5 SB			I-5 SB			S_O Sabodan St Overcrossing			S_O Sabodan St Overcrossing			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	3	0	0	0	0	0	0	0	
7:00 AM	0	0	0	0	84	0	0	0	0	0	0	0	84
7:15 AM	0	0	0	0	93	0	0	0	0	0	0	0	93
7:30 AM	0	0	0	0	116	0	0	0	0	0	0	0	116
7:45 AM	0	0	0	0	106	0	0	0	0	0	0	0	106
8:00 AM	0	0	0	0	120	0	0	0	0	0	0	0	120
8:15 AM	0	0	0	0	109	0	0	0	0	0	0	0	109
8:30 AM	0	0	0	0	134	0	0	0	0	0	0	0	134
8:45 AM	0	0	0	0	136	0	0	0	0	0	0	0	136

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	0	898	0	0	0	0	0	0	0	898
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	100.00%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	0	0	0	0	499	0	0	0	0	0	0	0	499
PEAK HR FACTOR :	0.000			0.917			0.000			0.000			0.917

CONTROL : No Control

Intersection Turning Movement

I-5 Southbound north of SR 99 - P.M. Peak Period

Prepared by:

National Data & Surveying Services

Project ID: 15-8076-003

Day: Tuesday

TOTALS

City: Kern County

Date: 6/23/2015

PM

NS/EW Streets:	I-5 SB			I-5 SB			S_O Sabodan St Overcrossing			S_O Sabodan St Overcrossing			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	3	0	0	0	0	0	0	0	
4:00 PM	0	0	0	0	214	0	0	0	0	0	0	0	214
4:15 PM	0	0	0	0	213	0	0	0	0	0	0	0	213
4:30 PM	0	0	0	0	202	0	0	0	0	0	0	0	202
4:45 PM	0	0	0	0	195	0	0	0	0	0	0	0	195
5:00 PM	0	0	0	0	250	0	0	0	0	0	0	0	250
5:15 PM	0	0	0	0	222	0	0	0	0	0	0	0	222
5:30 PM	0	0	0	0	197	0	0	0	0	0	0	0	197
5:45 PM	0	0	0	0	232	0	0	0	0	0	0	0	232

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	0	1725	0	0	0	0	0	0	0	1725
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	100.00%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	0	0	0	0	901	0	0	0	0	0	0	0	901
PEAK HR FACTOR :		0.000			0.901			0.000			0.000		0.901

CONTROL : No Control

I-5 Southbound north of Laval Rd Interchange - A.M. Peak Period

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-8076-004

Day: Tuesday

TOTALS

City: Kern County

Date: 6/23/2015

AM

NS/EW Streets:	I-5 SB			I-5 SB			N_O Laval Rd Interchange			N_O Laval Rd Interchange			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	4	0	0	0	0	0	0	0	
7:00 AM	0	0	0	0	260	0	0	0	0	0	0	0	260
7:15 AM	0	0	0	0	286	0	0	0	0	0	0	0	286
7:30 AM	0	0	0	0	343	0	0	0	0	0	0	0	343
7:45 AM	0	0	0	0	371	0	0	0	0	0	0	0	371
8:00 AM	0	0	0	0	323	0	0	0	0	0	0	0	323
8:15 AM	0	0	0	0	342	0	0	0	0	0	0	0	342
8:30 AM	0	0	0	0	374	0	0	0	0	0	0	0	374
8:45 AM	0	0	0	0	422	0	0	0	0	0	0	0	422

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	0	2721	0	0	0	0	0	0	0	2721
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	100.00%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	0	0	0	0	1461	0	0	0	0	0	0	0	1461
PEAK HR FACTOR :	0.000			0.866			0.000			0.000			0.866

CONTROL : No Control

I-5 Southbound north of Laval Rd Interchange - P.M. Peak Period

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-8076-004

Day: Tuesday

TOTALS

City: Kern County

Date: 6/23/2015

PM

NS/EW Streets:	I-5 SB			I-5 SB			N_O Laval Rd Interchange			N_O Laval Rd Interchange			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	4	0	0	0	0	0	0	0	
4:00 PM	0	0	0	0	441	0	0	0	0	0	0	0	441
4:15 PM	0	0	0	0	439	0	0	0	0	0	0	0	439
4:30 PM	0	0	0	0	462	0	0	0	0	0	0	0	462
4:45 PM	0	0	0	0	461	0	0	0	0	0	0	0	461
5:00 PM	0	0	0	0	455	0	0	0	0	0	0	0	455
5:15 PM	0	0	0	0	454	0	0	0	0	0	0	0	454
5:30 PM	0	0	0	0	470	0	0	0	0	0	0	0	470
5:45 PM	0	0	0	0	505	0	0	0	0	0	0	0	505

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	0	3687	0	0	0	0	0	0	0	3687
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	100.00%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	0	0	0	0	1884	0	0	0	0	0	0	0	1884
PEAK HR FACTOR :		0.000			0.933			0.000			0.000		0.933

CONTROL : No Control

Intersection Turning Movement

SR-99 Southbound north of I-5 - A.M. Peak Period

Prepared by:

National Data & Surveying Services

Project ID: 15-8076-005

Day: Tuesday

TOTALS

City: Kern County

Date: 6/23/2015

AM

NS/EW Streets:	SR-99 SB			SR-99 SB			S_O SR-166			S_O SR-166			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	3	0	0	0	0	0	0	0	
7:00 AM	0	0	0	0	182	0	0	0	0	0	0	0	182
7:15 AM	0	0	0	0	206	0	0	0	0	0	0	0	206
7:30 AM	0	0	0	0	238	0	0	0	0	0	0	0	238
7:45 AM	0	0	0	0	251	0	0	0	0	0	0	0	251
8:00 AM	0	0	0	0	228	0	0	0	0	0	0	0	228
8:15 AM	0	0	0	0	230	0	0	0	0	0	0	0	230
8:30 AM	0	0	0	0	253	0	0	0	0	0	0	0	253
8:45 AM	0	0	0	0	293	0	0	0	0	0	0	0	293

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	0	1881	0	0	0	0	0	0	0	1881
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	100.00%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	0	0	0	0	1004	0	0	0	0	0	0	0	1004
PEAK HR FACTOR :	0.000			0.857			0.000			0.000			0.857

CONTROL : No Control

SR-99 Southbound north of I-5 - P.M. Peak Period

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 15-8076-005

Day: Tuesday

TOTALS

City: Kern County

Date: 6/23/2015

PM

NS/EW Streets:	SR-99 SB			SR-99 SB			S_O SR-166			S_O SR-166			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	0	3	0	0	0	0	0	0	0	
4:00 PM	0	0	0	0	243	0	0	0	0	0	0	0	243
4:15 PM	0	0	0	0	240	0	0	0	0	0	0	0	240
4:30 PM	0	0	0	0	272	0	0	0	0	0	0	0	272
4:45 PM	0	0	0	0	235	0	0	0	0	0	0	0	235
5:00 PM	0	0	0	0	248	0	0	0	0	0	0	0	248
5:15 PM	0	0	0	0	220	0	0	0	0	0	0	0	220
5:30 PM	0	0	0	0	294	0	0	0	0	0	0	0	294
5:45 PM	0	0	0	0	254	0	0	0	0	0	0	0	254

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	0	2006	0	0	0	0	0	0	0	2006
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	0.00%	100.00%	0.00%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	0	0	0	0	1016	0	0	0	0	0	0	0	1016
PEAK HR FACTOR :	0.000			0.864			0.000			0.000			0.864

CONTROL : No Control

I-5 Southbound On-Ramp at Grapevine Rd

Class Report - Prepared by: NDS/ATD

Grapevine Rd West s/o I-5 SB Ramps
Lebec
Project #: CA15_8075_001n Date: 6/23/2015 Tuesday

North Bound

Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	1	1	0	1	0	0	0	0	0	0	0	0	3
12:15 AM	0	5	1	0	0	0	0	0	0	0	0	0	0	6
12:30 AM	0	2	3	0	0	0	0	0	0	0	0	0	0	5
12:45 AM	0	0	1	1	0	0	0	0	0	0	0	0	0	2
Hour Total	0	8	6	1	1	0	0	0	0	0	0	0	0	16
1:00 AM	0	1	0	1	0	0	0	0	0	0	0	0	0	2
1:15 AM	0	7	2	0	0	0	0	0	0	0	0	0	0	9
1:30 AM	0	2	1	0	0	0	0	0	1	0	0	0	0	4
1:45 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Hour Total	0	14	3	1	0	0	0	0	1	0	0	0	0	19
2:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
2:15 AM	0	2	1	0	1	0	0	1	0	0	0	0	0	5
2:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
2:45 AM	0	4	1	0	0	0	0	0	0	0	1	0	0	6
Hour Total	0	10	2	0	1	0	0	1	0	0	1	0	0	15
3:00 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	2
3:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	1
3:30 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1
3:45 AM	0	2	0	0	1	0	0	0	0	0	0	0	0	3
Hour Total	0	2	1	0	3	1	0	0	0	0	0	0	0	7
4:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 AM	0	2	0	0	1	0	0	0	0	0	0	0	0	3
4:30 AM	0	3	1	0	2	0	0	0	0	0	0	0	0	6
4:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hour Total	0	5	1	0	3	0	0	0	0	0	0	0	0	9
5:00 AM	0	3	0	0	2	0	0	0	0	0	0	0	0	5
5:15 AM	0	4	0	0	1	1	0	0	0	0	0	0	0	6
5:30 AM	0	2	0	0	1	0	0	0	0	0	0	0	0	3
5:45 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	3
Hour Total	0	11	1	0	4	1	0	0	0	0	0	0	0	17
6:00 AM	0	6	2	0	1	0	0	0	0	0	0	0	0	9
6:15 AM	0	5	1	0	0	0	0	0	0	0	0	0	0	6
6:30 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
6:45 AM	0	2	5	0	0	0	0	0	0	0	0	0	0	7
Hour Total	0	16	8	0	1	0	0	0	0	0	0	0	0	25
7:00 AM	0	5	0	0	3	0	0	0	0	0	0	0	0	8
7:15 AM	0	6	4	0	3	0	0	1	0	0	0	0	0	14
7:30 AM	0	5	1	0	1	0	0	0	0	0	0	0	0	7
7:45 AM	0	6	0	0	0	0	0	0	0	0	0	0	0	6
Hour Total	0	22	5	0	7	0	0	1	0	0	0	0	0	35
8:00 AM	0	4	3	0	4	0	0	0	0	0	0	0	0	11
8:15 AM	0	6	1	0	1	0	0	0	0	0	0	0	0	8
8:30 AM	0	1	1	0	3	0	0	0	1	0	0	0	0	6
8:45 AM	0	5	3	2	1	0	0	1	0	0	0	0	0	12
Hour Total	0	16	8	2	9	0	0	1	1	0	0	0	0	37
9:00 AM	0	2	5	0	1	0	0	0	0	0	0	0	0	8
9:15 AM	0	4	1	0	1	1	0	0	0	0	0	0	0	7
9:30 AM	0	5	1	0	1	0	0	0	1	0	0	0	0	8
9:45 AM	0	7	4	0	0	0	0	0	0	0	0	0	0	11
Hour Total	0	18	11	0	3	1	0	0	1	0	0	0	0	34
10:00 AM	0	8	3	0	1	0	0	0	0	0	0	0	0	12
10:15 AM	0	3	2	0	3	0	0	0	0	0	0	0	0	8
10:30 AM	0	7	1	0	1	0	0	0	1	0	0	0	0	10
10:45 AM	0	6	1	0	1	0	0	0	0	0	0	0	0	8
Hour Total	0	24	7	0	6	0	0	0	1	0	0	0	0	38
11:00 AM	0	9	3	0	0	0	0	2	0	0	0	0	0	14
11:15 AM	0	5	6	0	1	0	0	0	0	0	1	0	0	13
11:30 AM	0	6	2	0	2	0	0	0	0	0	0	0	0	10

Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
11:45 AM	0	2	4	0	4	0	0	1	0	0	0	0	0	11
Hour Total	0	22	15	0	7	0	0	3	0	0	1	0	0	48
12:00 PM	0	6	4	0	1	0	0	0	0	0	0	0	0	11
12:15 PM	0	5	3	0	2	0	0	0	0	0	0	0	0	10
12:30 PM	0	9	0	0	0	0	0	0	0	0	0	0	0	9
12:45 PM	0	7	3	0	0	0	0	0	0	0	0	0	0	10
Hour Total	0	27	10	0	3	0	0	0	0	0	0	0	0	40
1:00 PM	0	3	6	0	0	0	0	1	1	0	0	0	0	11
1:15 PM	0	5	3	0	1	0	0	0	0	0	0	0	0	9
1:30 PM	0	4	6	0	3	0	0	0	0	0	0	0	0	13
1:45 PM	0	3	1	0	1	0	0	0	1	0	0	0	0	6
Hour Total	0	15	16	0	5	0	0	1	2	0	0	0	0	39
2:00 PM	0	9	3	0	1	0	0	0	0	0	0	0	0	13
2:15 PM	0	13	0	0	2	0	0	0	0	0	0	0	0	15
2:30 PM	0	14	1	0	0	0	0	0	0	0	0	0	0	15
2:45 PM	0	6	3	1	1	0	0	0	1	0	0	0	0	12
Hour Total	0	42	7	1	4	0	0	0	1	0	0	0	0	55
3:00 PM	0	9	2	0	0	0	0	0	0	0	0	0	0	11
3:15 PM	0	9	4	0	0	0	0	0	0	0	0	0	0	13
3:30 PM	0	9	1	0	0	0	0	0	0	0	0	0	0	10
3:45 PM	0	6	1	0	2	0	0	0	0	0	0	0	0	9
Hour Total	0	33	8	0	2	0	0	0	0	0	0	0	0	43
4:00 PM	0	10	2	0	1	0	0	0	0	0	0	0	0	13
4:15 PM	0	8	0	0	0	0	0	0	0	0	0	0	0	8
4:30 PM	0	4	1	0	1	0	0	0	0	0	0	0	0	6
4:45 PM	0	9	4	0	0	0	0	0	1	0	0	0	0	14
Hour Total	0	31	7	0	2	0	0	0	1	0	0	0	0	41
5:00 PM	0	8	3	0	2	0	0	0	1	0	0	0	0	14
5:15 PM	0	7	0	0	1	0	0	0	0	0	0	0	0	8
5:30 PM	0	11	3	1	1	0	0	0	0	0	0	0	0	16
5:45 PM	0	8	3	0	2	0	0	1	0	0	0	0	0	14
Hour Total	0	34	9	1	6	0	0	1	1	0	0	0	0	52
6:00 PM	0	9	3	1	0	0	0	0	0	0	0	0	0	13
6:15 PM	1	10	2	1	1	0	0	0	0	0	0	0	0	15
6:30 PM	0	9	1	0	4	0	0	0	0	0	0	0	0	14
6:45 PM	0	9	4	0	3	0	0	0	0	0	0	0	0	16
Hour Total	1	37	10	2	8	0	0	0	0	0	0	0	0	58
7:00 PM	0	9	2	0	0	0	0	0	0	0	0	0	0	11
7:15 PM	0	10	3	0	2	0	0	0	0	0	0	0	0	15
7:30 PM	0	9	1	0	2	0	0	0	0	0	0	0	0	12
7:45 PM	0	5	2	0	3	0	0	1	0	0	0	0	0	11
Hour Total	0	33	8	0	7	0	0	1	0	0	0	0	0	49
8:00 PM	0	5	0	0	0	0	0	0	0	0	0	0	0	5
8:15 PM	0	4	0	0	0	0	0	0	0	0	0	0	0	4
8:30 PM	0	6	2	0	1	0	0	0	0	0	0	0	0	9
8:45 PM	1	5	2	0	1	0	0	0	0	0	0	0	0	9
Hour Total	1	20	4	0	2	0	0	0	0	0	0	0	0	27
9:00 PM	0	13	1	0	2	0	0	0	1	0	0	0	0	17
9:15 PM	0	7	1	0	6	0	0	0	0	0	0	0	0	14
9:30 PM	0	6	1	0	0	0	0	0	0	0	0	0	0	7
9:45 PM	0	6	1	0	1	0	0	1	0	0	0	0	0	9
Hour Total	0	32	4	0	9	0	0	1	1	0	0	0	0	47
10:00 PM	0	7	1	1	0	0	0	0	0	0	0	0	0	9
10:15 PM	0	5	2	0	2	0	0	0	0	0	0	0	0	9
10:30 PM	0	6	2	0	2	0	0	0	0	0	0	0	0	10
10:45 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	3
Hour Total	0	20	6	1	4	0	0	0	0	0	0	0	0	31
11:00 PM	0	3	1	0	3	0	0	0	0	0	0	0	0	7
11:15 PM	0	4	0	0	1	0	0	0	0	0	0	0	0	5
11:30 PM	0	2	2	0	0	0	0	0	0	0	0	0	0	4
11:45 PM	0	4	1	0	0	0	0	0	0	0	0	0	0	5
Hour Total	0	13	4	0	4	0	0	0	0	0	0	0	0	21
Totals	2	505	161	9	101	3	0	10	10	0	2	0	0	803
Percent	0.2%	62.9%	20.0%	1.1%	12.6%	0.4%	0.0%	1.2%	1.2%	0.0%	0.2%	0.0%	0.0%	

I-5 Southbound Off-Ramp at Grapevine Rd

Class Report - Prepared by: NDS/ATD

Grapevine Rd West s/o I-5 SB Ramps
Lebec
Project #: CA15_8075_001s   Date: 6/23/2015   Tuesday

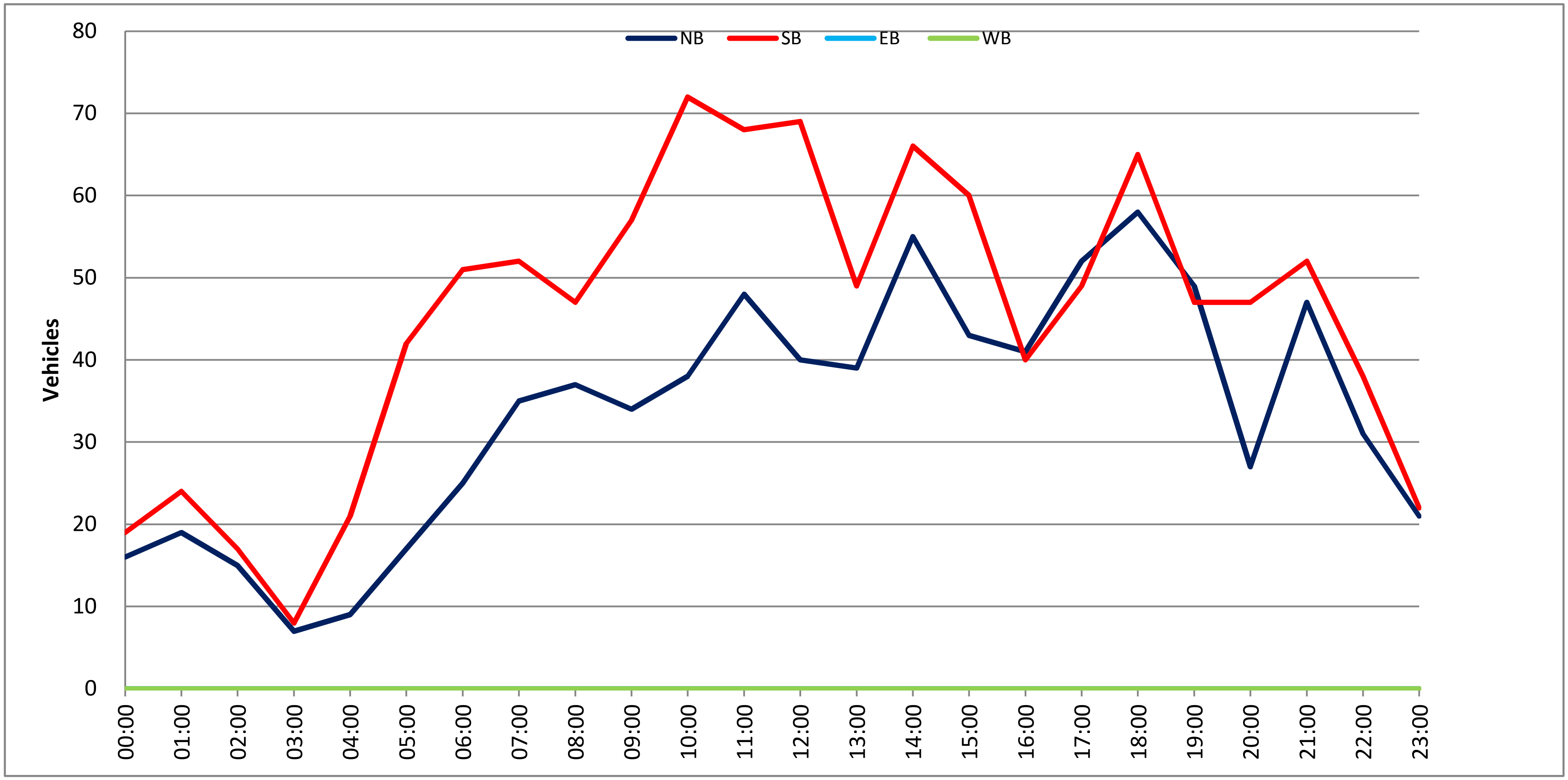
South Bound

Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	7	1	0	1	0	0	0	0	0	0	0	0	9
12:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
12:30 AM	0	4	3	1	0	0	0	0	0	0	0	0	0	8
12:45 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Hour Total	0	12	4	2	1	0	0	0	0	0	0	0	0	19
1:00 AM	0	7	0	0	0	0	0	0	0	0	0	0	0	7
1:15 AM	1	5	0	0	0	1	0	0	0	0	0	0	0	7
1:30 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	4
1:45 AM	0	6	0	0	0	0	0	0	0	0	0	0	0	6
Hour Total	1	22	0	0	0	1	0	0	0	0	0	0	0	24
2:00 AM	0	4	0	0	1	0	0	1	0	0	0	0	0	6
2:15 AM	0	2	0	0	0	0	0	0	0	0	1	0	0	3
2:30 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
2:45 AM	0	2	0	0	0	1	0	0	1	0	1	0	0	5
Hour Total	0	11	0	0	1	1	0	1	1	0	2	0	0	17
3:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	2
3:15 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	1
3:30 AM	0	2	1	0	1	0	0	0	0	0	0	0	0	4
3:45 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Hour Total	0	2	3	0	3	0	0	0	0	0	0	0	0	8
4:00 AM	0	1	0	0	1	0	0	1	0	0	0	0	0	3
4:15 AM	0	3	0	0	4	0	0	0	0	0	0	0	0	7
4:30 AM	0	3	2	0	0	0	0	0	1	0	0	0	0	6
4:45 AM	0	2	0	0	2	1	0	0	0	0	0	0	0	5
Hour Total	0	9	2	0	7	1	0	1	1	0	0	0	0	21
5:00 AM	0	3	2	0	2	1	0	0	0	0	0	0	0	8
5:15 AM	0	8	0	0	5	0	0	0	0	0	0	0	0	13
5:30 AM	0	1	1	0	3	0	0	0	0	0	0	0	0	5
5:45 AM	0	10	1	0	5	0	0	0	0	0	0	0	0	16
Hour Total	0	22	4	0	15	1	0	0	0	0	0	0	0	42
6:00 AM	0	10	0	0	0	0	0	0	0	0	0	0	0	10
6:15 AM	0	7	2	0	2	0	0	0	0	0	0	0	0	11
6:30 AM	0	10	0	0	3	0	0	0	0	0	0	0	0	13
6:45 AM	0	13	3	0	1	0	0	0	0	0	0	0	0	17
Hour Total	0	40	5	0	6	0	0	0	0	0	0	0	0	51
7:00 AM	0	10	2	0	4	0	0	0	0	0	0	0	0	16
7:15 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	3
7:30 AM	0	5	2	0	5	0	0	0	0	0	0	0	0	12
7:45 AM	1	10	3	1	4	0	0	1	0	0	1	0	0	21
Hour Total	1	27	8	1	13	0	0	1	0	0	1	0	0	52
8:00 AM	1	4	0	0	12	0	0	0	0	0	0	0	0	17
8:15 AM	0	7	3	0	3	0	0	0	0	0	1	0	0	14
8:30 AM	0	6	0	1	2	0	0	0	0	0	0	0	0	9
8:45 AM	0	4	3	0	0	0	0	0	0	0	0	0	0	7
Hour Total	1	21	6	1	17	0	0	0	0	0	1	0	0	47
9:00 AM	0	9	2	0	0	0	0	0	0	0	0	0	0	11
9:15 AM	0	7	3	2	5	1	0	0	0	0	0	0	0	18
9:30 AM	0	7	1	0	3	0	0	0	1	0	0	0	0	12
9:45 AM	0	10	2	0	4	0	0	0	0	0	0	0	0	16
Hour Total	0	33	8	2	12	1	0	0	1	0	0	0	0	57
10:00 AM	0	9	1	0	17	0	0	0	0	0	0	0	0	27
10:15 AM	0	7	1	0	4	1	0	0	2	0	1	0	0	16
10:30 AM	0	5	3	0	1	0	0	0	0	0	0	0	0	9
10:45 AM	0	17	0	0	2	0	0	1	0	0	0	0	0	20
Hour Total	0	38	5	0	24	1	0	1	2	0	1	0	0	72
11:00 AM	0	11	2	0	2	0	0	1	0	0	1	0	0	17
11:15 AM	0	6	3	0	5	0	0	0	0	0	0	0	0	14
11:30 AM	0	8	5	0	4	0	0	2	0	0	0	0	0	19

Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
11:45 AM	0	7	3	0	7	0	0	0	1	0	0	0	0	18
Hour Total	0	32	13	0	18	0	0	3	1	0	1	0	0	68
12:00 PM	0	9	2	0	7	0	0	0	1	0	0	0	0	19
12:15 PM	0	9	2	0	2	0	0	0	1	0	0	0	0	14
12:30 PM	0	13	2	0	5	0	0	0	0	0	1	0	0	21
12:45 PM	0	8	2	0	2	0	0	1	2	0	0	0	0	15
Hour Total	0	39	8	0	16	0	0	1	4	0	1	0	0	69
1:00 PM	0	9	2	0	2	0	0	1	0	0	0	0	0	14
1:15 PM	0	6	1	0	0	0	0	0	1	0	0	0	0	8
1:30 PM	0	5	2	0	3	0	0	0	1	0	0	0	0	11
1:45 PM	0	7	4	0	5	0	0	0	0	0	0	0	0	16
Hour Total	0	27	9	0	10	0	0	1	2	0	0	0	0	49
2:00 PM	0	14	3	0	3	1	0	0	0	0	0	0	0	21
2:15 PM	1	14	1	0	1	1	0	0	1	0	0	0	0	19
2:30 PM	0	12	0	0	3	0	0	0	0	0	0	0	0	15
2:45 PM	0	10	0	0	1	0	0	0	0	0	0	0	0	11
Hour Total	1	50	4	0	8	2	0	0	1	0	0	0	0	66
3:00 PM	0	13	2	0	0	0	0	0	0	0	0	0	0	15
3:15 PM	0	14	1	0	0	0	0	0	0	0	0	0	0	15
3:30 PM	0	9	3	0	1	0	0	0	1	0	0	0	0	14
3:45 PM	0	12	1	0	3	0	0	0	0	0	0	0	0	16
Hour Total	0	48	7	0	4	0	0	0	1	0	0	0	0	60
4:00 PM	0	9	0	0	0	0	0	0	0	0	0	0	0	9
4:15 PM	0	7	0	0	0	0	0	0	0	0	0	0	0	7
4:30 PM	0	8	1	0	1	0	0	0	0	0	0	0	0	10
4:45 PM	0	11	1	0	0	0	0	1	1	0	0	0	0	14
Hour Total	0	35	2	0	1	0	0	1	1	0	0	0	0	40
5:00 PM	0	8	0	1	2	0	0	0	0	0	0	0	0	11
5:15 PM	0	10	1	0	2	0	0	0	0	0	0	0	0	13
5:30 PM	0	10	2	0	0	0	0	0	0	0	0	0	0	12
5:45 PM	0	12	0	0	1	0	0	0	0	0	0	0	0	13
Hour Total	0	40	3	1	5	0	0	0	0	0	0	0	0	49
6:00 PM	0	13	4	0	3	0	0	0	0	0	0	0	0	20
6:15 PM	0	13	1	1	1	0	0	0	1	0	0	0	0	17
6:30 PM	0	8	0	0	3	0	0	0	1	0	0	0	0	12
6:45 PM	0	14	1	0	1	0	0	0	0	0	0	0	0	16
Hour Total	0	48	6	1	8	0	0	0	2	0	0	0	0	65
7:00 PM	0	10	5	0	0	0	0	0	0	0	0	0	0	15
7:15 PM	0	8	1	1	5	0	0	0	0	0	0	0	0	15
7:30 PM	0	4	4	0	1	0	0	0	0	0	0	0	0	9
7:45 PM	0	6	0	0	2	0	0	0	0	0	0	0	0	8
Hour Total	0	28	10	1	8	0	0	0	0	0	0	0	0	47
8:00 PM	0	7	0	0	1	0	0	1	0	0	0	0	0	9
8:15 PM	0	9	1	0	1	0	0	0	0	0	0	0	0	11
8:30 PM	0	9	2	0	0	0	0	0	0	0	0	0	0	11
8:45 PM	1	12	1	0	2	0	0	0	0	0	0	0	0	16
Hour Total	1	37	4	0	4	0	0	1	0	0	0	0	0	47
9:00 PM	0	11	1	0	1	0	0	0	0	0	0	0	0	13
9:15 PM	0	8	2	0	5	0	0	0	0	0	0	0	0	15
9:30 PM	0	9	2	0	0	0	0	0	0	1	0	0	0	12
9:45 PM	0	12	0	0	0	0	0	0	0	0	0	0	0	12
Hour Total	0	40	5	0	6	0	0	0	0	1	0	0	0	52
10:00 PM	0	9	2	0	1	0	0	0	0	0	0	0	0	12
10:15 PM	0	5	1	0	3	0	0	0	0	0	0	0	0	9
10:30 PM	0	6	4	0	0	0	0	0	0	0	0	0	0	10
10:45 PM	0	5	0	0	2	0	0	0	0	0	0	0	0	7
Hour Total	0	25	7	0	6	0	0	0	0	0	0	0	0	38
11:00 PM	0	4	2	0	3	0	0	0	0	0	0	0	0	9
11:15 PM	0	3	1	0	0	0	0	0	0	0	0	0	0	4
11:30 PM	0	6	0	0	0	0	0	0	0	0	0	0	0	6
11:45 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	3
Hour Total	0	15	4	0	3	0	0	0	0	0	0	0	0	22
Totals	5	701	127	9	196	8	0	11	17	1	7	0	0	1082
Percent	0.5%	64.8%	11.7%	0.8%	18.1%	0.7%	0.0%	1.0%	1.6%	0.1%	0.6%	0.0%	0.0%	

Prepared by NDS/ATD

Project #:	CA15_8075_001	**City:**	Lebec
Location:	Grapevine Rd West s/o I-5 SB Ramps	**Date:**	6/23/2015



I-5 Northbound On-Ramp at Grapevine Rd

Class Report - Prepared by: NDS/ATD

Grapevine Rd East s/o I-5 NB Ramps
Lebec
Project #: CA15_8075_002n | Date: 6/23/2015 | Tuesday

North Bound

Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
12:15 AM	0	5	0	0	0	0	0	0	0	0	1	0	0	6
12:30 AM	0	4	0	0	1	0	0	0	1	0	0	0	0	6
12:45 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
Hour Total	0	15	0	0	1	0	0	0	1	0	1	0	0	18
1:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
1:15 AM	0	5	0	0	1	1	0	0	0	0	0	0	0	7
1:30 AM	0	1	0	0	0	0	0	1	0	0	0	0	0	2
1:45 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Hour Total	0	10	0	0	1	1	0	1	0	0	0	0	0	13
2:00 AM	0	3	0	0	1	0	0	0	0	0	0	0	0	4
2:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
2:30 AM	0	3	0	0	1	0	0	0	0	0	0	0	0	4
2:45 AM	0	3	1	0	1	0	0	0	1	0	0	0	0	6
Hour Total	0	10	1	0	3	0	0	0	1	0	0	0	0	15
3:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
3:15 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	2
3:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
3:45 AM	0	3	0	0	1	0	0	0	0	0	0	0	0	4
Hour Total	0	5	0	1	2	0	0	0	0	0	0	0	0	8
4:00 AM	0	1	2	0	0	0	0	1	0	0	0	0	0	4
4:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 AM	0	2	0	0	1	0	0	0	0	0	0	0	0	3
4:45 AM	0	1	0	0	0	0	0	0	1	0	0	0	0	2
Hour Total	0	4	2	0	1	0	0	1	1	0	0	0	0	9
5:00 AM	0	1	1	0	1	0	0	0	0	0	0	0	0	3
5:15 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
5:30 AM	0	4	1	0	1	0	0	0	0	0	0	0	0	6
5:45 AM	0	2	2	1	1	1	0	0	1	0	0	0	0	8
Hour Total	0	9	4	1	3	1	0	0	1	0	0	0	0	19
6:00 AM	0	5	3	0	4	0	0	0	0	0	0	0	0	12
6:15 AM	0	3	2	0	10	0	0	0	0	0	1	0	0	16
6:30 AM	0	13	1	0	5	0	0	0	0	0	0	0	0	19
6:45 AM	0	1	2	0	1	0	0	0	1	0	0	0	0	5
Hour Total	0	22	8	0	20	0	0	0	1	0	1	0	0	52
7:00 AM	0	3	0	0	4	0	0	1	0	0	0	0	0	8
7:15 AM	0	5	0	1	1	0	0	0	0	0	0	0	0	7
7:30 AM	0	6	2	0	2	0	0	0	0	0	0	0	0	10
7:45 AM	0	8	4	2	0	0	0	0	0	0	1	0	0	15
Hour Total	0	22	6	3	7	0	0	1	0	0	1	0	0	40
8:00 AM	0	9	0	1	5	0	0	1	1	0	0	0	0	17
8:15 AM	1	9	4	1	12	0	0	1	0	0	0	0	0	28
8:30 AM	0	9	4	0	8	0	0	0	0	0	0	0	0	21
8:45 AM	0	6	2	0	4	0	0	0	0	0	1	0	0	13
Hour Total	1	33	10	2	29	0	0	2	1	0	1	0	0	79
9:00 AM	0	11	0	0	2	0	0	1	0	0	0	0	0	14
9:15 AM	0	7	1	2	1	0	0	0	0	0	0	0	0	11
9:30 AM	0	8	0	0	4	0	0	0	0	0	0	0	0	12
9:45 AM	0	6	2	0	3	0	0	0	0	0	0	0	0	11
Hour Total	0	32	3	2	10	0	0	1	0	0	0	0	0	48
10:00 AM	0	13	2	1	6	0	0	0	0	0	0	0	0	22
10:15 AM	0	9	1	0	10	0	0	0	1	0	1	0	0	22
10:30 AM	0	15	2	1	6	0	0	0	0	0	0	0	0	24
10:45 AM	0	11	9	1	7	0	0	2	1	0	1	0	0	32
Hour Total	0	48	14	3	29	0	0	2	2	0	2	0	0	100
11:00 AM	0	11	2	0	0	0	0	0	0	0	0	0	0	13
11:15 AM	0	16	4	0	2	0	0	0	0	0	0	0	0	22
11:30 AM	0	13	8	0	8	0	0	0	0	0	0	0	0	29

Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
11:45 AM	0	22	5	0	2	0	0	0	2	0	0	0	0	31
Hour Total	0	62	19	0	12	0	0	0	2	0	0	0	0	95
12:00 PM	0	15	3	0	4	0	0	1	1	0	0	0	0	24
12:15 PM	1	7	1	0	9	1	0	0	0	0	0	0	0	19
12:30 PM	0	19	1	0	6	0	0	0	0	0	1	0	0	27
12:45 PM	0	17	3	0	3	0	0	0	0	0	0	0	0	23
Hour Total	1	58	8	0	22	1	0	1	1	0	1	0	0	93
1:00 PM	0	14	5	0	5	0	0	0	0	0	1	0	0	25
1:15 PM	0	15	4	1	6	0	0	0	0	0	0	0	0	26
1:30 PM	0	9	0	0	6	0	0	0	2	0	0	0	0	17
1:45 PM	0	21	1	0	5	0	0	1	0	0	0	0	0	28
Hour Total	0	59	10	1	22	0	0	1	2	0	1	0	0	96
2:00 PM	0	17	1	0	0	0	0	0	0	0	0	0	0	18
2:15 PM	0	17	0	0	10	0	0	0	2	0	0	0	0	29
2:30 PM	0	8	3	0	3	0	0	0	0	0	0	0	0	14
2:45 PM	0	11	3	0	5	0	0	1	1	0	0	0	0	21
Hour Total	0	53	7	0	18	0	0	1	3	0	0	0	0	82
3:00 PM	0	22	8	0	1	0	0	0	0	0	0	0	0	31
3:15 PM	0	18	4	0	3	1	0	1	1	0	0	0	0	28
3:30 PM	0	20	1	1	2	0	0	0	3	0	0	0	0	27
3:45 PM	0	8	7	1	3	0	0	0	0	0	1	0	0	20
Hour Total	0	68	20	2	9	1	0	1	4	0	1	0	0	106
4:00 PM	0	11	3	0	1	0	0	0	0	0	0	0	0	15
4:15 PM	0	6	0	0	2	0	0	0	0	0	0	0	0	8
4:30 PM	0	9	3	0	2	0	0	0	0	0	0	0	0	14
4:45 PM	0	7	0	0	1	0	0	0	1	0	0	0	0	9
Hour Total	0	33	6	0	6	0	0	0	1	0	0	0	0	46
5:00 PM	0	14	1	0	4	0	0	0	0	0	0	0	0	19
5:15 PM	0	12	1	0	2	0	0	0	0	0	0	0	0	15
5:30 PM	0	7	0	0	2	0	0	0	0	0	0	0	0	9
5:45 PM	0	8	0	1	0	0	0	0	1	0	0	0	0	10
Hour Total	0	41	2	1	8	0	0	0	1	0	0	0	0	53
6:00 PM	0	7	0	0	0	0	0	1	0	0	0	0	0	8
6:15 PM	0	10	3	0	1	0	0	0	0	0	0	0	0	14
6:30 PM	0	9	2	0	3	0	0	0	1	0	0	0	0	15
6:45 PM	0	4	2	0	3	0	0	0	1	0	0	0	0	10
Hour Total	0	30	7	0	7	0	0	1	2	0	0	0	0	47
7:00 PM	0	8	2	0	2	0	0	0	0	0	0	0	0	12
7:15 PM	0	6	2	0	3	0	0	1	0	0	0	0	0	12
7:30 PM	0	8	8	1	4	0	0	0	0	0	0	0	0	21
7:45 PM	0	7	1	0	1	0	0	0	0	0	0	0	0	9
Hour Total	0	29	13	1	10	0	0	1	0	0	0	0	0	54
8:00 PM	0	9	0	0	2	0	0	0	0	0	0	0	0	11
8:15 PM	0	7	2	0	1	0	0	0	0	0	0	0	0	10
8:30 PM	0	11	2	0	1	0	0	0	0	0	0	0	0	14
8:45 PM	0	7	1	0	1	0	0	0	0	0	0	0	0	9
Hour Total	0	34	5	0	5	0	0	0	0	0	0	0	0	44
9:00 PM	0	8	1	0	1	0	0	0	0	0	0	0	0	10
9:15 PM	1	7	1	0	2	0	0	0	0	0	0	0	0	11
9:30 PM	0	6	1	1	0	0	0	0	1	0	0	0	0	9
9:45 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
Hour Total	1	24	3	1	3	0	0	0	1	0	0	0	0	33
10:00 PM	0	5	1	0	4	0	0	0	0	0	0	0	0	10
10:15 PM	0	7	0	0	0	0	0	0	0	0	0	0	0	7
10:30 PM	0	10	2	0	1	0	0	0	0	0	0	0	0	13
10:45 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	3
Hour Total	0	24	4	0	5	0	0	0	0	0	0	0	0	33
11:00 PM	0	18	3	0	2	0	0	0	1	0	0	0	0	24
11:15 PM	0	2	3	0	1	1	0	0	0	0	0	0	0	7
11:30 PM	0	4	1	0	0	0	0	0	0	0	0	0	0	5
11:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	2
Hour Total	0	25	7	0	4	1	0	0	1	0	0	0	0	38
Totals	3	750	159	18	237	5	0	14	26	0	9	0	0	1221
Percent	0.2%	61.4%	13.0%	1.5%	19.4%	0.4%	0.0%	1.1%	2.1%	0.0%	0.7%	0.0%	0.0%	

I-5 Northbound Off-Ramp at Grapevine Rd

Class Report - Prepared by: NDS/ATD

Grapevine Rd East s/o I-5 NB Ramps
Lebec
Project #: CA15_8075_002s   Date: 6/23/2015   Tuesday

South Bound

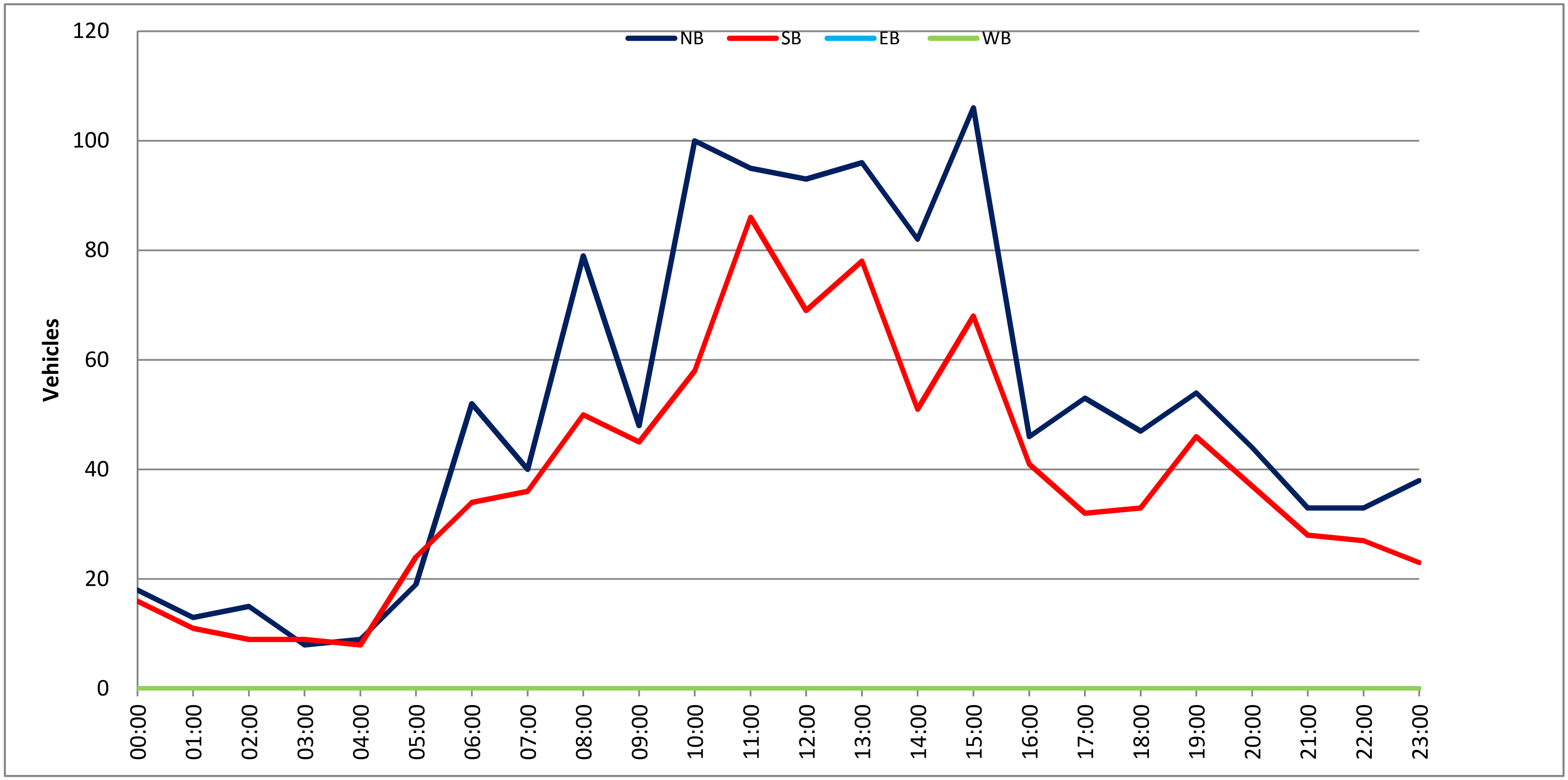
Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
12:15 AM	0	5	0	0	2	0	0	0	0	0	0	0	0	7
12:30 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	2
12:45 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Hour Total	0	13	0	0	2	1	0	0	0	0	0	0	0	16
1:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
1:15 AM	0	1	0	0	2	0	0	1	0	0	0	0	0	4
1:30 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
1:45 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	2
Hour Total	0	7	1	0	2	0	0	1	0	0	0	0	0	11
2:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
2:15 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	4
2:30 AM	0	2	0	0	1	0	0	0	0	0	0	0	0	3
2:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Hour Total	0	6	0	0	3	0	0	0	0	0	0	0	0	9
3:00 AM	0	2	1	0	1	0	0	0	0	0	0	0	0	4
3:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
3:30 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	2
3:45 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Hour Total	0	5	2	0	2	0	0	0	0	0	0	0	0	9
4:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
4:15 AM	0	0	1	1	1	0	0	0	0	0	0	0	0	3
4:30 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
4:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	2
Hour Total	0	3	2	1	2	0	0	0	0	0	0	0	0	8
5:00 AM	0	2	1	0	2	0	0	0	0	0	0	0	0	5
5:15 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1
5:30 AM	0	2	1	1	2	0	0	0	0	0	0	0	0	6
5:45 AM	0	7	1	0	3	1	0	0	0	0	0	0	0	12
Hour Total	0	11	3	1	8	1	0	0	0	0	0	0	0	24
6:00 AM	0	2	2	0	4	0	0	0	0	0	0	0	0	8
6:15 AM	0	7	0	0	1	0	0	0	0	0	0	0	0	8
6:30 AM	0	5	2	0	0	0	0	0	1	0	0	0	0	8
6:45 AM	0	5	1	0	3	0	0	1	0	0	0	0	0	10
Hour Total	0	19	5	0	8	0	0	1	1	0	0	0	0	34
7:00 AM	0	4	0	1	2	0	0	1	0	0	0	0	0	8
7:15 AM	0	3	4	0	1	0	0	0	0	0	0	0	0	8
7:30 AM	0	7	2	0	1	0	0	1	0	0	0	0	0	11
7:45 AM	0	7	0	0	0	0	0	1	1	0	0	0	0	9
Hour Total	0	21	6	1	4	0	0	3	1	0	0	0	0	36
8:00 AM	0	10	0	1	2	0	0	0	1	0	0	0	0	14
8:15 AM	0	9	3	0	2	0	0	0	0	0	0	0	0	14
8:30 AM	0	2	2	0	4	0	0	1	0	0	0	0	0	9
8:45 AM	0	10	0	0	3	0	0	0	0	0	0	0	0	13
Hour Total	0	31	5	1	11	0	0	1	1	0	0	0	0	50
9:00 AM	0	7	2	0	0	0	0	0	0	0	0	0	0	9
9:15 AM	0	8	2	0	1	0	0	0	0	0	0	0	0	11
9:30 AM	0	8	2	1	1	0	0	0	0	0	0	0	0	12
9:45 AM	0	10	1	0	2	0	0	0	0	0	0	0	0	13
Hour Total	0	33	7	1	4	0	0	0	0	0	0	0	0	45
10:00 AM	0	8	5	0	5	0	0	0	0	0	0	0	0	18
10:15 AM	0	6	3	1	1	0	0	0	0	0	0	0	0	11
10:30 AM	0	7	5	0	2	0	0	0	0	0	0	0	0	14
10:45 AM	0	7	5	1	0	0	0	0	2	0	0	0	0	15
Hour Total	0	28	18	2	8	0	0	0	2	0	0	0	0	58
11:00 AM	0	8	7	0	3	0	0	0	0	0	0	0	0	18
11:15 AM	0	12	7	0	2	0	0	0	0	0	0	0	0	21
11:30 AM	0	12	6	0	3	0	0	0	0	0	0	0	0	21

Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
11:45 AM	0	18	4	0	4	0	0	0	0	0	0	0	0	26
Hour Total	0	50	24	0	12	0	0	0	0	0	0	0	0	86
12:00 PM	0	16	1	0	0	0	0	0	0	0	0	0	0	17
12:15 PM	0	12	2	0	4	0	0	0	0	0	0	0	0	18
12:30 PM	0	8	2	0	2	0	0	0	0	0	0	0	0	12
12:45 PM	0	10	7	0	5	0	0	0	0	0	0	0	0	22
Hour Total	0	46	12	0	11	0	0	0	0	0	0	0	0	69
1:00 PM	0	17	1	1	2	0	0	0	0	0	0	0	0	21
1:15 PM	0	8	5	0	4	0	0	0	0	0	0	0	0	17
1:30 PM	0	10	5	0	1	0	0	0	1	0	0	0	0	17
1:45 PM	0	15	4	0	4	0	0	0	0	0	0	0	0	23
Hour Total	0	50	15	1	11	0	0	0	1	0	0	0	0	78
2:00 PM	0	10	0	0	2	0	0	0	0	0	0	0	0	12
2:15 PM	0	13	1	0	1	0	0	1	0	0	0	0	0	16
2:30 PM	0	7	3	0	1	0	0	0	0	0	0	0	0	11
2:45 PM	0	10	1	1	0	0	0	0	0	0	0	0	0	12
Hour Total	0	40	5	1	4	0	0	1	0	0	0	0	0	51
3:00 PM	0	11	4	0	1	0	0	1	0	0	0	0	0	17
3:15 PM	0	9	1	1	4	0	0	0	2	0	0	0	0	17
3:30 PM	0	8	5	0	1	0	0	0	1	0	0	0	0	15
3:45 PM	0	10	7	0	1	1	0	0	0	0	0	0	0	19
Hour Total	0	38	17	1	7	1	0	1	3	0	0	0	0	68
4:00 PM	0	3	2	1	3	0	0	0	0	0	0	0	0	9
4:15 PM	0	10	3	0	1	0	0	1	0	0	0	0	0	15
4:30 PM	0	4	1	0	2	0	0	0	0	0	0	0	0	7
4:45 PM	0	7	1	0	2	0	0	0	0	0	0	0	0	10
Hour Total	0	24	7	1	8	0	0	1	0	0	0	0	0	41
5:00 PM	0	4	0	0	1	0	0	0	0	0	0	0	0	5
5:15 PM	0	11	1	0	1	0	0	0	1	0	0	0	0	14
5:30 PM	0	4	1	1	0	0	0	0	1	0	0	0	0	7
5:45 PM	0	5	1	0	0	0	0	0	0	0	0	0	0	6
Hour Total	0	24	3	1	2	0	0	0	2	0	0	0	0	32
6:00 PM	0	2	4	0	1	0	0	0	0	0	0	0	0	7
6:15 PM	0	7	2	0	2	0	0	0	0	0	0	0	0	11
6:30 PM	0	5	0	0	1	0	0	0	0	0	0	0	0	6
6:45 PM	0	6	1	0	1	0	0	0	1	0	0	0	0	9
Hour Total	0	20	7	0	5	0	0	0	1	0	0	0	0	33
7:00 PM	0	11	2	0	2	0	0	1	0	0	0	0	0	16
7:15 PM	0	4	1	0	3	0	0	0	0	0	0	0	0	8
7:30 PM	0	6	3	0	3	0	0	0	0	0	0	0	0	12
7:45 PM	0	8	0	0	2	0	0	0	0	0	0	0	0	10
Hour Total	0	29	6	0	10	0	0	1	0	0	0	0	0	46
8:00 PM	0	7	1	0	2	0	0	0	0	0	0	0	0	10
8:15 PM	0	7	4	0	0	0	0	0	0	0	0	0	0	11
8:30 PM	0	4	2	1	0	0	0	0	0	0	0	0	0	7
8:45 PM	0	6	2	0	1	0	0	0	0	0	0	0	0	9
Hour Total	0	24	9	1	3	0	0	0	0	0	0	0	0	37
9:00 PM	1	5	1	0	2	0	0	0	0	0	0	0	0	9
9:15 PM	0	3	1	0	1	0	0	0	0	0	0	0	0	5
9:30 PM	0	5	1	0	0	0	0	0	0	0	0	0	0	6
9:45 PM	0	6	0	0	1	0	0	1	0	0	0	0	0	8
Hour Total	1	19	3	0	4	0	0	1	0	0	0	0	0	28
10:00 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	2
10:15 PM	0	5	4	0	0	0	0	0	0	0	0	0	0	9
10:30 PM	0	4	1	0	1	0	0	0	1	0	0	0	0	7
10:45 PM	0	4	3	0	2	0	0	0	0	0	0	0	0	9
Hour Total	0	14	8	1	3	0	0	0	1	0	0	0	0	27
11:00 PM	0	7	1	0	1	0	0	0	0	0	0	0	0	9
11:15 PM	0	6	0	0	1	1	0	0	0	0	0	0	0	8
11:30 PM	0	2	1	0	1	0	0	0	0	0	0	0	0	4
11:45 PM	0	0	0	0	0	0	0	0	1	0	1	0	0	2
Hour Total	0	15	2	0	3	1	0	0	1	0	1	0	0	23
Totals	1	570	167	14	137	4	0	11	14	0	1	0	0	919
Percent	0.1%	62.0%	18.2%	1.5%	14.9%	0.4%	0.0%	1.2%	1.5%	0.0%	0.1%	0.0%	0.0%	

Prepared by NDS/ATD

Project #: CA15_8075_002 **City:** Lebec

Location: Grapevine Rd East s/o I-5 NB Ramps **Date:** 6/23/2015



Study Roadway Segment 1 - Northbound

Class Report - Prepared by: NDS/ATD

Wheeler Ridge Rd n/o Santa Elena Dr
Wheeler Ridge
Project #: CA15_8075_003n Date: 6/23/2015 Tuesday

North Bound

Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	6	2	0	0	0	0	0	0	0	0	0	0	8
12:15 AM	0	6	2	0	0	0	0	0	1	0	0	0	0	9
12:30 AM	0	6	0	0	0	0	0	0	1	0	0	0	0	7
12:45 AM	0	4	1	0	0	0	0	1	1	0	0	0	0	7
Hour Total	0	22	5	0	0	0	0	1	3	0	0	0	0	31
1:00 AM	0	3	2	0	0	0	0	0	1	0	0	0	0	6
1:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
1:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	2
1:45 AM	0	5	0	0	0	0	0	0	1	0	0	0	0	6
Hour Total	0	10	2	0	1	0	0	0	2	0	0	0	0	15
2:00 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
2:15 AM	0	3	1	0	0	0	0	1	2	0	0	0	0	7
2:30 AM	0	1	1	0	0	0	0	0	1	0	0	0	0	3
2:45 AM	0	1	0	0	0	0	0	0	1	0	0	0	0	2
Hour Total	0	8	2	0	0	0	0	1	4	0	0	0	0	15
3:00 AM	0	1	0	0	0	0	0	0	2	0	0	0	0	3
3:15 AM	0	3	1	0	0	0	0	0	1	0	0	0	0	5
3:30 AM	0	3	0	0	1	0	0	0	0	0	0	0	0	4
3:45 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Hour Total	0	7	1	0	1	0	0	0	4	0	0	0	0	13
4:00 AM	0	2	0	0	1	0	0	0	0	0	0	0	0	3
4:15 AM	0	0	1	0	1	0	0	0	1	0	0	0	0	3
4:30 AM	0	4	1	1	0	0	0	0	0	0	0	0	0	6
4:45 AM	0	2	0	0	0	0	0	3	2	0	0	0	0	7
Hour Total	0	8	2	1	2	0	0	3	3	0	0	0	0	19
5:00 AM	0	2	1	0	0	0	0	0	1	0	0	0	0	4
5:15 AM	0	2	0	1	1	0	0	1	0	0	0	0	0	5
5:30 AM	0	10	1	0	2	0	0	0	0	0	0	0	0	13
5:45 AM	0	3	3	0	1	0	0	1	1	0	0	0	0	9
Hour Total	0	17	5	1	4	0	0	2	2	0	0	0	0	31
6:00 AM	0	1	1	0	0	0	0	1	0	0	0	0	0	3
6:15 AM	0	10	0	1	2	0	0	2	3	0	0	0	0	18
6:30 AM	0	6	0	0	0	0	0	0	2	0	0	0	0	8
6:45 AM	0	3	2	0	3	0	0	2	2	0	0	0	0	12
Hour Total	0	20	3	1	5	0	0	5	7	0	0	0	0	41
7:00 AM	0	14	3	0	2	0	0	1	3	0	0	0	0	23
7:15 AM	0	6	0	0	8	1	0	0	2	0	0	0	0	17
7:30 AM	0	9	1	0	2	0	0	0	3	0	0	0	0	15
7:45 AM	0	8	1	1	2	0	0	0	0	0	0	0	0	12
Hour Total	0	37	5	1	14	1	0	1	8	0	0	0	0	67
8:00 AM	0	8	2	0	3	0	0	1	1	0	1	0	0	16
8:15 AM	0	5	1	0	9	1	0	0	5	0	0	0	0	21
8:30 AM	0	7	1	0	1	0	0	1	2	0	1	0	0	13
8:45 AM	0	4	1	0	1	0	0	0	3	0	0	0	0	9
Hour Total	0	24	5	0	14	1	0	2	11	0	2	0	0	59
9:00 AM	0	6	2	1	5	0	0	3	4	0	0	0	0	21
9:15 AM	0	2	1	0	6	0	0	0	2	0	0	0	0	11
9:30 AM	0	5	1	0	4	1	0	2	2	0	1	0	0	16
9:45 AM	0	4	1	0	2	0	0	0	6	0	0	0	0	13
Hour Total	0	17	5	1	17	1	0	5	14	0	1	0	0	61
10:00 AM	0	8	2	0	4	0	1	2	1	0	0	0	0	18
10:15 AM	3	8	1	1	3	0	0	2	2	0	0	0	0	20
10:30 AM	0	1	1	1	1	0	0	0	1	0	0	0	0	5
10:45 AM	0	5	4	0	9	0	0	1	1	0	1	0	0	21
Hour Total	3	22	8	2	17	0	1	5	5	0	1	0	0	64
11:00 AM	1	6	3	0	3	2	0	1	4	0	0	0	0	20
11:15 AM	0	6	3	0	4	0	0	1	3	0	0	0	0	17
11:30 AM	0	3	3	0	7	0	1	0	2	0	0	0	0	16

Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
11:45 AM	0	2	3	0	7	0	0	0	7	0	0	0	0	19
Hour Total	1	17	12	0	21	2	1	2	16	0	0	0	0	72
12:00 PM	0	8	2	1	3	0	0	1	3	0	0	0	0	18
12:15 PM	1	10	2	2	5	0	0	1	1	0	1	0	0	23
12:30 PM	0	4	0	1	8	0	0	0	5	0	0	0	0	18
12:45 PM	0	8	8	0	10	0	0	0	2	0	0	0	0	28
Hour Total	1	30	12	4	26	0	0	2	11	0	1	0	0	87
1:00 PM	0	4	6	0	1	0	0	2	5	0	0	0	0	18
1:15 PM	0	7	0	1	5	0	0	0	3	0	0	0	0	16
1:30 PM	0	23	3	0	10	0	1	1	2	0	0	0	0	40
1:45 PM	0	17	1	1	7	0	0	1	1	0	0	0	0	28
Hour Total	0	51	10	2	23	0	1	4	11	0	0	0	0	102
2:00 PM	0	16	4	0	1	0	0	2	3	0	0	0	0	26
2:15 PM	1	11	3	0	7	0	0	1	4	0	0	0	0	27
2:30 PM	0	16	10	0	3	0	0	1	6	0	0	0	0	36
2:45 PM	0	11	3	0	9	0	0	0	6	0	0	0	0	29
Hour Total	1	54	20	0	20	0	0	4	19	0	0	0	0	118
3:00 PM	0	14	5	0	5	0	0	1	4	0	0	0	0	29
3:15 PM	0	22	3	1	2	0	0	0	5	0	0	0	0	33
3:30 PM	0	13	4	0	7	0	0	3	3	0	0	0	0	30
3:45 PM	0	7	2	1	5	0	0	0	4	0	1	0	0	20
Hour Total	0	56	14	2	19	0	0	4	16	0	1	0	0	112
4:00 PM	0	13	8	3	2	0	0	3	1	0	0	0	0	30
4:15 PM	0	12	5	0	2	0	0	1	1	0	1	0	0	22
4:30 PM	1	10	2	2	6	0	0	0	3	0	1	0	0	25
4:45 PM	1	13	7	1	2	0	0	0	3	0	0	0	0	27
Hour Total	2	48	22	6	12	0	0	4	8	0	2	0	0	104
5:00 PM	0	6	0	0	1	0	0	3	8	0	0	0	0	18
5:15 PM	0	0	0	0	6	0	0	3	6	1	0	0	0	16
5:30 PM	0	6	0	0	0	0	0	1	4	0	0	0	0	11
5:45 PM	0	10	2	0	0	0	0	1	2	0	0	0	0	15
Hour Total	0	22	2	0	7	0	0	8	20	1	0	0	0	60
6:00 PM	0	17	0	0	3	0	0	0	3	0	1	0	0	24
6:15 PM	0	11	1	0	1	0	0	1	6	0	0	0	0	20
6:30 PM	0	4	4	0	4	0	0	3	2	0	0	0	0	17
6:45 PM	0	4	1	0	1	0	0	0	3	0	0	0	0	9
Hour Total	0	36	6	0	9	0	0	4	14	0	1	0	0	70
7:00 PM	0	10	4	0	2	0	0	1	2	0	0	0	0	19
7:15 PM	0	5	1	0	2	0	0	1	7	0	0	0	0	16
7:30 PM	0	4	4	0	4	0	0	0	2	0	0	0	0	14
7:45 PM	0	7	1	0	0	0	0	0	4	0	0	0	0	12
Hour Total	0	26	10	0	8	0	0	2	15	0	0	0	0	61
8:00 PM	0	8	1	0	1	0	0	0	0	0	0	0	0	10
8:15 PM	0	2	3	1	1	0	0	0	0	0	0	0	0	7
8:30 PM	0	11	2	0	4	0	0	4	4	0	0	0	0	25
8:45 PM	1	9	1	0	0	1	1	0	4	0	0	0	0	17
Hour Total	1	30	7	1	6	1	1	4	8	0	0	0	0	59
9:00 PM	0	7	3	0	3	0	0	0	0	0	0	0	0	13
9:15 PM	0	4	4	0	2	0	0	0	0	0	0	0	0	10
9:30 PM	0	13	6	0	2	0	0	0	1	0	0	0	0	22
9:45 PM	0	4	3	0	2	0	0	0	0	0	1	0	0	10
Hour Total	0	28	16	0	9	0	0	0	1	0	1	0	0	55
10:00 PM	0	10	3	0	1	0	0	0	2	0	0	0	0	16
10:15 PM	0	13	0	0	4	0	0	0	2	0	0	0	0	19
10:30 PM	0	9	4	0	0	0	0	2	3	0	0	0	0	18
10:45 PM	0	10	1	0	2	0	0	0	4	0	0	0	0	17
Hour Total	0	42	8	0	7	0	0	2	11	0	0	0	0	70
11:00 PM	0	17	2	0	0	0	0	0	1	0	0	0	0	20
11:15 PM	0	11	3	0	1	1	0	0	0	0	0	0	0	16
11:30 PM	0	11	1	0	0	0	0	0	2	0	0	0	0	14
11:45 PM	0	7	1	0	0	0	0	0	0	0	0	0	0	8
Hour Total	0	46	7	0	1	1	0	0	3	0	0	0	0	58
Totals	9	678	189	22	243	7	4	65	216	1	10	0	0	1444
Percent	0.6%	47.0%	13.1%	1.5%	16.8%	0.5%	0.3%	4.5%	15.0%	0.1%	0.7%	0.0%	0.0%	

Study Roadway Segment 1 - Southbound

Class Report - Prepared by: NDS/ATD

Wheeler Ridge Rd n/o Santa Elena Dr
Wheeler Ridge
Project #: CA15_8075_003s Date: 6/23/2015 Tuesday

South Bound

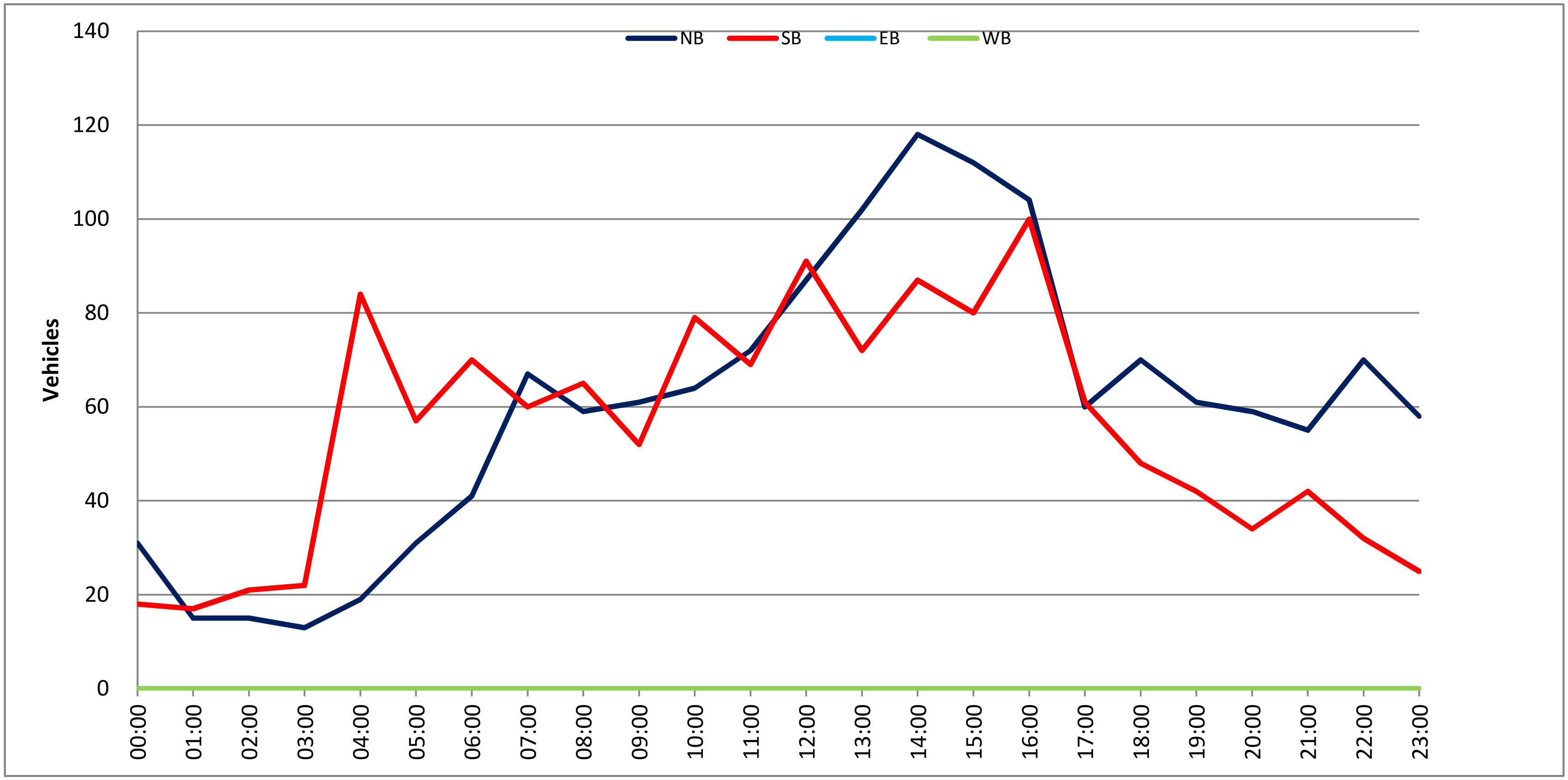
Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
12:00 AM	0	1	0	0	0	0	0	0	2	0	0	0	0	3
12:15 AM	1	1	1	0	2	0	0	0	2	0	0	0	0	7
12:30 AM	0	1	0	0	0	0	0	1	2	0	0	0	0	4
12:45 AM	0	1	1	0	0	0	0	0	2	0	0	0	0	4
Hour Total	1	4	2	0	2	0	0	1	8	0	0	0	0	18
1:00 AM	0	0	0	0	1	0	0	1	2	0	0	0	0	4
1:15 AM	0	0	0	0	3	0	0	0	3	0	0	0	0	6
1:30 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	1
1:45 AM	0	1	1	0	1	0	0	0	3	0	0	0	0	6
Hour Total	0	1	1	0	5	0	0	1	9	0	0	0	0	17
2:00 AM	1	0	0	1	0	0	0	0	2	0	0	0	0	4
2:15 AM	0	0	0	0	0	0	0	0	2	0	0	0	0	2
2:30 AM	1	0	0	0	9	0	0	1	0	0	0	0	0	11
2:45 AM	1	0	0	0	0	1	0	0	2	0	0	0	0	4
Hour Total	3	0	0	1	9	1	0	1	6	0	0	0	0	21
3:00 AM	0	0	1	0	0	0	0	0	4	0	0	0	0	5
3:15 AM	1	0	0	0	0	1	0	1	1	0	0	0	0	4
3:30 AM	0	1	0	1	0	0	0	1	3	0	0	0	0	6
3:45 AM	0	2	0	0	1	0	0	1	3	0	0	0	0	7
Hour Total	1	3	1	1	1	1	0	3	11	0	0	0	0	22
4:00 AM	0	4	2	0	4	0	0	1	2	0	0	0	0	13
4:15 AM	0	10	2	4	6	0	0	1	3	0	0	0	0	26
4:30 AM	0	8	6	0	3	0	0	0	1	0	0	0	0	18
4:45 AM	0	17	3	0	4	0	0	2	1	0	0	0	0	27
Hour Total	0	39	13	4	17	0	0	4	7	0	0	0	0	84
5:00 AM	0	7	2	0	4	0	0	1	0	0	0	0	0	14
5:15 AM	0	4	7	0	2	0	0	1	1	0	0	0	0	15
5:30 AM	0	3	4	0	4	0	0	2	2	0	0	0	0	15
5:45 AM	0	4	7	0	0	0	0	0	2	0	0	0	0	13
Hour Total	0	18	20	0	10	0	0	4	5	0	0	0	0	57
6:00 AM	0	5	4	0	2	0	0	1	2	0	0	0	0	14
6:15 AM	0	5	2	0	2	0	0	0	1	0	0	0	0	10
6:30 AM	0	7	5	0	2	1	0	1	2	0	0	0	0	18
6:45 AM	0	10	11	0	6	0	0	0	1	0	0	0	0	28
Hour Total	0	27	22	0	12	1	0	2	6	0	0	0	0	70
7:00 AM	0	3	3	0	0	0	0	0	0	0	0	0	0	6
7:15 AM	0	3	3	1	1	0	0	0	5	0	0	0	0	13
7:30 AM	0	5	8	1	2	0	0	0	2	0	0	0	0	18
7:45 AM	0	7	6	0	7	0	0	0	3	0	0	0	0	23
Hour Total	0	18	20	2	10	0	0	0	10	0	0	0	0	60
8:00 AM	0	3	4	0	3	0	0	2	0	0	1	0	0	13
8:15 AM	0	3	3	0	1	0	0	1	1	0	0	0	0	9
8:30 AM	0	1	2	0	6	0	0	1	3	0	0	0	0	13
8:45 AM	1	16	5	0	6	0	0	0	2	0	0	0	0	30
Hour Total	1	23	14	0	16	0	0	4	6	0	1	0	0	65
9:00 AM	0	1	2	1	3	0	0	0	5	0	0	0	0	12
9:15 AM	0	3	2	0	1	0	0	1	0	0	0	0	0	7
9:30 AM	0	2	3	0	4	0	0	1	2	0	0	0	0	12
9:45 AM	0	7	11	0	1	0	0	1	1	0	0	0	0	21
Hour Total	0	13	18	1	9	0	0	3	8	0	0	0	0	52
10:00 AM	0	7	2	0	1	0	0	2	4	0	1	0	0	17
10:15 AM	1	7	3	2	4	0	0	0	1	0	1	0	0	19
10:30 AM	1	5	5	0	3	0	0	0	1	0	0	0	0	15
10:45 AM	0	10	3	0	7	1	0	3	4	0	0	0	0	28
Hour Total	2	29	13	2	15	1	0	5	10	0	2	0	0	79
11:00 AM	0	10	3	0	8	0	0	1	3	0	0	0	0	25
11:15 AM	0	5	5	0	6	0	0	0	1	0	0	0	0	17
11:30 AM	0	2	1	1	3	0	0	1	0	0	0	0	0	8

Begin Time	Bikes	Cars & Pasngr	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>5 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Total
11:45 AM	0	2	4	2	8	0	0	1	2	0	0	0	0	19
Hour Total	0	19	13	3	25	0	0	3	6	0	0	0	0	69
12:00 PM	0	12	3	0	7	0	0	1	2	0	0	0	0	25
12:15 PM	0	7	2	0	5	0	0	0	4	0	0	0	0	18
12:30 PM	0	7	6	0	6	0	0	1	1	0	0	0	0	21
12:45 PM	0	14	3	0	8	1	0	0	0	0	1	0	0	27
Hour Total	0	40	14	0	26	1	0	2	7	0	1	0	0	91
1:00 PM	0	4	3	0	7	0	0	0	3	0	1	0	0	18
1:15 PM	0	4	1	1	2	0	0	1	1	0	0	0	0	10
1:30 PM	0	7	2	0	4	0	0	2	1	0	0	0	0	16
1:45 PM	0	12	3	2	8	0	1	1	1	0	0	0	0	28
Hour Total	0	27	9	3	21	0	1	4	6	0	1	0	0	72
2:00 PM	0	10	8	0	4	0	0	2	1	0	0	0	0	25
2:15 PM	0	3	8	0	3	0	0	1	1	0	0	0	0	16
2:30 PM	0	12	5	0	3	0	0	0	1	0	0	0	0	21
2:45 PM	0	12	8	1	3	0	0	0	1	0	0	0	0	25
Hour Total	0	37	29	1	13	0	0	3	4	0	0	0	0	87
3:00 PM	0	9	0	0	6	0	0	0	0	0	0	0	0	15
3:15 PM	0	12	4	0	4	0	0	0	1	0	0	0	0	21
3:30 PM	0	9	1	0	4	0	0	0	1	0	0	0	0	15
3:45 PM	0	17	3	0	6	0	0	1	2	0	0	0	0	29
Hour Total	0	47	8	0	20	0	0	1	4	0	0	0	0	80
4:00 PM	0	7	3	0	6	0	0	0	2	0	0	0	0	18
4:15 PM	0	3	8	0	2	0	0	2	3	0	0	0	0	18
4:30 PM	0	17	7	0	5	0	0	2	1	0	0	0	0	32
4:45 PM	0	15	6	1	4	1	1	0	4	0	0	0	0	32
Hour Total	0	42	24	1	17	1	1	4	10	0	0	0	0	100
5:00 PM	0	6	2	0	3	0	0	1	3	0	0	0	0	15
5:15 PM	0	5	2	1	2	0	0	0	2	0	0	0	0	12
5:30 PM	0	6	2	0	1	0	0	1	4	0	0	0	0	14
5:45 PM	1	10	4	0	1	1	0	2	1	0	0	0	0	20
Hour Total	1	27	10	1	7	1	0	4	10	0	0	0	0	61
6:00 PM	0	5	1	0	4	0	0	0	2	0	0	0	0	12
6:15 PM	0	5	3	0	3	0	0	1	5	0	0	0	0	17
6:30 PM	0	3	6	0	2	0	0	0	1	0	0	0	0	12
6:45 PM	0	4	0	0	2	0	0	0	1	0	0	0	0	7
Hour Total	0	17	10	0	11	0	0	1	9	0	0	0	0	48
7:00 PM	0	4	1	0	1	0	0	0	3	0	0	0	0	9
7:15 PM	1	3	3	0	4	0	0	0	1	0	0	0	0	12
7:30 PM	0	5	2	3	0	0	0	0	1	0	1	0	0	12
7:45 PM	0	3	1	0	1	0	0	0	4	0	0	0	0	9
Hour Total	1	15	7	3	6	0	0	0	9	0	1	0	0	42
8:00 PM	0	1	2	0	2	0	0	1	1	0	0	0	0	7
8:15 PM	0	1	3	0	2	0	0	0	0	0	0	0	0	6
8:30 PM	0	9	1	0	1	0	0	0	2	0	0	0	0	13
8:45 PM	0	4	3	0	0	0	0	0	1	0	0	0	0	8
Hour Total	0	15	9	0	5	0	0	1	4	0	0	0	0	34
9:00 PM	0	3	4	0	1	0	0	0	4	0	0	0	0	12
9:15 PM	0	1	1	0	2	0	0	1	1	0	0	0	0	6
9:30 PM	0	0	2	0	0	1	0	0	2	0	0	0	0	5
9:45 PM	0	5	6	1	1	0	0	1	5	0	0	0	0	19
Hour Total	0	9	13	1	4	1	0	2	12	0	0	0	0	42
10:00 PM	0	3	0	0	1	0	0	0	1	0	0	0	0	5
10:15 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	2
10:30 PM	0	5	0	0	0	0	0	0	5	0	0	0	0	10
10:45 PM	0	4	3	0	2	0	0	1	5	0	0	0	0	15
Hour Total	0	14	3	0	3	0	0	1	11	0	0	0	0	32
11:00 PM	0	2	3	0	0	0	0	0	2	0	0	0	0	7
11:15 PM	1	0	3	1	1	0	0	0	2	0	1	0	0	9
11:30 PM	0	2	0	0	0	0	0	0	1	0	0	0	0	3
11:45 PM	0	1	1	0	0	0	0	1	3	0	0	0	0	6
Hour Total	1	5	7	1	1	0	0	1	8	0	1	0	0	25
Totals	11	489	280	25	265	8	2	55	186	0	7	0	0	1328
Percent	0.8%	36.8%	21.1%	1.9%	20.0%	0.6%	0.2%	4.1%	14.0%	0.0%	0.5%	0.0%	0.0%	

Prepared by NDS/ATD

Project #: CA15_8075_003 **City:** Wheeler Ridge

Location: Wheeler Ridge Rd n/o Santa Elena Dr **Date:** 6/23/2015



INTENTIONALLY LEFT BLANK

Appendix B:

Existing Conditions (2015) – Intersection Operations & Queuing Analysis

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (veh/h)	47	1	5	5	17	96	4
Number	5	12		4	14	3	8
Initial Q (Qb), veh	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00			1.00	1.00	
Parking Bus, Adj	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1570	950		1258	1138	969	1086
Adj Flow Rate, veh/h	55	1		6	19	112	5
Adj No. of Lanes	2	1		1	2	1	1
Peak Hour Factor	0.86	0.86		0.86	0.86	0.86	0.86
Percent Heavy Veh, %	21	100		100	67	96	75
Cap, veh/h	310	86		82	110	171	488
Arrive On Green	0.11	0.11		0.06	0.06	0.19	0.45
Sat Flow, veh/h	2901	807		1258	1702	923	1086
Grp Volume(v), veh/h	55	1		6	19	112	5
Grp Sat Flow(s),veh/h/ln	1451	807		1258	851	923	1086
Q Serve(g_s), s	0.3	0.0		0.1	0.2	2.3	0.1
Cycle Q Clear(g_c), s	0.3	0.0		0.1	0.2	2.3	0.1
Prop In Lane	1.00	1.00			1.00	1.00	
Lane Grp Cap(c), veh/h	310	86		82	110	171	488
V/C Ratio(X)	0.18	0.01		0.07	0.17	0.66	0.01
Avail Cap(c_a), veh/h	2893	805		1568	2121	921	1353
HCM Platoon Ratio	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.2	8.0		8.8	8.9	7.6	3.1
Incr Delay (d2), s/veh	0.2	0.0		1.1	2.1	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0		0.1	0.1	0.7	0.0
LnGrp Delay(d),s/veh	8.3	8.0		9.9	11.0	10.2	3.1
LnGrp LOS	A	A		A	B	B	A
Approach Vol, veh/h	56			25			117
Approach Delay, s/veh	8.3			10.7			9.9
Approach LOS	A			B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		7.0	7.7	5.3				13.0
Change Period (Y+Rc), s		4.9	4.0	4.0				4.0
Max Green Setting (Gmax), s		20.0	20.0	25.0				25.0
Max Q Clear Time (g_c+I1), s		2.3	4.3	2.2				2.1
Green Ext Time (p_c), s		0.1	0.2	0.2				0.2

Intersection Summary		
HCM 2010 Ctrl Delay		9.5
HCM 2010 LOS		A

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	110	1	37	89	209	1	6	32	177	11	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1043	1900	1792	1250	1827	1863	1847	1900	1863	1830	1900
Adj Flow Rate, veh/h	2	118	0	40	96	64	1	6	12	200	0	0
Adj No. of Lanes	1	2	0	2	3	1	1	1	0	2	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	100	82	82	6	52	4	2	2	2	2	2	2
Cap, veh/h	4	366	0	239	860	391	68	21	42	802	414	0
Arrive On Green	0.00	0.18	0.00	0.07	0.25	0.25	0.04	0.04	0.04	0.23	0.00	0.00
Sat Flow, veh/h	905	2034	0	3312	3413	1553	1774	551	1102	3548	1830	0
Grp Volume(v), veh/h	2	118	0	40	96	64	1	0	18	200	0	0
Grp Sat Flow(s),veh/h/ln	905	991	0	1656	1138	1553	1774	0	1653	1774	1830	0
Q Serve(g_s), s	0.1	2.0	0.0	0.4	0.8	1.3	0.0	0.0	0.4	1.8	0.0	0.0
Cycle Q Clear(g_c), s	0.1	2.0	0.0	0.4	0.8	1.3	0.0	0.0	0.4	1.8	0.0	0.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.67	1.00		0.00
Lane Grp Cap(c), veh/h	4	366	0	239	860	391	68	0	63	802	414	0
V/C Ratio(X)	0.50	0.32	0.00	0.17	0.11	0.16	0.01	0.00	0.29	0.25	0.00	0.00
Avail Cap(c_a), veh/h	461	1112	0	1689	2610	1188	905	0	843	3166	1633	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.5	13.9	0.0	17.1	11.3	11.4	18.2	0.0	18.3	12.4	0.0	0.0
Incr Delay (d2), s/veh	49.5	0.7	0.0	0.2	0.1	0.3	0.1	0.0	1.5	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.6	0.0	0.2	0.3	0.6	0.0	0.0	0.2	0.9	0.0	0.0
LnGrp Delay(d),s/veh	68.9	14.6	0.0	17.3	11.4	11.7	18.2	0.0	19.8	12.8	0.0	0.0
LnGrp LOS	E	B		B	B	B	B		B	B		
Approach Vol, veh/h		120			200			19			200	
Approach Delay, s/veh		15.5			12.7			19.8			12.8	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.7	13.1		12.9	5.1	15.8		5.5
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0
Max Green Setting (Gmax), s	20.0	22.0		35.0	20.0	30.0		20.0
Max Q Clear Time (g_c+I1), s	2.4	4.0		3.8	2.1	3.3		2.4
Green Ext Time (p_c), s	0.0	1.9		1.5	0.0	2.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	13.6
HCM 2010 LOS	B

Notes
User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	121	198	1	90	70	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1557	1407	1863	1727	1301	0
Adj Flow Rate, veh/h	133	0	1	99	77	0
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	22	35	2	10	46	0
Cap, veh/h	269	217	6	1561	856	0
Arrive On Green	0.18	0.00	0.00	0.48	0.35	0.00
Sat Flow, veh/h	1483	1196	1774	3368	2603	0
Grp Volume(v), veh/h	133	0	1	99	77	0
Grp Sat Flow(s),veh/h/ln	1483	1196	1774	1641	1236	0
Q Serve(g_s), s	2.3	0.0	0.0	0.5	0.6	0.0
Cycle Q Clear(g_c), s	2.3	0.0	0.0	0.5	0.6	0.0
Prop In Lane	1.00	1.00	1.00			0.00
Lane Grp Cap(c), veh/h	269	217	6	1561	856	0
V/C Ratio(X)	0.49	0.00	0.16	0.06	0.09	0.00
Avail Cap(c_a), veh/h	1540	1242	1535	3895	2995	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	10.6	0.0	14.4	4.1	6.4	0.0
Incr Delay (d2), s/veh	2.8	0.0	11.9	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	0.0	0.2	0.2	0.0
LnGrp Delay(d),s/veh	13.5	0.0	26.3	4.1	6.5	0.0
LnGrp LOS	B		C	A	A	
Approach Vol, veh/h	133			100	77	
Approach Delay, s/veh	13.5			4.4	6.5	
Approach LOS	B			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		19.0		9.8	3.7	15.3		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 34		30.0	25.0	35.0		
Max Q Clear Time (g_c+I1), s		2.5		4.3	2.0	2.6		
Green Ext Time (p_c), s		2.0		0.8	0.0	2.0		

Intersection Summary		
HCM 2010 Ctrl Delay		8.8
HCM 2010 LOS		A

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Volume (vph)	8	91	279	132	114	0	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		0.99
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		2760	4472	2798	1256		1221
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		2760	4472	2798	1256		1221
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	9	105	321	152	131	0	55
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	114	321	152	131	0	55
Confl. Peds. (#/hr)					1		1
Heavy Vehicles (%)	2%	29%	16%	29%	27%	2%	33%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		7.9	35.7	18.1	35.7		35.7
Effective Green, g (s)		7.9	35.7	18.1	35.7		35.7
Actuated g/C Ratio		0.22	1.00	0.51	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		610	4472	1418	1256		1221
v/s Ratio Prot		c0.04	0.07	0.05			
v/s Ratio Perm					c0.10		0.05
v/c Ratio		0.19	0.07	0.11	0.10		0.05
Uniform Delay, d1		11.3	0.0	4.6	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.1	0.0	0.1	0.2		0.1
Delay (s)		11.3	0.0	4.7	0.2		0.1
Level of Service		B	A	A	A		A
Approach Delay (s)			3.0	2.6		0.1	
Approach LOS			A	A		A	

Intersection Summary			
HCM 2000 Control Delay	2.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	35.7	Sum of lost time (s)	9.7
Intersection Capacity Utilization	29.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	1	0	113	1	4	5	125	86	15	133	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	950	1863	1845	1606	1900	1863	1418	1827	1863	1275	1900
Adj Flow Rate, veh/h	0	1	0	135	1	4	6	149	67	18	158	0
Adj No. of Lanes	1	1	1	2	1	0	1	3	1	1	3	0
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	100	2	3	100	100	2	34	4	2	49	49
Cap, veh/h	4	2	4	783	98	390	17	1044	419	48	983	0
Arrive On Green	0.00	0.00	0.00	0.23	0.35	0.35	0.01	0.27	0.27	0.03	0.28	0.00
Sat Flow, veh/h	1774	950	1583	3408	281	1125	1774	3871	1551	1774	3596	0
Grp Volume(v), veh/h	0	1	0	135	0	5	6	149	67	18	158	0
Grp Sat Flow(s),veh/h/ln	1774	950	1583	1704	0	1406	1774	1290	1551	1774	1160	0
Q Serve(g_s), s	0.0	0.0	0.0	1.3	0.0	0.1	0.1	1.2	1.4	0.4	1.4	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.3	0.0	0.1	0.1	1.2	1.4	0.4	1.4	0.0
Prop In Lane	1.00		1.00	1.00		0.80	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	4	2	4	783	0	488	17	1044	419	48	983	0
V/C Ratio(X)	0.00	0.43	0.00	0.17	0.00	0.01	0.35	0.14	0.16	0.37	0.16	0.00
Avail Cap(c_a), veh/h	866	696	1159	1664	0	1029	866	2362	946	866	2124	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	20.4	0.0	12.7	0.0	8.8	20.2	11.4	11.4	19.6	11.1	0.0
Incr Delay (d2), s/veh	0.0	140.8	0.0	0.1	0.0	0.0	7.3	0.1	0.3	2.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.1	0.0	0.6	0.0	0.0	0.1	0.4	0.6	0.2	0.5	0.0
LnGrp Delay(d),s/veh	0.0	161.2	0.0	12.7	0.0	8.8	27.4	11.5	11.8	22.5	11.2	0.0
LnGrp LOS		F		B		A	C	B	B	C	B	
Approach Vol, veh/h		1			140			222			176	
Approach Delay, s/veh		161.2			12.6			12.0			12.4	
Approach LOS		F			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.1	5.8	4.6	16.5	0.0	19.9	5.1	16.0
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9
Max Green Setting (Gmax), s	* 20	30.0	* 20	25.0	* 20	30.0	20.0	25.0
Max Q Clear Time (g_c+I1), s	3.3	2.0	2.1	3.4	0.0	2.1	2.4	3.4
Green Ext Time (p_c), s	0.2	0.0	0.0	3.6	0.0	0.0	0.0	3.6

Intersection Summary	
HCM 2010 Ctrl Delay	12.5
HCM 2010 LOS	B

Notes

User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	86	0	10	20	56	58	3	62	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	0	1022	0	1357	1863	1496	1250	1863	1712	0
Adj Flow Rate, veh/h	0	0	0	100	0	9	23	65	41	3	72	0
Adj No. of Lanes	0	1	0	1	0	1	1	2	1	1	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	0	2	0	86	0	40	2	27	52	2	11	0
Cap, veh/h	0	6	0	141	0	0	608	847	316	12	1474	0
Arrive On Green	0.00	0.00	0.00	0.14	0.00	0.00	0.30	0.30	0.30	0.01	0.45	0.00
Sat Flow, veh/h	0	-65196	0	973	100		1323	2843	1063	1774	3338	0
Grp Volume(v), veh/h	0	0	0	100	16.2		23	65	41	3	72	0
Grp Sat Flow(s),veh/h/ln	0	1863	0	973	B		1323	1421	1063	1774	1626	0
Q Serve(g_s), s	0.0	0.0	0.0	3.3			0.4	0.6	0.9	0.1	0.4	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	3.3			0.4	0.6	0.9	0.1	0.4	0.0
Prop In Lane	0.00		0.00	1.00			1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	0	6	0	141			608	847	316	12	1474	0
V/C Ratio(X)	0.00	0.00	0.00	0.71			0.04	0.08	0.13	0.26	0.05	0.00
Avail Cap(c_a), veh/h	0	111	0	869			1988	3810	1424	1585	4359	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	1.00			1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	13.7			8.4	8.5	8.6	16.6	5.1	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.5			0.0	0.0	0.1	4.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.0			0.2	0.2	0.3	0.0	0.2	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	16.2			8.4	8.5	8.7	20.8	5.1	0.0
LnGrp LOS				B			A	A	A	C	A	
Approach Vol, veh/h		0						129			75	
Approach Delay, s/veh		0.0						8.6			5.8	
Approach LOS								A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4			7	8
Phs Duration (G+Y+Rc), s	10.9	0.0		22.7			5.2	17.5
Change Period (Y+Rc), s	6.0	3.5		7.5			5.0	7.5
Max Green Setting (Gmax), s	30.0	2.0		45.0			30.0	45.0
Max Q Clear Time (g_c+I1), s	5.3	0.0		2.4			2.1	2.9
Green Ext Time (p_c), s	0.2	0.0		0.8			0.0	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	10.4
HCM 2010 LOS	B

Notes

User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (veh/h)	33	0	10	0	0	0	10	80	0	5	5	60
Number	7	4	14	3	8	18	5	2	12		1	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900		1863	1863
Adj Flow Rate, veh/h	36	0	11	0	0	0	11	87	0		5	65
Adj No. of Lanes	2	1	0	1	1	0	1	2	0		1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2		2	2
Cap, veh/h	305	0	177	7	8	0	42	1121	0		15	1067
Arrive On Green	0.09	0.00	0.11	0.00	0.00	0.00	0.02	0.32	0.00		0.01	0.30
Sat Flow, veh/h	3442	0	1583	1774	1863	0	1774	3632	0		1774	3539
Grp Volume(v), veh/h	36	0	11	0	0	0	11	87	0		5	65
Grp Sat Flow(s),veh/h/ln	1721	0	1583	1774	1863	0	1774	1770	0		1774	1770
Q Serve(g_s), s	0.2	0.0	0.2	0.0	0.0	0.0	0.1	0.4	0.0		0.1	0.3
Cycle Q Clear(g_c), s	0.2	0.0	0.2	0.0	0.0	0.0	0.1	0.4	0.0		0.1	0.3
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00		1.00	
Lane Grp Cap(c), veh/h	305	0	177	7	8	0	42	1121	0		15	1067
V/C Ratio(X)	0.12	0.00	0.06	0.00	0.00	0.00	0.26	0.08	0.00		0.34	0.06
Avail Cap(c_a), veh/h	1616	0	2618	435	2661	0	579	5490	0		507	5346
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00		1.00	1.00
Uniform Delay (d), s/veh	10.3	0.0	9.7	0.0	0.0	0.0	11.8	5.9	0.0		12.1	6.1
Incr Delay (d2), s/veh	0.2	0.0	0.1	0.0	0.0	0.0	3.3	0.0	0.0		13.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.0		0.1	0.2
LnGrp Delay(d),s/veh	10.4	0.0	9.9	0.0	0.0	0.0	15.0	5.9	0.0		25.5	6.1
LnGrp LOS	B		A				B	A			C	A
Approach Vol, veh/h		47			0			98				110
Approach Delay, s/veh		10.3			0.0			6.9				7.0
Approach LOS		B						A				A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	4.9	12.7	0.0	6.9	5.3	12.3	6.9	0.1
Change Period (Y+Rc), s	* 4.7	4.9	* 4.7	* 4.2	* 4.7	4.9	* 4.7	* 4.2
Max Green Setting (Gmax), s	* 7	38.0	* 6	* 41	* 8	37.0	* 12	* 35
Max Q Clear Time (g_c+I1), s	2.1	2.4	0.0	2.2	2.1	2.4	2.2	0.0
Green Ext Time (p_c), s	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		7.6
HCM 2010 LOS		A

Notes

User approved ignoring U-Turning movement.

Movement	SBR
Lane Configurations	
Volume (veh/h)	37
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1863
Adj Flow Rate, veh/h	40
Adj No. of Lanes	1
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	477
Arrive On Green	0.30
Sat Flow, veh/h	1583
Grp Volume(v), veh/h	40
Grp Sat Flow(s),veh/h/ln	1583
Q Serve(g_s), s	0.4
Cycle Q Clear(g_c), s	0.4
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	477
V/C Ratio(X)	0.08
Avail Cap(c_a), veh/h	2391
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	6.1
Incr Delay (d2), s/veh	0.1
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.2
LnGrp Delay(d),s/veh	6.2
LnGrp LOS	A
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (veh/h)	81	3	2	8	54	76	2
Number	5	12		4	14	3	8
Initial Q (Qb), veh	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00			1.00	1.00	
Parking Bus, Adj	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1667	1138		1027	1652	1056	950
Adj Flow Rate, veh/h	108	4		11	59	101	3
Adj No. of Lanes	2	1		1	2	1	1
Peak Hour Factor	0.75	0.75		0.75	0.75	0.75	0.75
Percent Heavy Veh, %	14	67		100	15	80	100
Cap, veh/h	531	167		158	380	162	450
Arrive On Green	0.17	0.17		0.15	0.15	0.16	0.47
Sat Flow, veh/h	3079	967		1027	2472	1005	950
Grp Volume(v), veh/h	108	4		11	59	101	3
Grp Sat Flow(s),veh/h/ln	1540	967		1027	1236	1005	950
Q Serve(g_s), s	0.8	0.1		0.2	0.5	2.4	0.0
Cycle Q Clear(g_c), s	0.8	0.1		0.2	0.5	2.4	0.0
Prop In Lane	1.00	1.00			1.00	1.00	
Lane Grp Cap(c), veh/h	531	167		158	380	162	450
V/C Ratio(X)	0.20	0.02		0.07	0.16	0.62	0.01
Avail Cap(c_a), veh/h	2447	769		1021	2456	799	944
HCM Platoon Ratio	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.9	8.6		9.1	9.2	9.8	3.5
Incr Delay (d2), s/veh	0.1	0.0		0.5	0.5	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0		0.1	0.2	0.8	0.0
LnGrp Delay(d),s/veh	9.0	8.7		9.6	9.8	12.2	3.5
LnGrp LOS	A	A		A	A	B	A
Approach Vol, veh/h	112			70			104
Approach Delay, s/veh	9.0			9.8			12.0
Approach LOS	A			A			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		9.2	8.1	7.9				15.9
Change Period (Y+Rc), s		4.9	4.0	4.0				4.0
Max Green Setting (Gmax), s		20.0	20.0	25.0				25.0
Max Q Clear Time (g_c+I1), s		2.8	4.4	2.5				2.0
Green Ext Time (p_c), s		0.2	0.2	0.6				0.6

Intersection Summary		
HCM 2010 Ctrl Delay		10.3
HCM 2010 LOS		B

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	116	5	117	139	257	2	14	96	278	20	14
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1681	1266	1900	1845	1188	1863	1863	1863	1900	1863	1820	1900
Adj Flow Rate, veh/h	10	125	3	126	149	79	2	15	48	324	0	0
Adj No. of Lanes	1	2	0	2	3	1	1	1	0	2	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	13	52	52	3	60	2	2	2	2	2	2	2
Cap, veh/h	33	414	10	461	930	454	171	38	121	728	373	0
Arrive On Green	0.02	0.17	0.17	0.14	0.29	0.29	0.10	0.10	0.10	0.21	0.00	0.00
Sat Flow, veh/h	1601	2401	57	3408	3242	1583	1774	391	1251	3548	1820	0
Grp Volume(v), veh/h	10	62	66	126	149	79	2	0	63	324	0	0
Grp Sat Flow(s),veh/h/ln	1601	1203	1256	1704	1081	1583	1774	0	1642	1774	1820	0
Q Serve(g_s), s	0.3	2.2	2.2	1.6	1.7	1.8	0.0	0.0	1.7	3.8	0.0	0.0
Cycle Q Clear(g_c), s	0.3	2.2	2.2	1.6	1.7	1.8	0.0	0.0	1.7	3.8	0.0	0.0
Prop In Lane	1.00		0.05	1.00		1.00	1.00		0.76	1.00		0.00
Lane Grp Cap(c), veh/h	33	207	216	461	930	454	171	0	158	728	373	0
V/C Ratio(X)	0.30	0.30	0.30	0.27	0.16	0.17	0.01	0.00	0.40	0.45	0.00	0.00
Avail Cap(c_a), veh/h	666	550	574	1417	2021	987	737	0	683	2581	1324	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	23.2	17.4	17.4	18.7	12.8	12.9	19.7	0.0	20.4	16.7	0.0	0.0
Incr Delay (d2), s/veh	3.0	1.1	1.1	0.2	0.1	0.3	0.0	0.0	1.0	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.8	0.8	0.8	0.5	0.8	0.0	0.0	0.8	2.0	0.0	0.0
LnGrp Delay(d),s/veh	26.2	18.5	18.5	18.9	12.9	13.1	19.7	0.0	21.4	17.6	0.0	0.0
LnGrp LOS	C	B	B	B	B	B	B		C	B		
Approach Vol, veh/h		138			354			65			324	
Approach Delay, s/veh		19.1			15.1			21.4			17.6	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.4	14.2		13.9	5.9	19.7		8.6
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0
Max Green Setting (Gmax), s	20.0	22.0		35.0	20.0	30.0		20.0
Max Q Clear Time (g_c+I1), s	3.6	4.2		5.8	2.3	3.8		3.7
Green Ext Time (p_c), s	0.2	2.4		2.6	0.0	2.7		0.2

Intersection Summary			
HCM 2010 Ctrl Delay			17.1
HCM 2010 LOS			B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↑↑	↑↑	
Volume (veh/h)	245	245	2	100	81	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1667	1681	1863	1610	1570	0
Adj Flow Rate, veh/h	255	0	2	104	84	0
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	14	13	2	18	21	0
Cap, veh/h	374	337	6	1362	962	0
Arrive On Green	0.24	0.00	0.00	0.45	0.32	0.00
Sat Flow, veh/h	1587	1429	1774	3140	3140	0
Grp Volume(v), veh/h	255	0	2	104	84	0
Grp Sat Flow(s),veh/h/ln	1587	1429	1774	1530	1492	0
Q Serve(g_s), s	4.5	0.0	0.0	0.6	0.6	0.0
Cycle Q Clear(g_c), s	4.5	0.0	0.0	0.6	0.6	0.0
Prop In Lane	1.00	1.00	1.00			0.00
Lane Grp Cap(c), veh/h	374	337	6	1362	962	0
V/C Ratio(X)	0.68	0.00	0.34	0.08	0.09	0.00
Avail Cap(c_a), veh/h	1535	1382	1430	3383	3367	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	10.8	0.0	15.4	4.9	7.3	0.0
Incr Delay (d2), s/veh	4.4	0.0	31.1	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	0.1	0.3	0.3	0.0
LnGrp Delay(d),s/veh	15.2	0.0	46.5	5.0	7.4	0.0
LnGrp LOS	B		D	A	A	
Approach Vol, veh/h	255			106	84	
Approach Delay, s/veh	15.2			5.8	7.4	
Approach LOS	B			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		19.1		11.9	3.8	15.3		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 34		30.0	25.0	35.0		
Max Q Clear Time (g_c+I1), s		2.6		6.5	2.0	2.6		
Green Ext Time (p_c), s		2.2		1.7	0.0	2.2		

Intersection Summary	
HCM 2010 Ctrl Delay	11.5
HCM 2010 LOS	B

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Volume (vph)	28	161	414	161	279	0	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3144	4322	3195	1369		1141
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3144	4322	3195	1369		1141
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	29	168	431	168	291	0	78
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	197	431	168	291	0	78
Heavy Vehicles (%)	2%	13%	20%	13%	18%	2%	44%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		8.0	31.5	13.8	31.5		31.5
Effective Green, g (s)		8.0	31.5	13.8	31.5		31.5
Actuated g/C Ratio		0.25	1.00	0.44	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		798	4322	1399	1369		1141
v/s Ratio Prot		0.06	0.10	0.05			
v/s Ratio Perm					c0.21		0.07
v/c Ratio		0.25	0.10	0.12	0.21		0.07
Uniform Delay, d1		9.4	0.0	5.2	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.1	0.0	0.1	0.4		0.1
Delay (s)		9.4	0.0	5.4	0.4		0.1
Level of Service		A	A	A	A		A
Approach Delay (s)			3.0	2.2		0.1	
Approach LOS			A	A		A	

Intersection Summary			
HCM 2000 Control Delay	2.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	31.5	Sum of lost time (s)	9.7
Intersection Capacity Utilization	24.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	285	0	28	4	164	96	29	155	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1329	1759	1776	1319	1900
Adj Flow Rate, veh/h	0	0	0	306	0	20	4	176	68	31	167	0
Adj No. of Lanes	1	1	1	2	1	0	1	3	1	1	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	43	8	7	44	44
Cap, veh/h	5	5	4	1047	0	440	12	1061	437	75	1170	0
Arrive On Green	0.00	0.00	0.00	0.30	0.00	0.28	0.01	0.29	0.29	0.04	0.32	0.00
Sat Flow, veh/h	1774	1863	1583	3442	0	1583	1774	3627	1495	1691	3721	0
Grp Volume(v), veh/h	0	0	0	306	0	20	4	176	68	31	167	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1721	0	1583	1774	1209	1495	1691	1201	0
Q Serve(g_s), s	0.0	0.0	0.0	2.6	0.0	0.3	0.1	1.4	1.3	0.7	1.2	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.6	0.0	0.3	0.1	1.4	1.3	0.7	1.2	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	5	5	4	1047	0	440	12	1061	437	75	1170	0
V/C Ratio(X)	0.00	0.00	0.00	0.29	0.00	0.05	0.35	0.17	0.16	0.42	0.14	0.00
Avail Cap(c_a), veh/h	937	1476	1254	1818	0	1254	937	2395	987	893	2378	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	10.1	0.0	10.0	18.7	10.0	9.9	17.6	9.1	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.1	0.0	0.0	10.4	0.1	0.3	2.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.2	0.0	0.2	0.1	0.5	0.6	0.4	0.4	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	10.2	0.0	10.0	29.2	10.1	10.2	19.9	9.2	0.0
LnGrp LOS				B		B	C	B	B	B	A	
Approach Vol, veh/h		0			326			248			198	
Approach Delay, s/veh		0.0			10.1			10.4			10.8	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.2	0.0	4.4	17.2	0.0	16.2	5.7	16.0
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9
Max Green Setting (Gmax), s	* 20	30.0	* 20	25.0	* 20	30.0	20.0	25.0
Max Q Clear Time (g_c+I1), s	4.6	0.0	2.1	3.2	0.0	2.3	2.7	3.4
Green Ext Time (p_c), s	0.6	0.0	0.0	4.0	0.0	0.0	0.0	4.0

Intersection Summary		
HCM 2010 Ctrl Delay		10.4
HCM 2010 LOS		B

Notes

User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	77	0	13	42	91	63	10	107	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	0	1027	0	1301	1863	1570	1038	1188	1652	0
Adj Flow Rate, veh/h	0	0	0	88	0	15	48	103	60	11	122	0
Adj No. of Lanes	0	1	0	1	0	1	1	2	1	1	2	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	0	2	0	85	0	46	2	21	83	60	15	0
Cap, veh/h	0	6	0	130	0	0	587	883	261	26	1467	0
Arrive On Green	0.00	0.00	0.00	0.13	0.00	0.00	0.30	0.30	0.30	0.02	0.47	0.00
Sat Flow, veh/h	0	-65196	0	978	88		1264	2983	883	1131	3222	0
Grp Volume(v), veh/h	0	0	0	88	16.2		48	103	60	11	122	0
Grp Sat Flow(s),veh/h/ln	0	1863	0	978	B		1264	1492	883	1131	1570	0
Q Serve(g_s), s	0.0	0.0	0.0	2.9			0.9	0.9	1.7	0.3	0.7	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	2.9			0.9	0.9	1.7	0.3	0.7	0.0
Prop In Lane	0.00		0.00	1.00			1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	0	6	0	130			587	883	261	26	1467	0
V/C Ratio(X)	0.00	0.00	0.00	0.68			0.08	0.12	0.23	0.42	0.08	0.00
Avail Cap(c_a), veh/h	0	110	0	869			1897	3974	1176	1004	4182	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	1.00			1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	13.9			8.7	8.7	9.0	16.3	5.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	2.3			0.0	0.0	0.3	3.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.9			0.3	0.3	0.4	0.1	0.3	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	16.2			8.7	8.7	9.3	20.2	5.0	0.0
LnGrp LOS				B			A	A	A	C	A	
Approach Vol, veh/h		0						211			133	
Approach Delay, s/veh		0.0						8.9			6.3	
Approach LOS								A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4			7	8
Phs Duration (G+Y+Rc), s	10.5	0.0		23.3			5.8	17.5
Change Period (Y+Rc), s	6.0	3.5		7.5			5.0	7.5
Max Green Setting (Gmax), s	30.0	2.0		45.0			30.0	45.0
Max Q Clear Time (g_c+I1), s	4.9	0.0		2.7			2.3	3.7
Green Ext Time (p_c), s	0.1	0.0		1.4			0.0	1.4

Intersection Summary		
HCM 2010 Ctrl Delay		9.6
HCM 2010 LOS		A

Notes

User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (veh/h)	80	0	20	0	0	0	10	228	0	5	5	90
Number	7	4	14	3	8	18	5	2	12		1	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900		1863	1863
Adj Flow Rate, veh/h	87	0	22	0	0	0	11	248	0		5	98
Adj No. of Lanes	2	1	0	1	1	0	1	2	0		1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2		2	2
Cap, veh/h	591	0	315	6	6	0	41	1183	0		14	1129
Arrive On Green	0.17	0.00	0.20	0.00	0.00	0.00	0.02	0.33	0.00		0.01	0.32
Sat Flow, veh/h	3442	0	1583	1774	1863	0	1774	3632	0		1774	3539
Grp Volume(v), veh/h	87	0	22	0	0	0	11	248	0		5	98
Grp Sat Flow(s),veh/h/ln	1721	0	1583	1774	1863	0	1774	1770	0		1774	1770
Q Serve(g_s), s	0.6	0.0	0.3	0.0	0.0	0.0	0.2	1.5	0.0		0.1	0.6
Cycle Q Clear(g_c), s	0.6	0.0	0.3	0.0	0.0	0.0	0.2	1.5	0.0		0.1	0.6
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00		1.00	
Lane Grp Cap(c), veh/h	591	0	315	6	6	0	41	1183	0		14	1129
V/C Ratio(X)	0.15	0.00	0.07	0.00	0.00	0.00	0.27	0.21	0.00		0.35	0.09
Avail Cap(c_a), veh/h	1316	0	2132	354	2168	0	472	3883	0		708	4354
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00		1.00	1.00
Uniform Delay (d), s/veh	10.6	0.0	9.8	0.0	0.0	0.0	14.4	7.2	0.0		14.8	7.2
Incr Delay (d2), s/veh	0.1	0.0	0.1	0.0	0.0	0.0	3.4	0.1	0.0		13.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.2	0.0	0.0	0.0	0.1	0.7	0.0		0.1	0.3
LnGrp Delay(d),s/veh	10.7	0.0	9.9	0.0	0.0	0.0	17.8	7.3	0.0		28.4	7.2
LnGrp LOS	B		A				B	A			C	A
Approach Vol, veh/h		109			0			259				136
Approach Delay, s/veh		10.5			0.0			7.7				8.0
Approach LOS		B						A				A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	4.9	15.0	0.0	10.2	5.4	14.5	9.9	0.3
Change Period (Y+Rc), s	* 4.7	4.9	* 4.7	* 4.2	* 4.7	4.9	* 4.7	* 4.2
Max Green Setting (Gmax), s	* 12	33.0	* 6	* 41	* 8	37.0	* 12	* 35
Max Q Clear Time (g_c+I1), s	2.1	3.5	0.0	2.3	2.2	2.6	2.6	0.0
Green Ext Time (p_c), s	0.0	2.2	0.0	0.1	0.0	2.3	0.1	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	8.4
HCM 2010 LOS	A

Notes

User approved ignoring U-Turning movement.

Movement	SBR
Lane Configurations	
Volume (veh/h)	30
Number	16
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1863
Adj Flow Rate, veh/h	33
Adj No. of Lanes	1
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	505
Arrive On Green	0.32
Sat Flow, veh/h	1583
Grp Volume(v), veh/h	33
Grp Sat Flow(s),veh/h/ln	1583
Q Serve(g_s), s	0.4
Cycle Q Clear(g_c), s	0.4
Prop In Lane	1.00
Lane Grp Cap(c), veh/h	505
V/C Ratio(X)	0.07
Avail Cap(c_a), veh/h	1948
HCM Platoon Ratio	1.00
Upstream Filter(I)	1.00
Uniform Delay (d), s/veh	7.1
Incr Delay (d2), s/veh	0.1
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.2
LnGrp Delay(d),s/veh	7.2
LnGrp LOS	A
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	133	218	1	99	77
v/c Ratio	0.31	0.18	0.00	0.05	0.06
Control Delay	12.3	0.3	14.0	6.1	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	12.3	0.3	14.0	6.1	9.6
Queue Length 50th (ft)	18	0	0	4	4
Queue Length 95th (ft)	57	0	3	14	20
Internal Link Dist (ft)	130			478	386
Turn Bay Length (ft)					
Base Capacity (vph)	1277	1196	1272	3282	2377
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.10	0.18	0.00	0.03	0.03

Intersection Summary

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	255	255	2	104	84
v/c Ratio	0.45	0.18	0.01	0.09	0.09
Control Delay	12.1	0.3	15.5	7.8	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1	0.3	15.5	7.8	11.3
Queue Length 50th (ft)	30	0	0	5	4
Queue Length 95th (ft)	101	0	5	18	23
Internal Link Dist (ft)	130			478	386
Turn Bay Length (ft)					
Base Capacity (vph)	1383	1429	1289	3059	2820
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.18	0.18	0.00	0.03	0.03

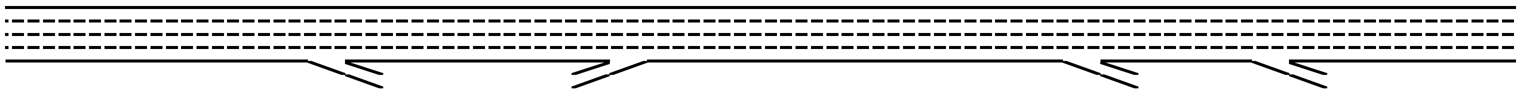
Intersection Summary

INTENTIONALLY LEFT BLANK

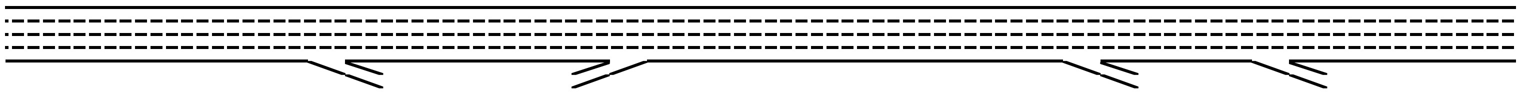
Appendix C:

Existing Conditions (2015) – Freeway Operations

Location	1	2	3	4	5	6	7	8
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Grapevine Downgrade	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp
Define Freeway Segment								
Type	Basic	Diverge	Basic	Merge	Basic	Diverge	Diverge	Basic
Length (ft)	24,012	1,500	1,460	1,500	11,784	1,500	1,240	1,470
Accel Length				405				
Decel Length		120				170	185	
Mainline Volume	1,541	1,541	1,491	1,491	1,571	1,571	1,404	1,356
On Ramp Volume				80				
Off Ramp Volume		50				167	48	
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	1,541	1,541	1,491	1,571	1,571	1,571	1,404	1,356
PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
GP Lanes	4	4	4	4	4	4	4	4
Terrain	Grade	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	21.2%	21.2%	20.9%	20.9%	22.0%	22.0%	22.0%	21.5%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.702	0.904	0.905	0.905	0.901	0.901	0.901	0.903
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	2,360	1,833	1,771	1,866	1,875	1,875	1,676	1,615
GP Flow (pcphpl)	590	458	443	466	469	469	419	404
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	70	70	70	70



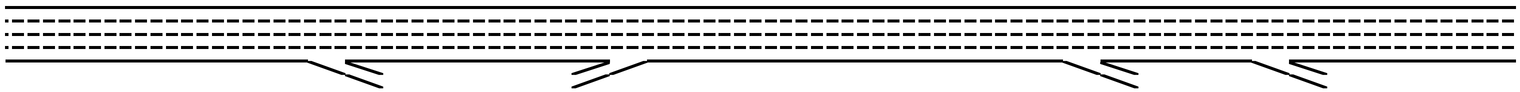
Location	1	2	3	4	5	6	7	8



Key
<> Express Lane (HOV)
No Trucks

Name	Grapevine Downgrade	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp
Calculate Operations in General Purpose Lanes								
v/c ratio	0.25	0.19	0.19	0.20	0.20	0.20	0.17	0.17
Speed (mph)	65.0	65.0	65.0	65.0	70.0	70.0	70.0	70.0
Density (pcphpl)	9.1	7.0	6.8	7.2	6.7	6.7	6.0	5.8
LOS	A	A	A	A	A	A	A	A
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)		1,833		1,730		1,875	1,676	
GP_{IN} Cap (pcph)		9,400		9,400		9,600	9,600	
GP_{IN} v/c ratio		0.19		0.18		0.20	0.17	
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)		1,769		1,866		1,662	1,606	
GP_{OUT} Cap (pcph)		9,400		9,400		9,600	9,600	
GP_{OUT} v/c ratio		0.19		0.20		0.17	0.17	
Calculate Flow Rate in Express Lanes (EL)								
Calculate Speed in Express Lanes								
Calculate Operations in Express Lanes								
Calculate On Ramp Flow Rate								
On Volume (vph)				80				
PHF				0.71				
Total Lanes				1				
Terrain				Level				
Grade %				0.0%				
Grade Length (mi)				0.00				
Truck & Bus %				41.8%				
RV %				0.0%				
E_T				1.5				
E_R				1.2				
f_{HV}				0.827				
f_P				1.00				
On Flow (pcph)				136				
On Flow (pcphpl)				136				
Calculate On Ramp Roadway Operations								
On Ramp Type				Right				
On Ramp Speed (mph)				45				
On Ramp Cap (pcph)				2,100				

Location	1	2	3	4	5	6	7	8

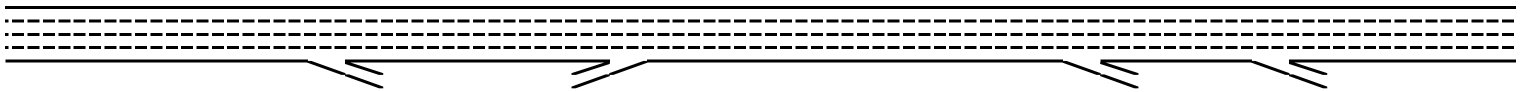


Key

<> Express Lane (HOV)

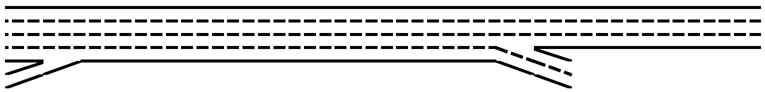
No Trucks

Name	Grapevine Downgrade	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp
On Ramp v/c ratio				0.06				
Calculate Off Ramp Flow Rate								
Off Volume (vph)		50				167	48	
PHF		0.89				0.87	0.8	
Total Lanes		1				1	1	
Terrain		Level				Level	Level	
Grade %		0.0%				0.0%	0.0%	
Grade Length (mi)		0.00				0.00	0.00	
Truck & Bus %		28.0%				22.2%	33.3%	
RV %		0.0%				0.0%	0.0%	
E_T		1.5				1.5	1.5	
E_R		1.2				1.2	1.2	
f_{HV}		0.877				0.900	0.857	
f_P		1.00				1.00	1.00	
Off Flow (pcph)		64				213	70	
Off Flow (pcphpl)		64				213	70	
Calculate Off Ramp Roadway Operations								
Off Ramp Type		Right				Right	Right	
Off Ramp Speed		25				45	25	
Off Ramp Cap (pcph)		1,900				2,100	1,900	
Off Ramp v/c ratio		0.03				0.10	0.04	
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps								
Calculate Merge Influence Area Operations								
Effective v_P (pcph)				1,730				
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)				0.589				
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}				0.301				
v_{12} (pcph)				521				
v_3 (pcph)								
v_{34} (pcph)				1,209				
v_{12a} (pcph)				692				



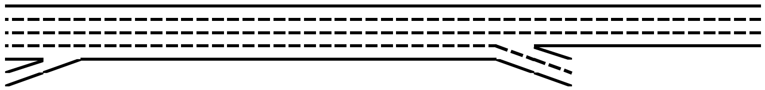
Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4	5	6	7	8
Name	Grapevine Downgrade	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp
v_{R12a} (pcph)				828				
Merge Speed Index				0.29				
Merge Area Speed				58.3				
Outer Lanes Volume				519				
Outer Lanes Speed				64.9				
Segment Speed				61.8				
Merge v/c ratio				0.18				
Merge Density				9.3				
Merge LOS				A				
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)		1,833				1,875	1,676	
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)		0.711				0.703	0.715	
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}		0.436				0.436	0.436	
v_{12} (pcph)		835				938	770	
v_3 (pcph)								
v_{34} (pcph)		997				937	906	
v_{12a} (pcph)		835				938	770	
Diverge Speed Index		0.56				0.32	0.56	
Diverge Area Speed		52.0				61.1	54.2	
Outer Lanes Volume		499				469	453	
Outer Lanes Speed		71.3				76.8	76.8	
Segment Speed		61.0				68.1	64.4	
Diverge v/c ratio		0.19				0.21	0.18	
Diverge Density		10.4				10.8	9.2	
Diverge LOS		B				B	A	
Summarize Segment Operations								
Segment v/c ratio	0.25	0.19	0.19	0.18	0.20	0.21	0.18	0.17
Segment Density	9.1	10.4	6.8	9.3	6.7	10.8	9.2	5.8
Segment LOS	A	B	A	A	A	B	A	A
Over Capacity								

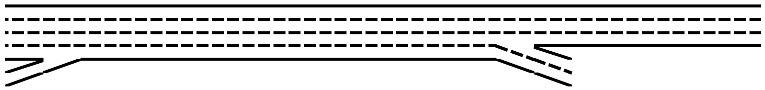


Key
<> Express Lane (HOV)
No Trucks

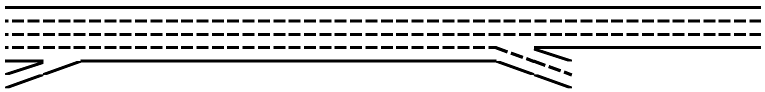
Location	9	10	11	12
Name	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment				
Type	Merge	Basic	Basic	Basic
Length (ft)	1,500	3,336	2,000	2,000
Accel Length	500			
Decel Length				
Mainline Volume	1,356	1,561	1,561	976
On Ramp Volume	205			
Off Ramp Volume			585	
Express Lane Volume				
EL On Ramp Volume				
EL Off Ramp Volume				
Calculate Flow Rate in General Pu				
GP Volume (vph)	1,561	1,561	1,561	976
PHF	0.93	0.93	0.93	0.93
GP Lanes	4	4	4	3
Terrain	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00
Truck & Bus %	21.5%	22.4%	22.4%	22.0%
RV %	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2
f_{HV}	0.903	0.899	0.899	0.901
f_P	1.00	1.00	1.00	1.00
GP Flow (pcph)	1,859	1,866	1,866	1,165
GP Flow (pcphpl)	465	467	467	388
Calculate Speed in General Purpo				
Lane Width (ft)				
Shoulder Width				
TRD				
f_{LW}				
f_{LC}				
Calculated FFS				
Measured FFS				
FFS Curve	70	70	70	70



Location	9	10	11	12
Key				
<> Express Lane (HOV)				
No Trucks				
Name	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Operations in General P				
v/c ratio	0.19	0.19	0.19	0.16
Speed (mph)	70.0	70.0	70.0	70.0
Density (pcphpl)	6.6	6.7	6.7	5.5
LOS	A	A	A	A
Calculate Operations for Entering				
GP_{IN} Vol (pcph)	1,581			
GP_{IN} Cap (pcph)	9,600			
GP_{IN} v/c ratio	0.16			
Calculate Operations for Exiting G				
GP_{OUT} Vol (pcph)	1,859		1,142	
GP_{OUT} Cap (pcph)	9,600		7,200	
GP_{OUT} v/c ratio	0.19		0.16	
Calculate Flow Rate in Express La				
Calculate Speed in Express Lanes				
Calculate Operations in Express L				
Calculate On Ramp Flow Rate				
On Volume (vph)	205			
PHF	0.84			
Total Lanes	1			
Terrain	Level			
Grade %	0.0%			
Grade Length (mi)	0.00			
Truck & Bus %	27.8%			
RV %	0.0%			
E_T	1.5			
E_R	1.2			
f_{HV}	0.878			
f_P	1.00			
On Flow (pcph)	278			
On Flow (pcphpl)	278			
Calculate On Ramp Roadway Ope				
On Ramp Type	Right			
On Ramp Speed (mph)	45			
On Ramp Cap (pcph)	2,100			



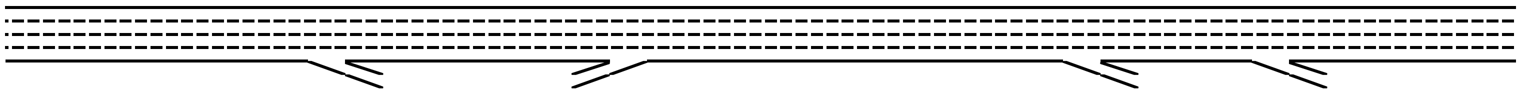
Location	9	10	11	12
Key				
<> Express Lane (HOV)				
No Trucks				
Name	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
On Ramp v/c ratio	0.13			
Calculate Off Ramp Flow Rate				
Off Volume (vph)			585	
PHF			0.9	
Total Lanes			2	
Terrain			Level	
Grade %			0.0%	
Grade Length (mi)			0.00	
Truck & Bus %			22.9%	
RV %			0.0%	
E_T			1.5	
E_R			1.2	
f_{HV}			0.897	
f_P			1.00	
Off Flow (pcph)			724	
Off Flow (pcphpl)			362	
Calculate Off Ramp Roadway Ope				
Off Ramp Type			Major	
Off Ramp Speed			65	
Off Ramp Cap (pcph)			4,700	
Off Ramp v/c ratio			0.15	
Determine Adjacent Ramp for Thr				
Calculate Merge Influence Area O				
Effective v_P (pcph)	1,581			
Up Ramp L_{EQ}				
Down Ramp L_{EQ}				
P_{FM} (Eqn 13-3)	0.592			
P_{FM} (Eqn 13-4)				
P_{FM} (Eqn 13-5)				
P_{FM}	0.307			
v_{12} (pcph)	485			
v_3 (pcph)				
v_{34} (pcph)	1,096			
v_{12a} (pcph)	632			



Key
<> Express Lane (HOV)
No Trucks

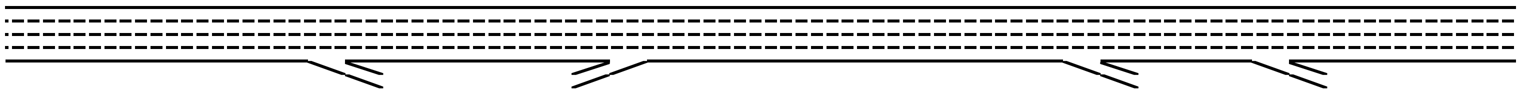
Location	9	10	11	12
Name	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
v_{R12a} (pcph)	910			
Merge Speed Index	0.29			
Merge Area Speed	62.0			
Outer Lanes Volume	474			
Outer Lanes Speed	70.0			
Segment Speed	65.8			
Merge v/c ratio	0.20			
Merge Density	9.3			
Merge LOS	A			
Calculate Diverge Influence Area (				
Effective v_P (pcph)				
Up Ramp L_{EQ}				
Down Ramp L_{EQ}				
P_{FD} (Eqn 13-9)				
P_{FD} (Eqn 13-10)				
P_{FD} (Eqn 13-11)				
P_{FD}				
v_{12} (pcph)				
v_3 (pcph)				
v_{34} (pcph)				
v_{12a} (pcph)				
Diverge Speed Index				
Diverge Area Speed				
Outer Lanes Volume				
Outer Lanes Speed				
Segment Speed				
Diverge v/c ratio				
Diverge Density				
Diverge LOS				
Summarize Segment Operations				
Segment v/c ratio	0.20	0.19	0.19	0.16
Segment Density	9.3	6.7	6.7	5.5
Segment LOS	A	A	A	A
Over Capacity				

Location	1	2	3	4	5	6	7	8



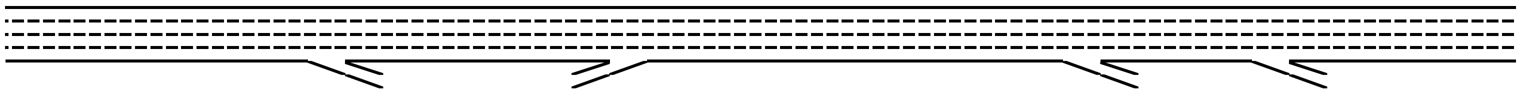
Key
<> Express Lane (HOV)
No Trucks

Name	Grapevine Downgrade	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp
Define Freeway Segment								
Type	Basic	Diverge	Basic	Merge	Basic	Diverge	Diverge	Basic
Length (ft)	24,012	1,500	1,460	1,500	11,784	1,500	1,240	1,470
Accel Length				405				
Decel Length		120				170	185	
Mainline Volume	2,035	2,035	1,994	1,994	2,051	2,051	1,793	1,718
On Ramp Volume				57				
Off Ramp Volume		41				258	75	
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	2,035	2,035	1,994	2,051	2,051	2,051	1,793	1,718
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
GP Lanes	4	4	4	4	4	4	4	4
Terrain	Grade	Level	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	28.1%	28.1%	28.1%	28.1%	27.8%	27.8%	27.8%	28.1%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.640	0.877	0.877	0.877	0.878	0.878	0.878	0.877
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,455	2,523	2,472	2,543	2,539	2,539	2,220	2,130
GP Flow (pcphpl)	864	631	618	636	635	635	555	532
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS	65.0	65.0	65.0					
FFS Curve	65	65	65	65	70	70	70	70



Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4	5	6	7	8
Name	Grapevine Downgrade	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp
Calculate Operations in General Purpose Lanes								
v/c ratio	0.37	0.27	0.26	0.27	0.26	0.26	0.23	0.22
Speed (mph)	65.0	65.0	65.0	65.0	70.0	70.0	70.0	70.0
Density (pcphpl)	13.3	9.7	9.5	9.8	9.1	9.1	7.9	7.6
LOS	B	A	A	A	A	A	A	A
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)		2,523		2,460		2,539	2,220	
GP_{IN} Cap (pcph)		9,400		9,400		9,600	9,600	
GP_{IN} v/c ratio		0.27		0.26		0.26	0.23	
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)		2,455		2,543		2,214	2,108	
GP_{OUT} Cap (pcph)		9,400		9,400		9,600	9,600	
GP_{OUT} v/c ratio		0.26		0.27		0.23	0.22	
Calculate Flow Rate in Express Lanes (EL)								
Calculate Speed in Express Lanes								
Calculate Operations in Express Lanes								
Calculate On Ramp Flow Rate								
On Volume (vph)				57				
PHF				0.75				
Total Lanes				1				
Terrain				Level				
Grade %				0.0%				
Grade Length (mi)				0.00				
Truck & Bus %				18.0%				
RV %				0.0%				
E_T				1.5				
E_R				1.2				
f_{HV}				0.917				
f_P				1.00				
On Flow (pcph)				83				
On Flow (pcphpl)				83				
Calculate On Ramp Roadway Operations								
On Ramp Type				Right				
On Ramp Speed (mph)				45				
On Ramp Cap (pcph)				2,100				

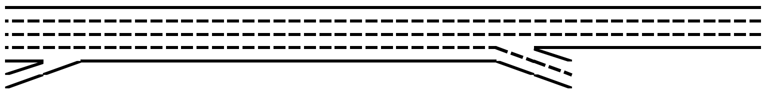


Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4	5	6	7	8
Name	Grapevine Downgrade	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp
On Ramp v/c ratio				0.04				
Calculate Off Ramp Flow Rate								
Off Volume (vph)		41				258	75	
PHF		0.68				0.88	0.82	
Total Lanes		1				1	1	
Terrain		Level				Level	Level	
Grade %		0.0%				0.0%	0.0%	
Grade Length (mi)		0.00				0.00	0.00	
Truck & Bus %		24.4%				21.7%	44.0%	
RV %		0.0%				0.0%	0.0%	
E_T		1.5				1.5	1.5	
E_R		1.2				1.2	1.2	
f_{HV}		0.891				0.902	0.820	
f_P		1.00				1.00	1.00	
Off Flow (pcph)		68				325	112	
Off Flow (pcphpl)		68				325	112	
Calculate Off Ramp Roadway Operations								
Off Ramp Type		Right				Right	Right	
Off Ramp Speed		25				45	25	
Off Ramp Cap (pcph)		1,900				2,100	1,900	
Off Ramp v/c ratio		0.04				0.15	0.06	
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps								
Calculate Merge Influence Area Operations								
Effective v_P (pcph)				2,460				
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)				0.589				
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}				0.308				
v_{12} (pcph)				757				
v_3 (pcph)								
v_{34} (pcph)				1,703				
v_{12a} (pcph)				984				

Key
<> Express Lane (HOV)
No Trucks

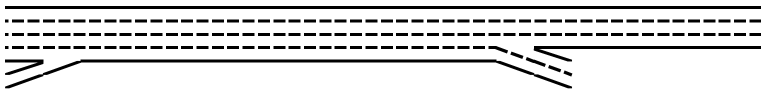
Location	1	2	3	4	5	6	7	8
Name	Grapevine Downgrade	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp	Laval Road West Off-Ramp	Laval Road Off to On-Ramp
v_{R12a} (pcph)				1,067				
Merge Speed Index				0.30				
Merge Area Speed				58.2				
Outer Lanes Volume				738				
Outer Lanes Speed				64.1				
Segment Speed				61.5				
Merge v/c ratio				0.23				
Merge Density				11.2				
Merge LOS				B				
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)		2,523				2,539	2,220	
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)		0.694				0.682	0.699	
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}		0.436				0.436	0.436	
v_{12} (pcph)		1,138				1,290	1,031	
v_3 (pcph)								
v_{34} (pcph)		1,385				1,249	1,189	
v_{12a} (pcph)		1,138				1,290	1,031	
Diverge Speed Index		0.56				0.33	0.57	
Diverge Area Speed		52.0				60.8	54.1	
Outer Lanes Volume		692				624	595	
Outer Lanes Speed		71.3				76.8	76.8	
Segment Speed		61.1				67.8	64.3	
Diverge v/c ratio		0.26				0.29	0.23	
Diverge Density		13.0				13.8	11.5	
Diverge LOS		B				B	B	
Summarize Segment Operations								
Segment v/c ratio	0.37	0.26	0.26	0.23	0.26	0.29	0.23	0.22
Segment Density	13.3	13.0	9.5	11.2	9.1	13.8	11.5	7.6
Segment LOS	B	B	A	B	A	B	B	A
Over Capacity								



Key
<> Express Lane (HOV)
No Trucks

Location	9	10	11	12
Name	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment				
Type	Merge	Basic	Basic	Basic
Length (ft)	1,500	3,336	1,500	
Accel Length	500			
Decel Length				
Mainline Volume	1,718	2,158	2,158	1,283
On Ramp Volume	440			
Off Ramp Volume			875	
Express Lane Volume				
EL On Ramp Volume				
EL Off Ramp Volume				
Calculate Flow Rate in General Pu				
GP Volume (vph)	2,158	2,158	2,158	1,283
PHF	0.92	0.92	0.92	0.95
GP Lanes	4	4	4	3
Terrain	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00
Truck & Bus %	28.1%	25.6%	25.6%	20.5%
RV %	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2
f_{HV}	0.877	0.887	0.887	0.907
f_P	1.00	1.00	1.00	1.00
GP Flow (pcph)	2,675	2,646	2,646	1,489
GP Flow (pcphpl)	669	661	661	496
Calculate Speed in General Purpo				
Lane Width (ft)				
Shoulder Width				
TRD				
f_{LW}				
f_{LC}				
Calculated FFS				
Measured FFS				
FFS Curve	70	70	70	70

Location	9	10	11	12

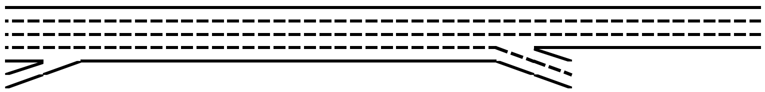


Key
<> Express Lane (HOV)
No Trucks

Name	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Operations in General P				
v/c ratio	0.28	0.28	0.28	0.21
Speed (mph)	70.0	70.0	70.0	70.0
Density (pcphpl)	9.6	9.4	9.4	7.1
LOS	A	A	A	A
Calculate Operations for Entering				
GP_{IN} Vol (pcph)	2,135			
GP_{IN} Cap (pcph)	9,600			
GP_{IN} v/c ratio	0.22			
Calculate Operations for Exiting G				
GP_{OUT} Vol (pcph)	2,675		1,474	
GP_{OUT} Cap (pcph)	9,600		7,200	
GP_{OUT} v/c ratio	0.28		0.20	
Calculate Flow Rate in Express La				
Calculate Speed in Express Lanes				
Calculate Operations in Express L				
Calculate On Ramp Flow Rate				
On Volume (vph)	440			
PHF	0.88			
Total Lanes	1			
Terrain	Level			
Grade %	0.0%			
Grade Length (mi)	0.00			
Truck & Bus %	15.9%			
RV %	0.0%			
E_T	1.5			
E_R	1.2			
f_{HV}	0.926			
f_P	1.00			
On Flow (pcph)	540			
On Flow (pcphpl)	540			
Calculate On Ramp Roadway Ope				
On Ramp Type	Right			
On Ramp Speed (mph)	45			
On Ramp Cap (pcph)	2,100			

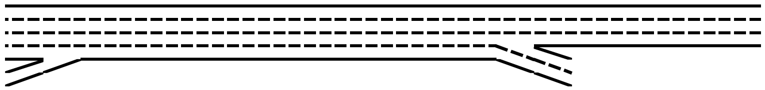
Project: Grapevine
Freeway Corridor: Northbound I-5

Location	9	10	11	12



Key				
<> Express Lane (HOV)				
No Trucks				
Name	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
On Ramp v/c ratio	0.26			
Calculate Off Ramp Flow Rate				
Off Volume (vph)			875	
PHF			0.87	
Total Lanes			2	
Terrain			Level	
Grade %			0.0%	
Grade Length (mi)			0.00	
Truck & Bus %			33.0%	
RV %			0.0%	
E_T			1.5	
E_R			1.2	
f_{HV}			0.858	
f_P			1.00	
Off Flow (pcph)			1,172	
Off Flow (pcphpl)			586	
Calculate Off Ramp Roadway Ope				
Off Ramp Type			Major	
Off Ramp Speed			65	
Off Ramp Cap (pcph)			4,700	
Off Ramp v/c ratio			0.25	
Determine Adjacent Ramp for Thr				
Calculate Merge Influence Area O				
Effective v_P (pcph)	2,135			
Up Ramp L_{EQ}				
Down Ramp L_{EQ}				
P_{FM} (Eqn 13-3)	0.592			
P_{FM} (Eqn 13-4)				
P_{FM} (Eqn 13-5)				
P_{FM}	0.274			
v_{12} (pcph)	586			
v_3 (pcph)				
v_{34} (pcph)	1,550			
v_{12a} (pcph)	854			

Location	9	10	11	12



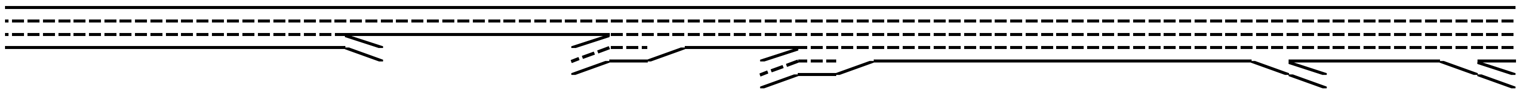
Key

<> Express Lane (HOV)

No Trucks

Name	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
v_{R12a} (pcph)	1,394			
Merge Speed Index	0.29			
Merge Area Speed	61.8			
Outer Lanes Volume	641			
Outer Lanes Speed	69.5			
Segment Speed	65.3			
Merge v/c ratio	0.30			
Merge Density	13.0			
Merge LOS	B			
Calculate Diverge Influence Area (				
Effective v_P (pcph)				
Up Ramp L_{EQ}				
Down Ramp L_{EQ}				
P_{FD} (Eqn 13-9)				
P_{FD} (Eqn 13-10)				
P_{FD} (Eqn 13-11)				
P_{FD}				
v_{12} (pcph)				
v_3 (pcph)				
v_{34} (pcph)				
v_{12a} (pcph)				
Diverge Speed Index				
Diverge Area Speed				
Outer Lanes Volume				
Outer Lanes Speed				
Segment Speed				
Diverge v/c ratio				
Diverge Density				
Diverge LOS				
Summarize Segment Operations				
Segment v/c ratio	0.30	0.28	0.28	0.21
Segment Density	13.0	9.4	9.4	7.1
Segment LOS	B	A	A	A
Over Capacity				

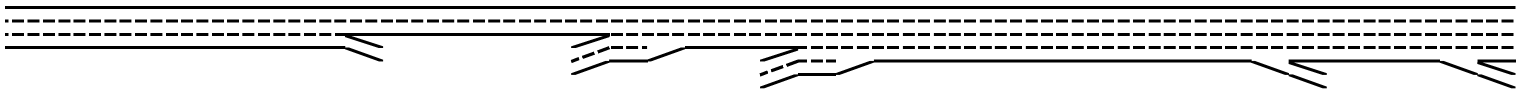
Location	1	2	3	4	5	6	7	8



Key
<> Express Lane (HOV)
No Trucks

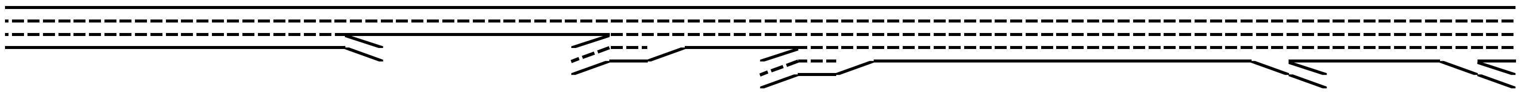
Name	SR 99 North of I-5 Mixed Flow	SR 99 Truck Split	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99/I-5 Southbound Truck On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp
Define Freeway Segment								
Type	Basic	Basic	Basic	Basic	Basic	Basic	Diverge	Diverge
Length (ft)	2,000	2,500	3,500	1,500	1,500	3,470	1,500	1,250
Accel Length								
Decel Length							125	170
Mainline Volume	1,004	1,004	796	796	1,107	1,461	1,461	1,245
On Ramp Volume				311	354			
Off Ramp Volume		208					216	91
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	1,004	1,004	796	1,107	1,461	1,461	1,461	1,245
PHF	0.89	0.89	0.89	0.89	0.89	0.87	0.87	0.87
GP Lanes	3	3	2	3	4	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	20.7%	20.7%	0.0%	0.0%	0.0%	24.2%	24.2%	24.2%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.906	0.906	1.000	1.000	1.000	0.892	0.892	0.892
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	1,245	1,245	894	1,244	1,642	1,883	1,883	1,604
GP Flow (pcphpl)	415	415	447	415	410	471	471	401
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65

Location	1	2	3	4	5	6	7	8



Key
<> Express Lane (HOV)
No Trucks

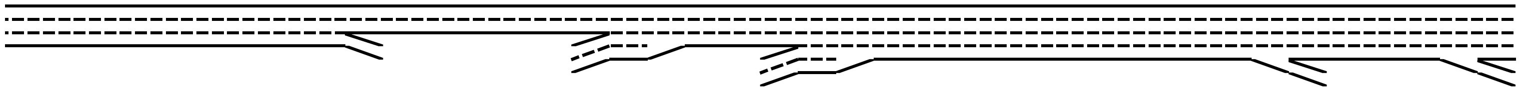
Name	SR 99 North of I-5 Mixed Flow	SR 99 Truck Split	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99/I-5 Southbound Truck On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp
Calculate Operations in General Purpose Lanes								
v/c ratio	0.18	0.18	0.19	0.18	0.17	0.20	0.20	0.17
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Density (pcphpl)	6.4	6.4	6.9	6.4	6.3	7.2	7.2	6.2
LOS	A	A	A	A	A	A	A	A
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)				906	1,064		1,883	1,604
GP_{IN} Cap (pcph)				7,050	7,050		9,400	9,400
GP_{IN} v/c ratio				0.13	0.15		0.20	0.17
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)		906					1,554	1,437
GP_{OUT} Cap (pcph)		4,700					9,400	9,400
GP_{OUT} v/c ratio		0.19					0.17	0.15
Calculate On Ramp Flow Rate								
On Volume (vph)				311	354			
PHF				0.92	0.92			
Total Lanes				2	2			
Terrain				Level	Level			
Grade %				0.0%	0.0%			
Grade Length (mi)				0.00	0.00			
Truck & Bus %				0.0%	100.0%			
RV %				0.0%	0.0%			
E_T				1.5	1.5			
E_R				1.2	1.2			
f_{HV}				1.000	0.667			
f_P				1.00	1.00			
On Flow (pcph)				338	577			
On Flow (pcphpl)				169	289			
Calculate On Ramp Roadway Operations								
On Ramp Type				Major	Major			
On Ramp Speed (mph)				55	55			
On Ramp Cap (pcph)				4,500	4,500			
On Ramp v/c ratio				0.08	0.13			
Calculate Off Ramp Flow Rate								
Off Volume (vph)		208					216	91
PHF		0.92					0.71	0.57



Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4	5	6	7	8
Name	SR 99 North of I-5 Mixed Flow	SR 99 Truck Split	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99/I-5 Southbound Truck On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp
Total Lanes		1					1	1
Terrain		Level					Level	Level
Grade %		0.0%					0.0%	0.0%
Grade Length (mi)		0.00					0.00	0.00
Truck & Bus %		100.0%					15.7%	9.9%
RV %		0.0%					0.0%	0.0%
E_T		1.5					1.5	1.5
E_R		1.2					1.2	1.2
f_{HV}		0.667					0.927	0.953
f_P		1.00					1.00	1.00
Off Flow (pcph)		339					328	168
Off Flow (pcphpl)		339					328	168
Calculate Off Ramp Roadway Operations								
Off Ramp Type		Right					Right	Right
Off Ramp Speed		45					45	20
Off Ramp Cap (pcph)		2,100					2,100	1,900
Off Ramp v/c ratio		0.16					0.16	0.09
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps								
Up Type		No						
Up Distance								
Up Flow (pcph)								
Down Type		No						
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area Operations								
Effective v_P (pcph)								
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)								
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}								
v_{12} (pcph)								
v_3 (pcph)								

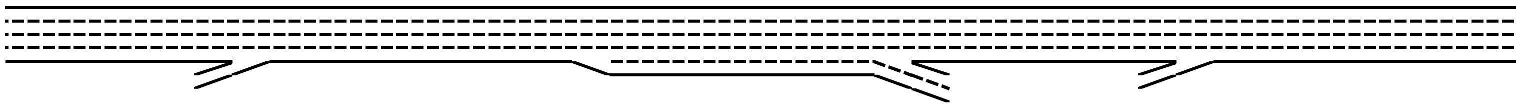
Location	1	2	3	4	5	6	7	8



Key
<> Express Lane (HOV)
No Trucks

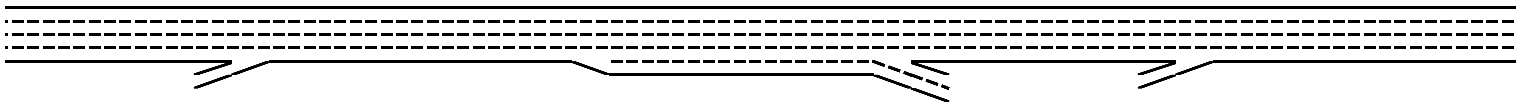
Name	SR 99 North of I-5 Mixed Flow	SR 99 Truck Split	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99/I-5 Southbound Truck On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp
v_{34} (pcph)								
v_{12a} (pcph)								
v_{R12a} (pcph)								
Merge Speed Index								
Merge Area Speed								
Outer Lanes Volume								
Outer Lanes Speed								
Segment Speed								
Merge v/c ratio								
Merge Density								
Merge LOS								
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)							1,883	1,604
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)							0.698	0.712
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}							0.436	0.436
v_{12} (pcph)							1,006	794
v_3 (pcph)								
v_{34} (pcph)							877	810
v_{12a} (pcph)							1,006	794
Diverge Speed Index							0.33	0.64
Diverge Area Speed							57.5	50.3
Outer Lanes Volume							438	405
Outer Lanes Speed							71.3	71.3
Segment Speed							63.2	59.1
Diverge v/c ratio							0.23	0.18
Diverge Density							11.8	9.5
Diverge LOS							B	A
Summarize Segment Operations								
Segment v/c ratio	0.18	0.18	0.19	0.18	0.17	0.20	0.23	0.18
Segment Density	6.4	6.4	6.9	6.4	6.3	7.2	11.8	9.5
Segment LOS	A	A	A	A	A	A	B	A
Over Capacity								

Location	9	10	11	12	13	14	15	16



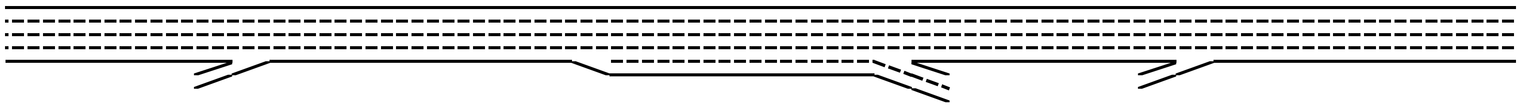
Key
<> Express Lane (HOV)
No Trucks

Name	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Lane Add	Lane Add to CVEF Off	CVEF Off-Ramp	CVEF Off to On	CVEF On-Ramp	CVEF to Grapevine
Define Freeway Segment								
Type	Basic	Merge	Basic	Basic	Diverge	Basic	Merge	Basic
Length (ft)	1,760	1,500	2,820	200	1,500	3,160	1,500	1,210
Accel Length		560					1,500	
Decel Length					150			
Mainline Volume	1,154	1,154	1,422	1,422	1,422	1,072	1,072	1,422
On Ramp Volume		268					350	
Off Ramp Volume					350			
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Pu								
GP Volume (vph)	1,154	1,422	1,422	1,422	1,422	1,072	1,422	1,422
PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
GP Lanes	4	4	4	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	26.9%	26.9%	29.0%	29.0%	29.0%	5.8%	5.8%	29.0%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.881	0.881	0.873	0.873	0.873	0.972	0.972	0.873
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	1,505	1,854	1,871	1,871	1,871	1,268	1,682	1,871
GP Flow (pcphpl)	376	464	468	374	374	317	420	468
Calculate Speed in General Purpo								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65



Key
<> Express Lane (HOV)
No Trucks

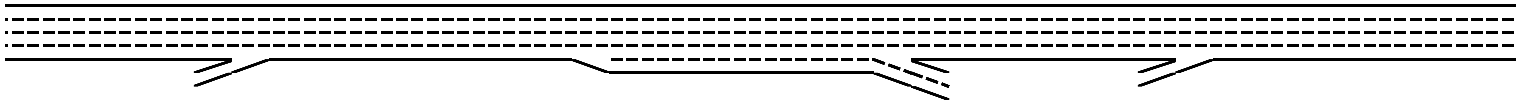
Location	9	10	11	12	13	14	15	16
Name	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Lane Add	Lane Add to CVEF Off	CVEF Off-Ramp	CVEF Off to On	CVEF On-Ramp	CVEF to Grapevine
Calculate Operations in General P								
v/c ratio	0.16	0.20	0.20	0.16	0.16	0.13	0.18	0.20
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Density (pcphpl)	5.8	7.1	7.2	5.8	5.8	4.9	6.5	7.2
LOS	A	A	A	A	A	A	A	A
Calculate Operations for Entering								
GP_{IN} Vol (pcph)		1,508		1,871	1,871		1,111	
GP_{IN} Cap (pcph)		9,400		9,400	9,400		9,400	
GP_{IN} v/c ratio		0.16		0.20	0.20		0.12	
Calculate Operations for Exiting G								
GP_{OUT} Vol (pcph)		1,854			1,301		1,682	
GP_{OUT} Cap (pcph)		9,400			9,400		9,400	
GP_{OUT} v/c ratio		0.20			0.14		0.18	
Calculate On Ramp Flow Rate								
On Volume (vph)		268					350	
PHF		0.92					0.92	
Total Lanes		1					1	
Terrain		Level					Level	
Grade %		0.0%					0.0%	
Grade Length (mi)		0.00					0.00	
Truck & Bus %		37.7%					100.0%	
RV %		0.0%					0.0%	
E_T		1.5					1.5	
E_R		1.2					1.2	
f_{HV}		0.841					0.667	
f_P		1.00					1.00	
On Flow (pcph)		346					571	
On Flow (pcphpl)		346					571	
Calculate On Ramp Roadway Ope								
On Ramp Type		Right					Right	
On Ramp Speed (mph)		45					45	
On Ramp Cap (pcph)		2,100					2,100	
On Ramp v/c ratio		0.16					0.27	
Calculate Off Ramp Flow Rate								
Off Volume (vph)					350			
PHF					0.92			



Key
<> Express Lane (HOV)
No Trucks

Location	9	10	11	12	13	14	15	16
Name	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Lane Add	Lane Add to CVEF Off	CVEF Off-Ramp	CVEF Off to On	CVEF On-Ramp	CVEF to Grapevine
Total Lanes					2			
Terrain								
Grade %					0.0%			
Grade Length (mi)					0.00			
Truck & Bus %					100.0%			
RV %					0.0%			
E_T					1.5			
E_R					1.2			
f_{HV}					0.667			
f_P					1.00			
Off Flow (pcph)					571			
Off Flow (pcphpl)					285			
Calculate Off Ramp Roadway Ope								
Off Ramp Type					Right			
Off Ramp Speed					25			
Off Ramp Cap (pcph)					3,800			
Off Ramp v/c ratio					0.15			
Determine Adjacent Ramp for Thr								
Up Type								
Up Distance								
Up Flow (pcph)								
Down Type								
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area O								
Effective v_P (pcph)		1,508					1,111	
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)		0.593					0.620	
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}		0.313					0.518	
v_{12} (pcph)		472					576	
v_3 (pcph)								

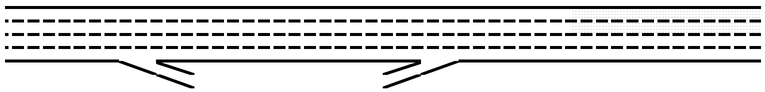
Location	9	10	11	12	13	14	15	16



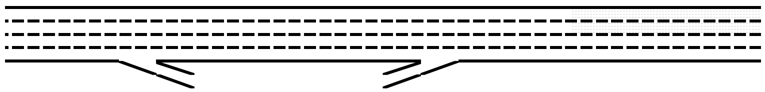
Key
<> Express Lane (HOV)
No Trucks

Name	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Lane Add	Lane Add to CVEF Off	CVEF Off-Ramp	CVEF Off to On	CVEF On-Ramp	CVEF to Grapevine
v_{34} (pcph)		1,036					535	
v_{12a} (pcph)		603					576	
v_{R12a} (pcph)		949					1,146	
Merge Speed Index		0.28					0.20	
Merge Area Speed		58.5					60.4	
Outer Lanes Volume		452					268	
Outer Lanes Speed		65.0					65.0	
Segment Speed		61.5					61.8	
Merge v/c ratio		0.21					0.25	
Merge Density		9.2					4.7	
Merge LOS		A					A	
Calculate Diverge Influence Area (								
Effective v_P (pcph)					1,871			
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)					0.687			
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}					0.260			
v_{12} (pcph)					909			
v_3 (pcph)								
v_{34} (pcph)					963			
v_{12a} (pcph)					909			
Diverge Speed Index					0.61			
Diverge Area Speed					51.0			
Outer Lanes Volume					481			
Outer Lanes Speed					71.3			
Segment Speed					59.7			
Diverge v/c ratio					0.21			
Diverge Density					10.7			
Diverge LOS					B			

Summarize Segment Operations								
Segment v/c ratio	0.16	0.21	0.20	0.16	0.21	0.13	0.25	0.20
Segment Density	5.8	9.2	7.2	5.8	10.7	4.9	4.7	7.2
Segment LOS	A	A	A	A	B	A	A	A
Over Capacity								

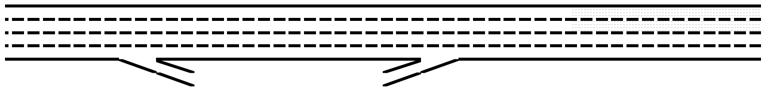


Location	17	18	19	20
Key				
<> Express Lane (HOV)				
No Trucks				
Name	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp	Grapevine Upgrade
Define Freeway Segment				
Type	Diverge	Basic	Merge	Basic
Length (ft)	1,500	975	1,500	22,312
Accel Length			900	
Decel Length	175			
Mainline Volume	1,422	1,360	1,360	1,398
On Ramp Volume			38	
Off Ramp Volume	62			
Express Lane Volume				
EL On Ramp Volume				
EL Off Ramp Volume				
Calculate Flow Rate in General Pu				
GP Volume (vph)	1,422	1,360	1,398	1,398
PHF	0.87	0.87	0.87	0.87
GP Lanes	4	4	4	4
Terrain	Level	Level	Level	Grade
Grade %	0.0%	0.0%	0.0%	6.0%
Grade Length (mi)	0.00	0.00	0.00	5.00
Truck & Bus %	29.0%	28.2%	28.2%	28.1%
RV %	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	3.5
E_R	1.2	1.2	1.2	6.0
f_{HV}	0.873	0.876	0.876	0.587
f_P	1.00	1.00	1.00	1.00
GP Flow (pcph)	1,871	1,784	1,833	2,736
GP Flow (pcphpl)	468	446	458	684
Calculate Speed in General Purpo				
Lane Width (ft)				
Shoulder Width				
TRD				
f_{LW}				
f_{LC}				
Calculated FFS				
Measured FFS				
FFS Curve	65	65	65	55



Location	17	18	19	20
Key				
<> Express Lane (HOV)				
No Trucks				
Name	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp	Grapevine Upgrade
Calculate Operations in General P				
v/c ratio	0.20	0.19	0.20	0.30
Speed (mph)	65.0	65.0	65.0	55.0
Density (pcphpl)	7.2	6.9	7.1	12.4
LOS	A	A	A	B
Calculate Operations for Entering				
GP_{IN} Vol (pcph)	1,871		1,771	
GP_{IN} Cap (pcph)	9,400		9,400	
GP_{IN} v/c ratio	0.20		0.19	
Calculate Operations for Exiting G				
GP_{OUT} Vol (pcph)	1,774		1,833	
GP_{OUT} Cap (pcph)	9,400		9,400	
GP_{OUT} v/c ratio	0.19		0.20	
Calculate On Ramp Flow Rate				
On Volume (vph)			38	
PHF			0.68	
Total Lanes			1	
Terrain			Level	
Grade %			0.0%	
Grade Length (mi)			0.00	
Truck & Bus %			23.7%	
RV %			0.0%	
E_T			1.5	
E_R			1.2	
f_{HV}			0.894	
f_P			1.00	
On Flow (pcph)			63	
On Flow (pcphpl)			63	
Calculate On Ramp Roadway Ope				
On Ramp Type			Right	
On Ramp Speed (mph)			25	
On Ramp Cap (pcph)			1,900	
On Ramp v/c ratio			0.03	
Calculate Off Ramp Flow Rate				
Off Volume (vph)	62			
PHF	0.78			

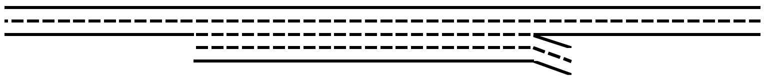
Location	17	18	19	20



Key
<> Express Lane (HOV)
No Trucks

Name	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp	Grapevine Upgrade
Total Lanes	1			
Terrain	Level			
Grade %	0.0%			
Grade Length (mi)	0.00			
Truck & Bus %	45.2%			
RV %	0.0%			
E_T	1.5			
E_R	1.2			
f_{HV}	0.816			
f_P	1.00			
Off Flow (pcph)	97			
Off Flow (pcphpl)	97			
Calculate Off Ramp Roadway Ope				
Off Ramp Type	Right			
Off Ramp Speed	45			
Off Ramp Cap (pcph)	2,100			
Off Ramp v/c ratio	0.05			
Determine Adjacent Ramp for Thr				
Up Type				
Up Distance				
Up Flow (pcph)				
Down Type				
Down Distance				
Down Flow (pcph)				
Calculate Merge Influence Area O				
Effective v_P (pcph)			1,771	
Up Ramp L_{EQ}				
Down Ramp L_{EQ}				
P_{FM} (Eqn 13-3)			0.603	
P_{FM} (Eqn 13-4)				
P_{FM} (Eqn 13-5)				
P_{FM}			0.611	
v_{12} (pcph)			1,083	
v_3 (pcph)				

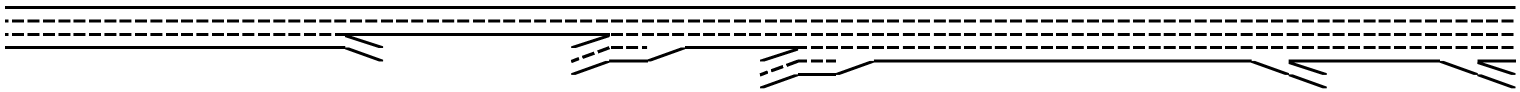
Location	17	18	19	20
Key				
<> Express Lane (HOV)				
No Trucks				
Name	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp	Grapevine Upgrade
v_{34} (pcph)			688	
v_{12a} (pcph)			1,083	
v_{R12a} (pcph)			1,145	
Merge Speed Index			0.29	
Merge Area Speed			58.4	
Outer Lanes Volume			344	
Outer Lanes Speed			65.0	
Segment Speed			60.7	
Merge v/c ratio			0.25	
Merge Density			8.7	
Merge LOS			A	
Calculate Diverge Influence Area (				
Effective v_P (pcph)	1,871			
Up Ramp L_{EQ}				
Down Ramp L_{EQ}				
P_{FD} (Eqn 13-9)	0.709			
P_{FD} (Eqn 13-10)				
P_{FD} (Eqn 13-11)				
P_{FD}	0.436			
v_{12} (pcph)	871			
v_3 (pcph)				
v_{34} (pcph)	1,001			
v_{12a} (pcph)	871			
Diverge Speed Index	0.31			
Diverge Area Speed	57.9			
Outer Lanes Volume	500			
Outer Lanes Speed	71.3			
Segment Speed	64.4			
Diverge v/c ratio	0.20			
Diverge Density	10.2			
Diverge LOS	B			
Summarize Segment Operations				
Segment v/c ratio	0.20	0.19	0.25	0.30
Segment Density	10.2	6.9	8.7	12.4
Segment LOS	B	A	A	B
Over Capacity				



Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4
Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Truck Split	I-5 North of SR 99 Auto Only
Define Freeway Segment				
Type	Basic	Basic	Basic	Basic
Length (ft)	2,000	800	1,000	3,800
Accel Length				
Decel Length				
Mainline Volume	457	457	457	311
On Ramp Volume				
Off Ramp Volume			146	
Express Lane Volume				
EL On Ramp Volume				
EL Off Ramp Volume				
Calculate Flow Rate in General Purpose Lanes (GP)				
GP Volume (vph)	457	457	457	311
PHF	0.89	0.89	0.89	0.89
GP Lanes	2	4	4	2
Terrain	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00
Truck & Bus %	31.9%	31.9%	31.9%	0.0%
RV %	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2
f_{HV}	0.862	0.862	0.862	1.000
f_P	1.00	1.00	1.00	1.00
GP Flow (pcph)	595	595	595	349
GP Flow (pcphpl)	298	149	149	175
Calculate Speed in General Purpose Lanes				
Lane Width (ft)				
Shoulder Width				
TRD				
f_{LW}				
f_{LC}				
Calculated FFS				
Measured FFS				
FFS Curve	65	65	65	65
Calculate Operations in General Purpose Lanes				
v/c ratio	0.13	0.06	0.06	0.07
Speed (mph)	65.0	65.0	65.0	65.0
Density (pcphpl)	4.6	2.3	2.3	2.7
LOS	A	A	A	A
Calculate Operations for Entering GP Lanes				
GP_{IN} Vol (pcph)				
GP_{IN} Cap (pcph)				
GP_{IN} v/c ratio				
Calculate Operations for Exiting GP Lanes				
GP_{OUT} Vol (pcph)			357	
GP_{OUT} Cap (pcph)			4,700	
GP_{OUT} v/c ratio			0.08	

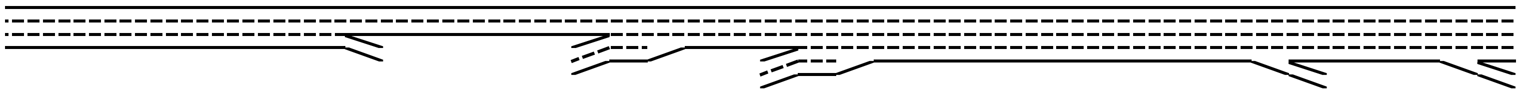
Location	1	2	3	4
Key				
<> Express Lane (HOV)				
No Trucks				
Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Truck Split	I-5 North of SR 99 Auto Only
Calculate On Ramp Flow Rate				
On Volume (vph)				
PHF				
Total Lanes				
Terrain				
Grade %				
Grade Length (mi)				
Truck & Bus %				
RV %				
E_T				
E_R				
f_{HV}				
f_P				
On Flow (pcph)				
On Flow (pcphpl)				
Calculate On Ramp Roadway Operations				
On Ramp Type				
On Ramp Speed (mph)				
On Ramp Cap (pcph)				
On Ramp v/c ratio				
Calculate Off Ramp Flow Rate				
Off Volume (vph)			146	
PHF			0.92	
Total Lanes			2	
Terrain			Level	
Grade %			0.0%	
Grade Length (mi)			0.00	
Truck & Bus %			100.0%	
RV %			0.0%	
E_T			1.5	
E_R			1.2	
f_{HV}			0.667	
f_P			1.00	
Off Flow (pcph)			238	
Off Flow (pcphpl)			119	
Calculate Off Ramp Roadway Operations				
Off Ramp Type				
Off Ramp Speed				
Off Ramp Cap (pcph)				
Off Ramp v/c ratio				
Summarize Segment Operations				
Segment v/c ratio	0.13	0.06	0.06	0.07
Segment Density	4.6	2.3	2.3	2.7
Segment LOS	A	A	A	A
Over Capacity				



Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4	5	6	7	8
Name	SR 99 North of I-5 Mixed Flow	SR 99 Truck Split	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99/I-5 Southbound Truck On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp
Define Freeway Segment								
Type	Basic	Basic	Basic	Basic	Basic	Basic	Diverge	Diverge
Length (ft)	2,000	2,500	3,500	1,500	1,500	3,470	1,500	1,250
Accel Length								
Decel Length							125	170
Mainline Volume	1,016	1,016	808	808	1,443	1,884	1,884	1,556
On Ramp Volume				635	441			
Off Ramp Volume		208					328	102
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	1,016	1,016	808	1,443	1,884	1,884	1,884	1,556
PHF	0.86	0.86	0.86	0.86	0.86	0.93	0.93	0.93
GP Lanes	3	3	2	3	4	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	20.5%	20.5%	0.0%	0.0%	0.0%	23.4%	23.4%	23.4%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.907	0.907	1.000	1.000	1.000	0.895	0.895	0.895
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	1,302	1,302	940	1,678	2,191	2,263	2,263	1,869
GP Flow (pcphpl)	434	434	470	559	548	566	566	467
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes								
v/c ratio	0.18	0.18	0.20	0.24	0.23	0.24	0.24	0.20
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0

Location	1	2	3	4	5	6	7	8



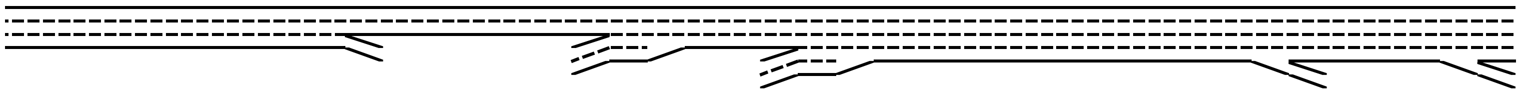
Key

<> Express Lane (HOV)

No Trucks

Name	SR 99 North of I-5 Mixed Flow	SR 99 Truck Split	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99/I-5 Southbound Truck On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp
Density (pcphpl)	6.7	6.7	7.2	8.6	8.4	8.7	8.7	7.2
LOS	A	A	A	A	A	A	A	A
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)				972	1,456		2,263	1,869
GP_{IN} Cap (pcph)				4,700	7,050		9,400	9,400
GP_{IN} v/c ratio				0.21	0.21		0.24	0.20
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)		963					1,822	1,730
GP_{OUT} Cap (pcph)		4,700					9,400	9,400
GP_{OUT} v/c ratio		0.20					0.19	0.18
Calculate On Ramp Flow Rate								
On Volume (vph)				635	441			
PHF				0.9	0.9			
Total Lanes				2	2			
Terrain				Level	Level			
Grade %				0.0%	0.0%			
Grade Length (mi)				0.00	0.00			
Truck & Bus %				0.0%	100.0%			
RV %				0.0%	0.0%			
E_T				1.5	1.5			
E_R				1.2	1.2			
f_{HV}				1.000	0.667			
f_P				1.00	1.00			
On Flow (pcph)				706	735			
On Flow (pcphpl)				353	368			
Calculate On Ramp Roadway Operations								
On Ramp Type				Major	Major			
On Ramp Speed (mph)				65	55			
On Ramp Cap (pcph)				4,700	4,500			
On Ramp v/c ratio				0.15	0.16			
Calculate Off Ramp Flow Rate								
Off Volume (vph)		208					328	102
PHF		0.92					0.8	0.8
Total Lanes		1					1	1

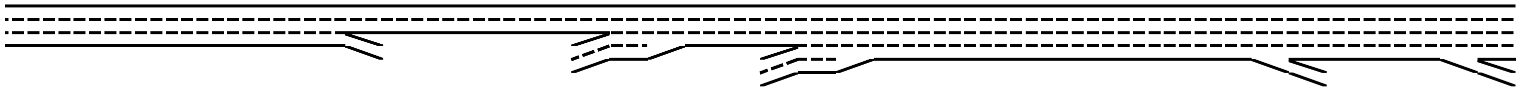
Location	1	2	3	4	5	6	7	8



Key
<> Express Lane (HOV)
No Trucks

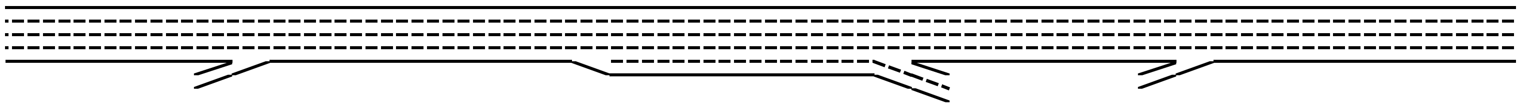
Name	SR 99 North of I-5 Mixed Flow	SR 99 Truck Split	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99/I-5 Southbound Truck On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp
Terrain		Level					Level	Level
Grade %		0.0%					0.0%	0.0%
Grade Length (mi)		0.00					0.00	0.00
Truck & Bus %		100.0%					14.9%	17.6%
RV %		0.0%					0.0%	0.0%
E_T		1.5					1.5	1.5
E_R		1.2					1.2	1.2
f_{HV}		0.667					0.931	0.919
f_P		1.00					1.00	1.00
Off Flow (pcph)		339					441	139
Off Flow (pcphpl)		339					441	139
Calculate Off Ramp Roadway Operations								
Off Ramp Type		Right					Right	Right
Off Ramp Speed		45					45	20
Off Ramp Cap (pcph)		2,100					2,100	1,900
Off Ramp v/c ratio		0.16					0.21	0.07
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps								
Up Type		No						
Up Distance								
Up Flow (pcph)								
Down Type		No						
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area Operations								
Effective v_P (pcph)								
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)								
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}								
v_{12} (pcph)								
v_3 (pcph)								
v_{34} (pcph)								

Location	1	2	3	4	5	6	7	8

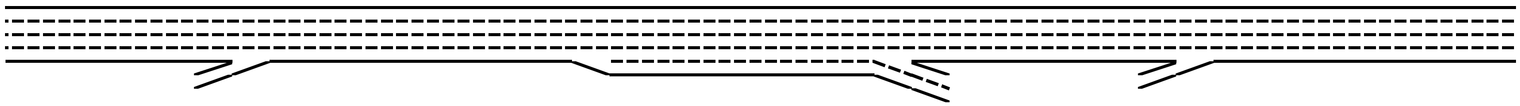


Key
<> Express Lane (HOV)
No Trucks

Name	SR 99 North of I-5 Mixed Flow	SR 99 Truck Split	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99/I-5 Southbound Truck On-Ramp	SR 99 to Laval Road	Laval Road West Off-Ramp	Laval Road East Off-Ramp
v_{12a} (pcph)								
v_{R12a} (pcph)								
Merge Speed Index								
Merge Area Speed								
Outer Lanes Volume								
Outer Lanes Speed								
Segment Speed								
Merge v/c ratio								
Merge Density								
Merge LOS								
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)							2,263	1,869
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)							0.683	0.707
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}							0.436	0.436
v_{12} (pcph)							1,235	893
v_3 (pcph)								
v_{34} (pcph)							1,028	976
v_{12a} (pcph)							1,235	893
Diverge Speed Index							0.34	0.64
Diverge Area Speed							57.2	50.4
Outer Lanes Volume							514	488
Outer Lanes Speed							71.3	71.3
Segment Speed							62.9	59.5
Diverge v/c ratio							0.28	0.20
Diverge Density							13.7	10.4
Diverge LOS							B	B
Summarize Segment Operations								
Segment v/c ratio	0.18	0.18	0.20	0.24	0.23	0.24	0.28	0.20
Segment Density	6.7	6.7	7.2	8.6	8.4	8.7	13.7	10.4
Segment LOS	A	A	A	A	A	A	B	B
Over Capacity								

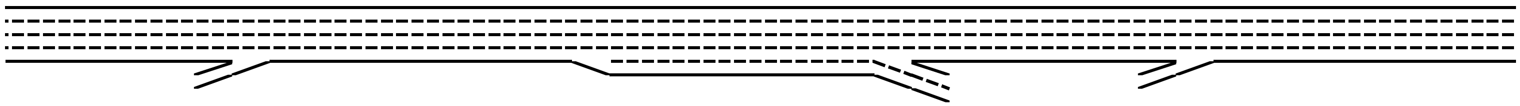


Location	9	10	11	12	13	14	15	16
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Lane Add	Lane Add to CVEF Off	CVEF Off-Ramp	CVEF Off to On	CVEF On-Ramp	CVEF to Grapevine
Define Freeway Segment								
Type	Basic	Merge	Basic	Basic	Diverge	Basic	Merge	Basic
Length (ft)	1,760	1,500	2,820	200	1,500	3,160	1,500	1,210
Accel Length		560					1,500	
Decel Length					150			
Mainline Volume	1,454	1,454	1,780	1,780	1,780	1,420	1,420	1,780
On Ramp Volume		326					360	
Off Ramp Volume					360			
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Pu								
GP Volume (vph)	1,454	1,780	1,780	1,780	1,780	1,420	1,780	1,780
PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
GP Lanes	4	4	4	5	5	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	25.7%	25.7%	23.8%	23.8%	23.8%	4.4%	4.4%	23.8%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.886	0.886	0.894	0.894	0.894	0.978	0.978	0.894
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	1,764	2,160	2,142	2,142	2,142	1,560	1,956	2,142
GP Flow (pcphpl)	441	540	535	428	428	390	489	535
Calculate Speed in General Purpo								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65
Calculate Operations in General P								
v/c ratio	0.19	0.23	0.23	0.18	0.18	0.17	0.21	0.23
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0

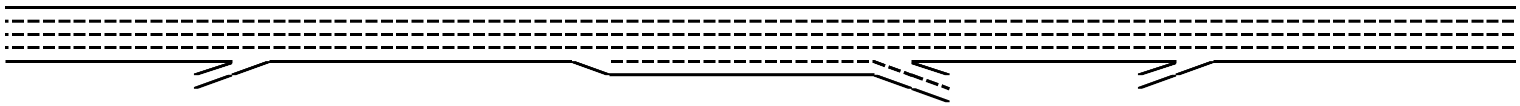


Key
<> Express Lane (HOV)
No Trucks

Location	9	10	11	12	13	14	15	16
Name	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Lane Add	Lane Add to CVEF Off	CVEF Off-Ramp	CVEF Off to On	CVEF On-Ramp	CVEF to Grapevine
Density (pcphpl)	6.8	8.3	8.2	6.6	6.6	6.0	7.5	8.2
LOS	A	A	A	A	A	A	A	A
Calculate Operations for Entering								
GP_{IN} Vol (pcph)		1,757		2,142	2,142		1,375	
GP_{IN} Cap (pcph)		9,400		9,400	9,400		9,400	
GP_{IN} v/c ratio		0.19		0.23	0.23		0.15	
Calculate Operations for Exiting G								
GP_{OUT} Vol (pcph)		2,160			1,561		1,956	
GP_{OUT} Cap (pcph)		9,400			9,400		9,400	
GP_{OUT} v/c ratio		0.23			0.17		0.21	
Calculate On Ramp Flow Rate								
On Volume (vph)		326					360	
PHF		0.87					0.93	
Total Lanes		1					1	
Terrain		Level					Level	
Grade %		0.0%					0.0%	
Grade Length (mi)		0.00					0.00	
Truck & Bus %		15.0%					100.0%	
RV %		0.0%					0.0%	
E_T		1.5					1.5	
E_R		1.2					1.2	
f_{HV}		0.930					0.667	
f_P		1.00					1.00	
On Flow (pcph)		403					581	
On Flow (pcphpl)		403					581	
Calculate On Ramp Roadway Ope								
On Ramp Type		Right					Right	
On Ramp Speed (mph)		45					45	
On Ramp Cap (pcph)		2,100					2,100	
On Ramp v/c ratio		0.19					0.28	
Calculate Off Ramp Flow Rate								
Off Volume (vph)					360			
PHF					0.93			
Total Lanes					2			

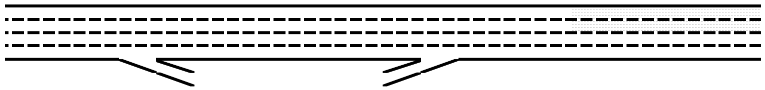


Location	9	10	11	12	13	14	15	16
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Lane Add	Lane Add to CVEF Off	CVEF Off-Ramp	CVEF Off to On	CVEF On-Ramp	CVEF to Grapevine
Terrain					Level			
Grade %					0.0%			
Grade Length (mi)					0.00			
Truck & Bus %					100.0%			
RV %					0.0%			
E_T					1.5			
E_R					1.2			
f_{HV}					0.667			
f_P					1.00			
Off Flow (pcph)					581			
Off Flow (pcphpl)					290			
Calculate Off Ramp Roadway Ope								
Off Ramp Type					Right			
Off Ramp Speed					25			
Off Ramp Cap (pcph)					3,800			
Off Ramp v/c ratio					0.15			
Determine Adjacent Ramp for Thr								
Up Type								
Up Distance								
Up Flow (pcph)								
Down Type								
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area O								
Effective v_P (pcph)		1,757					1,375	
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)		0.593					0.620	
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}		0.306					0.517	
v_{12} (pcph)		538					711	
v_3 (pcph)								
v_{34} (pcph)		1,219					664	



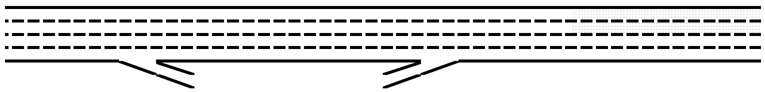
Key
<> Express Lane (HOV)
No Trucks

Location	9	10	11	12	13	14	15	16
Name	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Lane Add	Lane Add to CVEF Off	CVEF Off-Ramp	CVEF Off to On	CVEF On-Ramp	CVEF to Grapevine
v_{12a} (pcph)		703					711	
v_{R12a} (pcph)		1,106					1,292	
Merge Speed Index		0.28					0.20	
Merge Area Speed		58.5					60.4	
Outer Lanes Volume		527					332	
Outer Lanes Speed		64.9					65.0	
Segment Speed		61.5					61.9	
Merge v/c ratio		0.24					0.28	
Merge Density		10.4					5.9	
Merge LOS		B					A	
Calculate Diverge Influence Area (								
Effective v_P (pcph)					2,142			
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)					0.680			
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}					0.260			
v_{12} (pcph)					987			
v_3 (pcph)								
v_{34} (pcph)					1,155			
v_{12a} (pcph)					987			
Diverge Speed Index					0.61			
Diverge Area Speed					51.0			
Outer Lanes Volume					578			
Outer Lanes Speed					71.3			
Segment Speed					60.2			
Diverge v/c ratio					0.22			
Diverge Density					11.4			
Diverge LOS					B			
Summarize Segment Operations								
Segment v/c ratio	0.19	0.24	0.23	0.18	0.22	0.17	0.28	0.23
Segment Density	6.8	10.4	8.2	6.6	11.4	6.0	5.9	8.2
Segment LOS	A	B	A	A	B	A	A	A
Over Capacity								



Key
<> Express Lane (HOV)
No Trucks

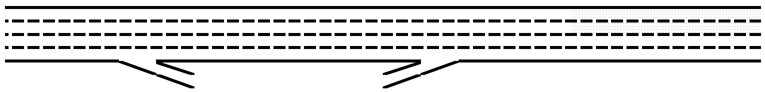
Location	17	18	19	20
Name	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp	Grapevine Upgrade
Define Freeway Segment				
Type	Diverge	Basic	Merge	Basic
Length (ft)	1,500	975	1,500	22,312
Accel Length			900	
Decel Length	175			
Mainline Volume	1,780	1,730	1,730	1,782
On Ramp Volume			52	
Off Ramp Volume	50			
Express Lane Volume				
EL On Ramp Volume				
EL Off Ramp Volume				
Calculate Flow Rate in General Pu				
GP Volume (vph)	1,780	1,730	1,782	1,782
PHF	0.93	0.93	0.93	0.93
GP Lanes	4	4	4	4
Terrain	Level	Level	Level	Grade
Grade %	0.0%	0.0%	0.0%	6.0%
Grade Length (mi)	0.00	0.00	0.00	5.00
Truck & Bus %	23.8%	24.0%	24.0%	23.7%
RV %	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	3.5
E_R	1.2	1.2	1.2	6.0
f_{HV}	0.894	0.893	0.893	0.628
f_P	1.00	1.00	1.00	1.00
GP Flow (pcph)	2,142	2,083	2,146	3,051
GP Flow (pcphpl)	535	521	537	763
Calculate Speed in General Purpo				
Lane Width (ft)				
Shoulder Width				
TRD				
f_{LW}				
f_{LC}				
Calculated FFS				
Measured FFS				
FFS Curve	65	65	65	55
Calculate Operations in General P				
v/c ratio	0.23	0.22	0.23	0.34
Speed (mph)	65.0	65.0	65.0	55.0



Key
<> Express Lane (HOV)
No Trucks

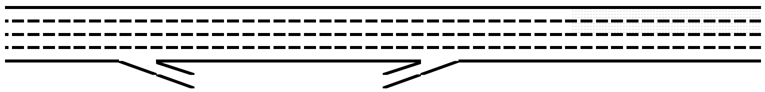
Location	17	18	19	20
Name	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp	Grapevine Upgrade
Density (pcphpl)	8.2	8.0	8.3	13.9
LOS	A	A	A	B
Calculate Operations for Entering				
GP_{IN} Vol (pcph)	2,142		2,078	
GP_{IN} Cap (pcph)	9,400		9,400	
GP_{IN} v/c ratio	0.23		0.22	
Calculate Operations for Exiting G				
GP_{OUT} Vol (pcph)	2,082		2,146	
GP_{OUT} Cap (pcph)	9,400		9,400	
GP_{OUT} v/c ratio	0.22		0.23	
Calculate On Ramp Flow Rate				
On Volume (vph)			52	
PHF			0.81	
Total Lanes			1	
Terrain			Level	
Grade %			0.0%	
Grade Length (mi)			0.00	
Truck & Bus %			13.5%	
RV %			0.0%	
E_T			1.5	
E_R			1.2	
f_{HV}			0.937	
f_P			1.00	
On Flow (pcph)			69	
On Flow (pcphpl)			69	
Calculate On Ramp Roadway Ope				
On Ramp Type			Right	
On Ramp Speed (mph)			25	
On Ramp Cap (pcph)			1,900	
On Ramp v/c ratio			0.04	
Calculate Off Ramp Flow Rate				
Off Volume (vph)	50			
PHF	0.89			
Total Lanes	1			

Location	17	18	19	20



Key
<> Express Lane (HOV)
No Trucks

Name	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp	Grapevine Upgrade
Terrain	Level			
Grade %	0.0%			
Grade Length (mi)	0.00			
Truck & Bus %	14.0%			
RV %	0.0%			
E_T	1.5			
E_R	1.2			
f_{HV}	0.935			
f_P	1.00			
Off Flow (pcph)	60			
Off Flow (pcphpl)	60			
Calculate Off Ramp Roadway Ope				
Off Ramp Type	Right			
Off Ramp Speed	45			
Off Ramp Cap (pcph)	2,100			
Off Ramp v/c ratio	0.03			
Determine Adjacent Ramp for Thr				
Up Type				
Up Distance				
Up Flow (pcph)				
Down Type				
Down Distance				
Down Flow (pcph)				
Calculate Merge Influence Area O				
Effective v_P (pcph)			2,078	
Up Ramp L_{EQ}				
Down Ramp L_{EQ}				
P_{FM} (Eqn 13-3)			0.603	
P_{FM} (Eqn 13-4)				
P_{FM} (Eqn 13-5)				
P_{FM}			0.209	
v_{12} (pcph)			435	
v_3 (pcph)				
v_{34} (pcph)			1,643	

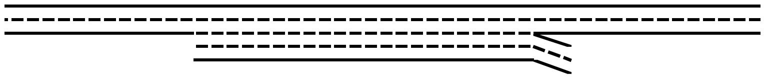


Location	17	18	19	20
Key				
<> Express Lane (HOV)				
No Trucks				
Name	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp	Grapevine Upgrade
v_{12a} (pcph)			831	
v_{R12a} (pcph)			900	
Merge Speed Index			0.29	
Merge Area Speed			58.4	
Outer Lanes Volume			623	
Outer Lanes Speed			64.6	
Segment Speed			61.8	
Merge v/c ratio			0.20	
Merge Density			6.8	
Merge LOS			A	
Calculate Diverge Influence Area (				
Effective v_P (pcph)	2,142			
Up Ramp L_{EQ}				
Down Ramp L_{EQ}				
P_{FD} (Eqn 13-9)	0.704			
P_{FD} (Eqn 13-10)				
P_{FD} (Eqn 13-11)				
P_{FD}	0.436			
v_{12} (pcph)	968			
v_3 (pcph)				
v_{34} (pcph)	1,174			
v_{12a} (pcph)	968			
Diverge Speed Index	0.30			
Diverge Area Speed	58.0			
Outer Lanes Volume	587			
Outer Lanes Speed	71.3			
Segment Speed	64.6			
Diverge v/c ratio	0.22			
Diverge Density	11.0			
Diverge LOS	B			
Summarize Segment Operations				
Segment v/c ratio	0.22	0.22	0.20	0.34
Segment Density	11.0	8.0	6.8	13.9
Segment LOS	B	A	A	B
Over Capacity				

Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4
Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Truck Split	I-5 North of SR 99 Auto Only
Define Freeway Segment				
Type	Basic	Basic	Basic	Basic
Length (ft)	2,000	800	1,000	3,800
Accel Length				
Decel Length				
Mainline Volume	868	868	868	635
On Ramp Volume				
Off Ramp Volume			233	
Express Lane Volume				
EL On Ramp Volume				
EL Off Ramp Volume				
Calculate Flow Rate in General Purpose Lanes (GP)				
GP Volume (vph)	868	868	868	635
PHF	0.87	0.86	0.86	0.86
GP Lanes	2	4	4	2
Terrain	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00
Truck & Bus %	26.8%	26.8%	26.8%	0.0%
RV %	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2
f_{HV}	0.882	0.882	0.882	1.000
f_P	1.00	1.00	1.00	1.00
GP Flow (pcph)	1,131	1,145	1,145	738
GP Flow (pcphpl)	566	286	286	369
Calculate Speed in General Purpose Lanes				
Lane Width (ft)				
Shoulder Width				
TRD				
f_{LW}				
f_{LC}				
Calculated FFS				
Measured FFS				
FFS Curve	65	65	65	65
Calculate Operations in General Purpose Lanes				
v/c ratio	0.24	0.12	0.12	0.16
Speed (mph)	65.0	65.0	65.0	65.0
Density (pcphpl)	8.7	4.4	4.4	5.7
LOS	A	A	A	A
Calculate Operations for Entering GP Lanes				
GP_{IN} Vol (pcph)				
GP_{IN} Cap (pcph)				
GP_{IN} v/c ratio				
Calculate Operations for Exiting GP Lanes				
GP_{OUT} Vol (pcph)			756	
GP_{OUT} Cap (pcph)			4,700	
GP_{OUT} v/c ratio			0.16	
Calculate Flow Rate in Express Lanes (EL)				
Calculate Speed in Express Lanes				
Calculate Operations in Express Lanes				

Location	1	2	3	4



Key
<> Express Lane (HOV)
No Trucks

Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Truck Split	I-5 North of SR 99 Auto Only
Calculate On Ramp Flow Rate				
On Volume (vph)				
PHF				
Total Lanes				
Terrain				
Grade %				
Grade Length (mi)				
Truck & Bus %				
RV %				
E_T				
E_R				
f_{HV}				
f_P				
On Flow (pcph)				
On Flow (pcphpl)				
Calculate On Ramp Roadway Operations				
On Ramp Type				
On Ramp Speed (mph)				
On Ramp Cap (pcph)				
On Ramp v/c ratio				
Calculate Off Ramp Flow Rate				
Off Volume (vph)			233	
PHF			0.9	
Total Lanes			2	
Terrain			Level	
Grade %			0.0%	
Grade Length (mi)			0.00	
Truck & Bus %			100.0%	
RV %			0.0%	
E_T			1.5	
E_R			1.2	
f_{HV}			0.667	
f_P			1.00	
Off Flow (pcph)			388	
Off Flow (pcphpl)			194	
Calculate Off Ramp Roadway Operations				
Off Ramp Type				
Off Ramp Speed				
Off Ramp Cap (pcph)				
Off Ramp v/c ratio				
Summarize Segment Operations				
Segment v/c ratio	0.24	0.12	0.12	0.16
Segment Density	8.7	4.4	4.4	5.7
Segment LOS	A	A	A	A
Over Capacity				

INTENTIONALLY LEFT BLANK

Appendix D:

Trip Internalization Analysis Memorandum

MEMORANDUM

Date: January 26, 2016

To: Harpreet Binning, Caltrans

CC: Kevin Lum & Beverly Boucher, Caltrans

From: Rob Hananouchi & Fred Choa, Fehr & Peers

Subject: Grapevine Transportation Impact Study – Trip Internalization

RS13-3088

This memorandum presents the trip internalization analysis for the proposed Grapevine Specific and Community Plan development. This memorandum begins by presenting the characteristics of the proposed project that contribute to the internalization of project trips, and then follows with a summary of the methodology used to develop the proposed project's trip internalization estimate. Attachment A to this memorandum provides additional background information related to the trip internalization analysis, including specific data references and calculations used to estimate the project's trip internalization.

The trip internalization analysis is based on a wide range of transportation and demographic data sources, including the Institute of Transportation Engineers (ITE), the National Cooperative Highway Research Program (NCHRP), and the U.S. Census Bureau.

The trip internalization analysis is intended to validate the travel forecasting outputs from the Kern Council of Governments (Kern COG) travel demand forecasting (TDF) model. The Grapevine Transportation Impact Study (TIS) ultimately uses the Kern COG TDF model to forecast the proposed project's trip generation and trip distribution, including forecasting the internalization of project trips. The results of this trip internalization analysis are intended to verify that the Kern COG TDF model internalization forecasts are reasonable.

PROJECT DESCRIPTION & LOCAL CONTEXT

The 8,010-acre Grapevine project site is located in the west-central portion of Tejon Ranch within unincorporated Kern County, just south of the junction of I-5 and SR 99. The project would leverage and build upon the economic expansion and job growth that has occurred at the Tejon Ranch Commerce

Center (TRCC), which is located immediately north of the project adjacent to the I-5 / Laval Road interchange.

Overall, Grapevine is one part of an area identified for development in the Kern COG Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). The Kern COG RTP/SCS includes future development at TRCC, some development at San Emidio New Town, as well as Grapevine in this area. Table 1 below presents the land uses for these three developments.

TABLE 1
LAND USE INPUTS

<table>
<tr><th>Development</th><th>Land Use Category</th><th>Land Use Type</th><th>Amount</th></tr>
<tr><td rowspan="14">Grapevine[1]</td><td rowspan="3">Residential[3]</td><td>Residential</td><td>8,410 Dwelling Units</td></tr>
<tr><td>Village Center Residential</td><td>3,590 Dwelling Units</td></tr>
<tr><td>Total</td><td>12,000 Dwelling Units</td></tr>
<tr><td rowspan="6">Non-Residential[3]</td><td>Village Center Commercial - Retail[5]</td><td>450,000 square feet</td></tr>
<tr><td>Village Center Commercial - Office[5]</td><td>350,000 square feet</td></tr>
<tr><td>Highway/Regional Commercial</td><td>750,000 square feet</td></tr>
<tr><td>Office / Research & Development</td><td>2,100,000 square feet</td></tr>
<tr><td>Light Industrial / Warehouse</td><td>1,450,000 square feet</td></tr>
<tr><td>Total</td><td>5,100,000 square feet</td></tr>
<tr><td rowspan="4">Schools[4]</td><td>K-5 Students</td><td>3,520 Students</td></tr>
<tr><td>6-8 Students</td><td>1,760 Students</td></tr>
<tr><td>High School</td><td>2,454 Students</td></tr>
<tr><td>Total</td><td>7,734 Students</td></tr>
<tr><td rowspan="3">Tejon Ranch Commerce Center (TRCC)[1]</td><td rowspan="3">Non-Residential</td><td>Highway/Regional Commercial</td><td>936,000 square feet</td></tr>
<tr><td>Industrial/Warehouse</td><td>17,236,000 square feet</td></tr>
<tr><td>Total</td><td>18,172,000 square feet</td></tr>
</table>

TABLE 1
LAND USE INPUTS

Development	Land Use Category	Land Use Type	Amount
San Emidio New Town[2]	Residential	Single-Family Residential	1,025 Dwelling Units
		Multi-Family Residential	325 Dwelling Units
		Total	**1,350 Dwelling Units**
	Non-Residential	Commercial Retail	16,000 square feet
		Office	30,000 square feet
		Industrial	24,000 square feet
		Total	**70,000 square feet**

Notes: [1]Grapevine and TRCC land use data provided by Ken Kay Associates and Tejon Ranch, respectively.
[2]San Emidio New Town land use data presented above was obtained from the Kern COG RTP/SCS TDF model.
[3]Grapevine residential and non-residential land use data provided by Ken Kay Associates
[4]School enrollment data based on student generation rates from General Shafter Elementary School District for elementary and middle schools and Kern County High School District for high schools.
[5]Village Center Commercial is a mix of 450,000 sq. ft. of Village Center Retail and 350,000 sq. ft. of Village Center Office, per data provided by Tejon Ranch and Ken Kay Associates
Source: Ken Kay Associates, 2015; Kern COG RTP/SCS, 2014.

As shown in Table 1 above, Grapevine is part of a larger planned development area within Kern County that will ultimately be a complete, full-service community. The proposed Grapevine project consists of a mix of complementary land uses to provide both jobs and services for future residents and workers in Grapevine. As shown in Table 1, this includes:

- Neighborhood-serving retail and services such as grocery stores, pharmacies, restaurants, and local serving retail (Village Center Retail)
- Retail and commercial outlets such as larger-scale retail stores, fast-food restaurants, and gas stations that will serve both the community and existing regional traffic on I-5 (Highway/Regional Commercial)
- Local services such as health care facilities, and banking and real estate services (Village Center Office)
- A wide range of employment opportunities for future residents (Office/Research & Development and Light Industrial/Warehouse)
- Educational facilities, including K-12 schools
- Parks and a comprehensive trail system to support local recreation and bicycle and pedestrian connectivity within the project

Additional key characteristics of the proposed project include:

- Consists of a series of compact neighborhoods with conveniently located village centers, each composed of a mix of housing, neighborhood-serving retail and office uses, schools, parks, and community services.
- Adjacent to a major employment center at TRCC, which already provides over 3,000 jobs with approximately 4.4 million square feet of existing commercial and industrial development. TRCC is entitled to include over 18 million square feet of industrial and commercial space providing additional employment and service opportunities for future Grapevine residents.
- Isolated location 30 miles south of Downtown Bakersfield and 45 miles north of Santa Clarita

JOBS-HOUSING BALANCE

The proposed Grapevine development, in concert with development at TRCC and the small amount of development at San Emidio New Town included in the Kern COG RTP/SCS, will create a development with a balance of housing and employment opportunities. Tables 2 and 3 present the anticipated workforce generation and employment generation for this area.

TABLE 2
ESTIMATED WORKFORCE GENERATION

Development	Residential Dwelling Units	Workforce per Dwelling Unit[1]	Total Workforce
Grapevine	12,000 Dwelling Units	1.50	**18,000**
Tejon Ranch Commerce Center	0	1.50	**0**
San Emidio New Town	1,350 Dwelling Units	1.50	**2,025**
Total	**13,350 Dwelling Units**	**-**	**20,025**

Notes: [1]Workforce per Dwelling Unit value comes from U.S. Census data for similarly sized communities.
Source: Ken Kay Associates, 2015; Kern COG RTP/SCS, 2014; 2008-2012 ACS – Report DP03 & DP04, U.S. Census Bureau, 2012.

TABLE 3
ESTIMATED EMPLOYMENT GENERATION

Development	Land Use Type	Amount	Employment Factor	Number of Jobs
Grapevine	Village Center Commercial - Retail	450,000 SF	2 jobs per 1,000 SF	900
	Village Center Commercial - Office	350,000 SF	3 jobs per 1,000 SF	1,050
	Highway/Regional Commercial	750,000 SF	2 jobs per 1,000 SF	1,500
	Office / Research & Development	2,100,000 SF	3 jobs per 1,000 SF	6,300
	Light Industrial / Warehouse	1,450,000 SF	0.75 jobs per 1,000 SF	1,088
	Elementary School[3]	3,520 Students	1 job per 10.7 students	329
	Middle School[3]	1,760 Students	1 job per 10.7 students	164
	High School[3]	2,454 Students	1 job per 10.7 students	229
			Total	**11,560**
Tejon Ranch Commerce Center (TRCC)[1]	Highway/Regional Commercial	936,000 SF	2 jobs per 1,000 SF	1,872
	Industrial/Warehouse	17,236,000 SF	0.30 jobs per 1,000 SF	5,143
			Total	**7,015**
San Emidio New Town[2]	Commercial Retail	16,000 SF	2 jobs per 1,000 SF	32
	Office	30,000 SF	3 jobs per 1,000 SF	90
	Industrial	24,000 SF	1 job per 1,000 SF	24
			Total	**146**
			Total Employment	**18,721**

Notes: [1]TRCC employment factors based on existing employment yields
[2]San Emidio New Town land use data presented above was obtained from the Kern COG RTP/SCS TDF model.
[3]School employment yields based on the average student to teacher ratio for California and national teacher to school staff data (see Attachment A).
Source: Tejon Ranch, 2015.

As shown in Tables 2 and 3, the amount of workforce generated by the proposed residential development in the area will closely match the total number of jobs generated by the non-residential development, demonstrating a well-balanced jobs-housing ratio.

It should be noted that the Industrial/Warehouse employment yield factors are different for each development since Grapevine is expected to provide more local distribution, warehousing, and manufacturing, while TRCC is expected to include more high-cube, regional distribution centers and logistics centers, which typically have lower employment yields.

TRIP GENERATION

While the Grapevine TIS uses the Kern COG TDF model to estimate the proposed project's trip generation, this study also calculated the estimated trip generation for the project using trip rates in the Institute of Transportation Engineers' *Trip Generation 9th Edition* (ITE, 2012) to validate and calibrate the trip generation outputs from the Kern COG TDF model. Table 4 presents these daily, a.m. peak hour, and p.m. peak hour trip generation estimates based on these ITE trip rates.

TABLE 4
ITE TRIP GENERATION ESTIMATE

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	*In*	*Out*	*Total*	*In*	*Out*	
Residential									
Residential	8,410 DUs	210	6,308	1,577	4,731	8,410	5,298	3,112	80,063
Village Center Residential	3,590 DUs	220	1,831	366	1,465	2,226	1,446	779	23,874
Non-Residential									
Village Center Comm. - Retail[1]	450 ksf	820[1]	432	268	164	1,670	802	868	19,215
Village Center Comm. - Office[1]	350 ksf	710[1]	546	480	66	522	89	433	3,861
Highway/Regional Commercial	750 ksf	820	720	446	274	2,783	1,336	1,447	32,025
Office/Research & Development	2,100 ksf	710	3,276	2,883	393	3,129	532	2,597	23,163
Light Industrial/Warehouse[2]	1,450 ksf	130/ 150[2]	813	660	153	848	187	661	7,533
Schools & Parks									
Elementary Schools	3,520 students	520	1,584	871	713	528	259	269	4,541
Middle Schools	1,760 students	522	950	523	428	282	138	144	2,851
High Schools	2,454 students	530	1,055	717	338	319	150	169	4,196
Parks[3]	132 acres	411	-	-	-	-	-	-	249
Total			**17,515**	**8,791**	**8,725**	**20,717**	**10,238**	**10,479**	**201,571**

Notes: DUs = dwelling units; ksf = thousand square feet
Trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition*
[1]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[2]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
[3]City Park land use (ITE Code 411) in ITE's *Trip Generation Manual* only includes daily trip information.
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

As shown in Table 4, the proposed project has an overall balance of "in" and "out" trips during the a.m. and p.m. peak hours, further demonstrating its jobs-housing balance.

TRIP INTERNALIZATION ANALYSIS

As noted in the project description, the proposed Grapevine development is a complete, full-service community that provides a mix of complementary land uses to provide both jobs and services for future residents and workers in Grapevine. This complete community approach will allow future residents and workers to fulfill most of their daily needs within the proposed project at build out.

Furthermore, the project's isolated location approximately 30 miles south of Downtown Bakersfield and 45 miles north of Santa Clarita make it more likely that people will primarily stay within the project and the immediate vicinity (i.e., TRCC) particularly for non-work trips such as shopping, school, restaurant, and basic services, such as medical, banking, and real estate.

These aspects of the project description and location result in an increased likelihood for project trips to remain within the community at build out. While this full-service community approach along with the project's isolated location means that residents and workers will likely make most of their trips within the project and the immediate vicinity, this study acknowledges that some project residents will work and travel outside the area, and some workers and visitors to Grapevine will travel to the project from outside the area.

KERN COG MODEL

As stated in the introduction of the memorandum, the Grapevine TIS ultimately uses the Kern COG TDF model to forecast the proposed project's trip generation and trip distribution, including forecasting the internalization of project trips. The Kern COG TDF model predicts that the proposed Grapevine project will have an internal capture rate of 73% during the a.m. peak hour and 72% during the p.m. peak hour.

TRIP INTERNALIZATION ANALYSIS METHODOLOGY

The following trip internalization analysis is intended to verify that the Kern COG TDF model internalization forecasts are reasonable.

Given the project's size, unique location, and complete community approach, this analysis uses the following three-step process to estimate the project's trip internalization, or the number of trips that are expected to remain within the project.

Step 1. Estimate the trip purpose for project trips

Step 2. Estimate the internalization by trip purpose

Step 3. Estimate the total trip internalization

This study uses trip purpose information from the Transportation Research Board along with data from the U.S. Census Bureau for similarly sized and isolated communities in California and the MXD+ tool to support this analysis process.

STEP 1: DETERMINING PEAK HOUR TRIP PURPOSE SPLIT

This study uses information from the National Cooperative Highway Research Program (NCHRP) Report 365 (Transportation Research Board, 1998) to estimate the peak hour trip purpose breakdown. Developing the peak hour trip purpose breakdown is a two-step process that includes the following:

Step 1A. Identify trip purpose split for daily trip productions based on NCHRP 365

Step 1B. Use Time of Day Factors from NCHRP 365 to estimate the peak hour trip purpose split

Through this process, this study estimates that the peak hour trip purpose split is as shown in Table 5.

TABLE 5
PEAK HOUR TRIP PURPOSE

A.M. Peak Hour			P.M. Peak Hour		
HBW	*HBO*	*NHB*	*HBW*	*HBO*	*NHB*
47.8%	46.5%	5.7%	28.1%	47.5%	24.4%

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
Source: *National Cooperative Highway Research Program Report 365* (Transportation Research Board, 1998); Fehr & Peers, 2015.

The detailed calculations for each of these steps to develop this breakdown are provided in Attachment A.

STEP 2: INTERNALIZATION BY TRIP PURPOSE

This study recognizes that the internal trip capture rate will be different for different trip purposes. For example, people generally travel further for their commute trips and may not live where they work. However, most people tend to shop and attend schools within their community, when feasible. Therefore, this study evaluates the trip internalization for home-based work and home-based other/non-home-based trips separately, as described below.

Step 2A: Home-Based Work Trips

Internalization for home-based work trips is estimated using U.S. Census Journey to Work data for California communities that have similar characteristics to Grapevine. This includes similar size, in terms of dwelling units and population, employment opportunities, and proximity to other developed areas (i.e., similar isolation). This analysis included the following six communities:

- El Centro, CA
- Madera, CA
- Paso Robles, CA
- Porterville, CA
- Santa Maria, CA
- Watsonville, CA

Additional data for each of these communities is provided in Attachment A.

This study uses the Journey to Work data from the U.S. Census Bureau's American Community Survey (ACS) for these six communities to estimate how many Grapevine residents will work within Grapevine and the immediate area (i.e., TRCC). Specifically, the study uses the percentage of the population who worked in their place of residence from the Journey to Work data, as presented in Table 6 below.

TABLE 6
JOURNEY TO WORK DATA FOR SIMILAR COMMUNITIES

City	Percent of Population that Work in Place of Residence
El Centro, CA	57.6%
Madera, CA	51.2%
Paso Robles, CA	48.5%
Porterville, CA	58.0%
Santa Maria, CA	62.0%
Watsonville, CA	49.4%
Average	**54.5%**

Source: 2008-2012 ACS – Report S0801, U.S. Census Bureau, 2012.

Based on this U.S. Census data, this study anticipates that approximately 54.5% of Grapevine residents will work in Grapevine/TRCC. Therefore, this study assumes that **54.5%** of home-based work trips will be internal.

Step 2B: Home-Based Other and Non-Home-Based Trips

Internalization for home-based other and non-home-based trips are based on travel data from NCHRP 365, specific land use characteristics, cell phone data, and the MXD+ trip generation model.

Since the non-residential land uses attract a combination of home-based work, home-based other, and non-home-based trips, this study estimates the proportion of home-based work trips versus home-based other and non-home-based trips to isolate the home-based other and non-home-based trips.

Table 7 presents a summary of the anticipated break down of home-based other/non-home-based trips versus home-based work trips by land use. This breakdown is based on data from NCHRP 365. Calculations used to develop the percentages presented in Table 7 are included in Attachment A.

TABLE 7
TRIP PURPOSE FOR NON-RESIDENTIAL LAND USES

Land Use	A.M. Peak Hour				P.M. Peak Hour			
	HBW	*HBO*	*NHB*	***HBO+NHB***	*HBW*	*HBO*	*NHB*	***HBO+NHB***
Village Center Comm. - Retail	28%	63%	9%	**72%**	14%	55%	31%	**86%**
Village Center Comm. - Office	66%	28%	6%	**34%**	42%	31%	27%	**58%**
Highway/Regional Commercial	28%	63%	9%	**72%**	14%	55%	31%	**86%**
Office/Research & Development	66%	28%	6%	**34%**	42%	31%	27%	**58%**
Light Industrial/Warehouse	86%	11%	3%	**14%**	67%	15%	18%	**33%**

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
Source: *National Cooperative Highway Research Program Report 365* – Table 8 (Transportation Research Board, 1998).

NCHRP 365 does not present specific trip purpose data for school trips. Therefore, this study uses a combination of the data presented in NCHRP 365 and school employment yield data from the California School Boards Association and the National Center for Education Statistics to estimate home-based work trips associated with schools. Table 8 presents the estimated home-based work trips for the schools in the proposed projects. Detailed calculations associated with this data are included in Attachment A.

TABLE 8
ESTIMATED EDUCATION HOME-BASED WORK TRIPS

School Type	Amount	Number of Jobs[1]	A.M. Peak Hour		P.M. Peak Hour	
			HBW Trip Rate[2]	*# of HBW Trips*	*HBW Trip Rate*[2]	*# of HBW Trips*
Elementary School	3,520 Students	329	0.21	69	0.17	56
Middle School	1,760 Students	164	0.21	35	0.17	28
High School	2,454 Students	229	0.21	48	0.17	39
Total				**152**		**123**

Notes: [1]School employment yields based on the average student to teacher ratio for California and national teacher to school staff data.
[2]Home-based work trip rate for schools based on data in Table 8 and Table 41 of NCHRP 365 (Transportation Research Board, 1998).
Source: Fehr & Peers, 2015.

Using the information in Table 8 along with the estimated ITE trip generation for schools within the proposed project (see Table 4), this study is able to deduce that the remaining trip generation at schools would be home-based other or non-home-based trips, as shown in Table 8.

Using the data in Tables 4, 7, and 8, Table 9 estimates the number of home-based other and non-home-based trips by non-residential land use type.

TABLE 9
HBO/NHB TRIP ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour		P.M. Peak Hour	
		Total Trip Generation[1]	*HBO+NHB*[2]	*Total Trip Generation*[1]	*HBO+NHB*[2]
Non-Residential					
Village Center Comm. - Retail[3]	450 ksf	432	311	1,670	1,436
Village Center Comm. - Office[3]	350 ksf	546	186	522	303
Highway/Regional Commercial	750 ksf	720	518	2,783	2,393
Office/Research & Development	2,100 ksf	3,276	1,114	3,129	1,815
Light Industrial/Warehouse[4]	1,450 ksf	813	114	848	280
Non-Residential Sub-Total		*5,787*	*2,243*	*8,952*	*6,227*

TABLE 9
HBO/NHB TRIP ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour		P.M. Peak Hour	
		Total Trip Generation[1]	*HBO+NHB[2]*	*Total Trip Generation[1]*	*HBO+NHB[2]*
Schools					
Elementary Schools	3,520 students	1,584	1,515	528	472
Middle Schools	1,760 students	950	915	282	254
High Schools	2,454 students	1,055	1,007	319	280
Schools Sub-Total		*3,589*	*3,437*	*1,129*	*1,006*
Total		**9,376**	**5,680**	**10,081**	**7,233**

Notes: ksf = thousand square feet
[1]A.M. and P.M. peak hour trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition* from Table 4.
[2]Home-based other and non-home-based trip estimate based on percentages presented in Table 7 for non-residential uses; and the remaining trips after home-based work trips calculated in Table 8 are subtracted from total school trips.
[3]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[4]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

For the home-based other and non-home-based trip estimates presented in Table 9, this study applies a different internalization percentage for each land use type based on its function. Further details regarding the determination of the internalization percentage for home-based other/non-home-based trips for each land use type is described in Attachment A.

Table 10 presents the estimated internal home-based other/non-home-based trips by land use type. These are based on the total home-based other/non-home-based trip numbers from Table 9 and the internalization percentage of for each land use type.

TABLE 10
HBO/NHB TRIP INTERNALIZATION ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour			P.M. Peak Hour		
		HBO/NHB[1]	*Internal %[2]*	*Internal HBO/NHB*	*HBO/NHB[1]*	*Internal %[2]*	*Internal HBO/NHB*
Non-Residential							
Village Center Comm. - Retail[3]	450 ksf	311	95%	295	1,436	95%	1,364
Village Center Comm. - Office[3]	350 ksf	186	95%	177	303	95%	288
Highway/Regional Commercial	750 ksf	518	60%	311	2,393	60%	1,436
Office/Research & Development	2,100 ksf	1,114	85%	947	1,815	85%	1,543
Light Industrial/Warehouse[4]	1,450 ksf	114	20%	23	280	20%	56
Non-Residential Sub-Total		*2,243*	*77.0%*	*1,753*	*6,227*	*75.3%*	*4,687*
Schools							
Elementary Schools	3,520 students	1,515	95%	1,439	472	95%	448
Middle Schools	1,760 students	915	95%	869	254	95%	241
High Schools	2,454 students	1,007	95%	957	280	95%	266
Schools Sub-Total		*3,437*	*95.0%*	*3,265*	*1,006*	*95.0%*	*955*
Total		**5,680**	**88.3%**	**5,018**	**7,233**	**78.0%**	**5,642**

Notes: ksf = thousand square feet
[1]Home-based other and non-home-based trip estimate based on data presented in Table 9.
[2]Internalization percentage based on discussion provided in Attachment A.
[3]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[4]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

Step 2 Summary: Internalization by Trip Purpose

As presented above, the estimated internalization for home-based work trips is 54.5% during both the a.m. and p.m. peak hours (see Table 6). For home-based other and non-home-based trips, the project's internalization is estimated to be 88.3% during the a.m. peak hour and 78.0% during the p.m. peak hour (see Table 10).

STEP 3: TOTAL PROJECT TRIP INTERNALIZATION BY PEAK HOUR

The final step in the trip internalization analysis is to combine the data from Steps 1 and 2 into an aggregate trip internalization estimate for each peak hour. This study calculates this aggregate total project trip internalization by peak hour using the peak hour trip purpose split presented in Table 5 along with the internalization by trip purpose presented in Tables 6 and 10.

Table 11 below calculates the total project trip internalization by peak hour.

TABLE 11
ESTIMATED PROJECT TRIP INTERNALIZATION BY PEAK HOUR

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips[1]	*% Internal*[2]	*Total Internalization %*[3]	*% of Trips*[1]	*% Internal*[2]	*Total Internalization %*[3]
Home-Based Work	47.8%	54.5%	26.1%	28.1%	54.5%	15.3%
Home-Based Other/ Non-Home-Based	52.2%	88.3%	46.1%	71.9%	78.0%	56.1%
Total			**72.2%**			**71.4%**

Notes: [1]Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Tables A-1 through A-3 of Attachment A.
[2]Internalization percentage by trip purpose. Home-based work trip internalization shown in Table 5. Home-based other/non-home-based trip internalization shown in Table 9.
[3]Overall internalization estimate calculation.
Source: Fehr & Peers, 2015.

As shown in Table 11, the proposed Grapevine project is estimated to have a total internalization of 72.2% during the a.m. peak hour and 71.4% during the p.m. peak hour.

These analysis results validate the trip internalization outputs from the Kern COG RTP/SCS TDF model, which estimated an approximately 73% internalization during the a.m. peak hour and 72% internalization during the p.m. peak hour.

INTENTIONALLY LEFT BLANK

Appendix E:

Trip Internalization Analysis Calculations

STEP 1: PEAK HOUR TRIP PURPOSE SPLIT CALCULATIONS

Developing the peak hour trip purpose breakdown is a two-step process that includes the following:

Step 1A: Identify trip purpose split for the daily productions based on NCHRP 365

Step 1B: Use Time of Day Factors from NCHRP 365 to estimate the peak hour trip purpose split

The data and calculations for these steps are provided below.

STEP 1A: DAILY TRIP PURPOSE

Table A-1 presents the daily trip purpose percentages for home-based work (HBW), home-based other (HBO), and non-home-based trips (NHB) based on data presented in NCHRP 365.

TABLE A-1
DAILY TRIP PURPOSE

Data Set	Productions per Household	Percentage			Daily Productions per HH[1]		
		HBW	*HBO*	*NHB*	*HBW*	*HBO*	*NHB*
All Area Types	8.55	21%	56.25%	22.75%	1.86	4.98	2.01

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
[1]NCHRP 365 provides Productions per Household and trip purpose percentages. The Daily Productions per Household are calculated by multiplying the Productions Per Household by the daily trip purpose percentages.
Source: *National Cooperative Highway Research Program Report 365* – Table 9 (Transportation Research Board, 1998).

STEP 1B: PEAK HOUR TRIP PURPOSE

Table A-2 presents the time of day factors by trip purpose for the a.m. and p.m. peak hours from NCHRP 365.

TABLE A-2
TIME OF DAY FACTORS BY TRIP PURPOSE

Data	A.M. Peak Hour[1]			P.M. Peak Hour[2]		
	HBW	*HBO*	*NHB*	*HBW*	*HBO*	*NHB*
Percent of Daily Trips that Occur During Time Period	14.33%	5.21%	1.57%	11.53%	7.28%	9.24%

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
[1]A.M. Peak Hour data uses data for 7-8 a.m., consistent with the typical a.m. peak hour shown in Table 41 of NCHRP 365.
[2]P.M. Peak Hour data uses data for 5-6 p.m., consistent with the typical p.m. peak hour shown in Table 41 of NCHRP 365.
Source: *National Cooperative Highway Research Program Report 365* – Table 41 (Transportation Research Board, 1998).

This study uses the data presented in Tables A-1 and A-2 to estimate the trip purpose split during the a.m. and p.m. peak hour, as shown in Table A-3.

The number of peak hour productions by trip purpose is calculated by multiplying the daily productions per household in Table A-1 by the time of day factors in Table A-2. These calculations for Table A-3 are presented below. For example, the number of home-based work productions during the a.m. peak hour is calculated by multiplying the daily home-based work productions by the time of day factor (i.e., 1.86 x 14.33% = 0.27).

TABLE A-3
PEAK HOUR TRIP PURPOSE – PRODUCTIONS PER HOUSEHOLD CALCULATIONS

Trip Purpose	Daily[1]	A.M. Peak Hour			P.M. Peak Hour		
	Productions per HH	*% of Daily Trips that Occur During Time Period[3]*	*Productions per HH[2]*		*% of Daily Trips that Occur During Time Period[3]*	*Productions per HH[2]*	
			Amount	*%*		*Amount*	*%*
Home-Based Work (HBW)	1.86	14.33%	0.27	**47.8%**	11.53%	0.21	**28.1%**
Home-Based Other (HBO)	4.98	5.21%	0.26	**46.5%**	7.28%	0.36	**47.5%**
Non-Home-Based (NHB)	2.04	1.57%	0.03	**5.7%**	9.24%	0.19	**24.4%**

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based; HH = household
[1]Daily productions per household from Table A-1.
[2]A.M. and P.M. Peak Hour productions calculated by multiplying the daily productions per household by the Time of Day factors in Table A-2.
Source: *National Cooperative Highway Research Program Report 365* (Transportation Research Board, 1998); Fehr & Peers, 2015.

The key conclusions from Table A-3 are as follows:

- A.M. Peak Hour trip purpose breakdown is:
  - 47.8% home-based work trips
  - 46.5% home-based other trips
  - 5.7% non-home-based trips
- P.M. Peak Hour trip purpose breakdown is:
  - 28.1% home-based work trips
  - 47.5% home-based other trips
  - 24.4% non-home-based trips

STEP 2: INTERNALIZATION BY TRIP PURPOSE

STEP 2A: HOME-BASED WORK TRIPS

Internalization for home-based work trips is estimated using U.S. Census Journey to Work data for California communities that have similar characteristics to Grapevine. This includes similar size, in terms of dwelling units and population, employment opportunities, and proximity to other developed areas (i.e., similar isolation). This analysis included the six communities presented in Table A-4 below.

TABLE A-4
U.S. CENSUS DATA FOR SIMILAR COMMUNITIES

City	Dwelling Units	Population	% Worked in Place of Residence	Nearest Major Cities
El Centro, CA	14,475	42,514	57.6%	Adjacent to Imperial; 10 miles to Brawley; 100 miles to San Diego
Madera, CA	17,687	61,151	51.2%	20 miles to Fresno; 120 miles to San Jose
Paso Robles, CA	11,686	29,770	48.5%	30 miles to San Luis Obispo; 150 miles to San Jose
Porterville, CA	17,331	54,038	58.0%	30 miles to Tulare & Visalia; 50 miles to Bakersfield
Santa Maria, CA	28,673	98,715	62.0%	30 miles to San Luis Obispo; 60 miles to Santa Barbara; 130+ miles to Los Angeles
Watsonville, CA	14,521	50,945	49.4%	20 miles to Salinas, Santa Cruz, Monterey; 50 miles to San Jose
Average	**17,396**	**50,972**	**54.5%**	
Grapevine	**12,000**	[redacted]		30 miles to Bakersfield; 45 miles to Santa Clarita

Source: 2008-2012 ACS, U.S. Census Bureau, 2012.

The communities presented in Table A-4 are all roughly similar in size to Grapevine at build out and are located in generally isolated locations. Although none of these communities exactly match every aspect of Grapevine's unique context and location, they each have a few aspects in common with Grapevine to serve as comparable communities for this analysis.

This study uses the Journey to Work data from the U.S. Census Bureau's American Community Survey (ACS) for these six communities to estimate how many Grapevine residents will work within Grapevine and the immediate area (i.e., TRCC). Specifically, the study uses the percentage of the population who worked in their place of residence from the Journey to Work data, as presented in Table A-4 above.

Based on this U.S. Census data, this study anticipates that approximately 54.5% of Grapevine residents will work in Grapevine/TRCC. Therefore, this study assumes that 54.5% of home-based work trips will be internal.

STEP 2B: HOME-BASED OTHER/NON-HOME BASED TRIPS

Non-residential land uses attract a combination of home-based work, home-based other, and non-home-based trips. Since this study uses U.S. Census Journey to Work data to estimate the internalization of home-based work trips, the next step in the trip internalization analysis is to identify the internalization of home-based other and non-home-based trips.

This study uses data from NCHRP 365 to estimate the trip purpose split for trip attractions to non-residential land uses. Table A-5 presents the estimated number of daily trip attractions generated by non-residential land uses by trip purpose based on data presented in Table 8 of NCHRP 365.

TABLE A-5
DAILY TRIP ATTRACTIONS BY LAND USE

Land Use	Unit	Daily Productions per Employee		
		HBW	*HBO*	*NHB*
Commercial/Retail	Per Retail Employee	1.45	9.00	4.10
Office	Per Office Employee	1.45	1.70	1.20
Industrial/Other	Per Industrial Employee	1.45	0.50	0.50

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
Data presented for non-CBD (Central Business District) condition.
Source: *National Cooperative Highway Research Program Report 365* – Table 8 (Transportation Research Board, 1998).

This study then uses daily trip attraction data presented in Table A-5 along with the Time of Day data presented in Table A-2 to estimate the trip attraction by trip purpose during the a.m. and p.m. peak hours. This calculation is presented in Table A-6 below.

TABLE A-6
PEAK HOUR TRIP ATTRACTIONS BY LAND USE

Data	A.M. Peak Hour[1]						P.M. Peak Hour[2]					
	HBW		*HBO*		*NHB*		*HBW*		*HBO*		*NHB*	
	Amount	*%*	*Amount*	*%*	*Amount*	*%*	*Amount*	*%*	*Amount*	*%*	*Amount*	*%*
Percent of Daily Trips that Occur During Time Period[3]	*14.33%*		*5.21%*		*1.57%*		*11.53%*		*7.28%*		*9.24%*	
Commercial/Retail	0.21	28%	0.47	63%	0.06	9%	0.17	14%	0.66	55%	0.38	31%
Office	0.21	66%	0.09	28%	0.02	6%	0.17	42%	0.12	31%	0.11	27%
Industrial/Other	0.21	86%	0.03	11%	0.01	3%	0.17	67%	0.04	15%	0.05	18%

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
[1]A.M. Peak Hour data uses data for 7-8 a.m., consistent with the typical a.m. peak hour shown in Table 41 of NCHRP 365.
[2]P.M. Peak Hour data uses data for 5-6 p.m., consistent with the typical p.m. peak hour shown in Table 41 of NCHRP 365.
[3]Data from Table A-2; originally from Table 41 of NCHRP 365.
Source: *National Cooperative Highway Research Program Report 365* – Table 41 (Transportation Research Board, 1998).

Table A-7 takes the peak hour trip purpose splits presented in Table A-6 and identifies the combined share for home-based other and non-home-based trips by land use type.

TABLE A-7
TRIP PURPOSE FOR NON-RESIDENTIAL LAND USES

Land Use	A.M. Peak Hour				P.M. Peak Hour			
	HBW	*HBO*	*NHB*	***HBO+NHB***	*HBW*	*HBO*	*NHB*	***HBO+NHB***
Village Center Comm. - Retail	28%	63%	9%	**72%**	14%	55%	31%	**86%**
Village Center Comm. - Office	66%	28%	6%	**34%**	42%	31%	27%	**58%**
Highway/Regional Commercial	28%	63%	9%	**72%**	14%	55%	31%	**86%**
Office/Research & Development	66%	28%	6%	**34%**	42%	31%	27%	**58%**
Light Industrial/Warehouse	86%	11%	3%	**14%**	67%	15%	18%	**33%**

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
Source: *National Cooperative Highway Research Program Report 365* – Table 8 (Transportation Research Board, 1998).

Using the trip purpose information presented in Table A-7 and the total project trip generation estimate in Table 4 of the memorandum, this study estimates the total home-based other and non-home-based trips generated by the proposed project, as shown in Table A-8 below.

TABLE A-8
HBO/NHB TRIP ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour		P.M. Peak Hour	
		Total Trip Generation[1]	*HBO+NHB[2]*	*Total Trip Generation[1]*	*HBO+NHB[2]*
Non-Residential					
Village Center Comm. - Retail[3]	450 ksf	432	311	1,670	1,436
Village Center Comm. - Office[3]	350 ksf	546	186	522	303
Highway/Regional Commercial	750 ksf	720	518	2,783	2,393
Office/Research & Development	2,100 ksf	3,276	1,114	3,129	1,815
Light Industrial/Warehouse[4]	1,450 ksf	813	114	848	280
Total		**5,787**	**2,243**	**8,952**	**6,227**

Notes: ksf = thousand square feet
[1]A.M. and P.M. peak hour trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition* from Table 4.
[2]Home-based other and non-home-based trip estimate based on percentages presented in Table A-7.
[3]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[4]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

School Trips

NCHRP 365 does not present specific trip attractions by purpose for school trips. Therefore, this study uses a combination of the data presented in NCHRP 365, school employment yield data, and the ITE trip generation estimate for schools in the project presented in Table 4 of the memorandum.

According to the California School Boards Association, the average student-teacher ratio for California is 20.9 students per teacher. The national average for teacher to total school staff ratio is 51% (i.e., about half of school staff are teachers), according to the National Center for Education Statistics. Based on this data, the average student to school staff ratio is 10.7 students per school staff.

Using this employment yield data along with the student generation data for the proposed project shown in Table 1, Table A-9 presents the estimated number of education employees expected at build out of the proposed project.

TABLE A-9
ESTIMATED EDUCATION EMPLOYMENT GENERATION

School Type	Amount	Employment Factor[1]	Number of Jobs
Elementary School	3,520 Students	1 job per 10.7 students	329
Middle School	1,760 Students	1 job per 10.7 students	164
High School	2,454 Students	1 job per 10.7 students	229
		Total	**722**

Notes: [1]School employment yields based on the average student to teacher ratio for California and national teacher to school staff data.
Source: California School Boards Association, 2015; National Center for Education Statistics, 2015.

Table 8 in NCHRP 365 shows that home-based work attractions can be estimated by multiplying the total employment by a factor by 1.45 (see Table A-4, for example). Similarly, the Time of Day data in NCHRP 365 for home-based work trips (see Table A-2) results in a consistent 0.21 trips per employee during the a.m. peak hour and 0.17 trips per employee during the p.m. peak hour.

This study uses this information to estimate the home-based work trips associated with schools during the a.m. and p.m. peak hour, as shown in Table A-10 below.

TABLE A-10
ESTIMATED EDUCATION HOME-BASED WORK TRIPS

School Type	Amount	Number of Jobs[1]	A.M. Peak Hour		P.M. Peak Hour	
			HBW Trip Rate[2]	*# of HBW Trips*	*HBW Trip Rate[2]*	*# of HBW Trips*
Elementary School	3,520 Students	329	0.21	69	0.17	56
Middle School	1,760 Students	164	0.21	35	0.17	28
High School	2,454 Students	229	0.21	48	0.17	39
		Total		**152**		**123**

Notes: [1]School employment yields based on the average student to teacher ratio for California and national teacher to school staff data.
[2]Home-based work trip rate for schools based on data in Table 8 and Table 41 of NCHRP 365 (Transportation Research Board, 1998).
Source: Fehr & Peers, 2015.

Using the information in Table A-10 along with the estimated ITE trip generation for schools within the proposed project (see Table 4 in the memorandum), this study is able to deduce that the remaining trip generation at schools would be home-based other or non-home-based trips. Table A-11 presents this calculation.

TABLE A-11
ESTIMATED EDUCATION HOME-BASED OTHER/NON-HOME-BASED TRIPS

School Type	Amount	A.M. Peak Hour			P.M. Peak Hour		
		Total Trip Generation[1]	*HBW[2]*	*HBO/NHB*	*Total Trip Generation[1]*	*HBW[2]*	*HBO/NHB*
Elementary School	3,520 Students	1,584	69	1,515	528	56	472
Middle School	1,760 Students	950	35	915	282	28	254
High School	2,454 Students	1,055	48	1,007	319	39	280
	Total	**3,589**	**152**	**3,437**	**1,129**	**123**	**1,006**

Notes: [1]Total A.M. and P.M. peak hour trip generation calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition*
[2]Home-based work trip data from Table A-9.
Source: Fehr & Peers, 2015.

Home-Based Other & Non-Home-Based Trip Internalization Discussion

Village Center Commercial

The Village Center Commercial uses include retail and office uses that are primarily local-serving, such as grocery stores, pharmacies, banks, small eateries, real estate offices, small medical offices, and other local serving uses. Therefore, this study assumes that 95% of the home-based other and non-home-based trips traveling to these uses will be internal trips generated by Grapevine residents and workers.

Highway/Regional Commercial

Highway/Regional Commercial uses will include larger-scale retail stores, fast-food restaurants, and gas stations that will serve both the community and regional traffic on I-5. These highway/regional commercial uses will partially draw from trips that already exist or will exist in the future on I-5 without the project. These trips, called diverted link trips, will not be new trips generated by the project, but trips that are "diverted" off the freeway to visit highway/regional commercial uses (e.g., gas stations, restaurants, etc.) as an intermediate stop in their trip.

This study estimates that 26% of the trips generated by highway/regional commercial uses will be diverted link trips based on data in ITE's *Trip Generation Handbook, 3rd Edition* (Institute of Transportation Engineers, 2012) for shopping centers (ITE Code 820). The highway/regional commercial uses are likely to include gas stations, fast-food restaurants, and other services with higher diverted link percentages than shopping centers according to the ITE *Trip Generation Handbook*. However, the exact breakdown of these specific highway commercial uses is not identified in the Specific Plan. Therefore, this study uses the lower "diverted link" percentage of shopping center to present a more conservative analysis and be consistent with the trip generation inputs identified in Table 4.

With 26% of highway/regional commercial trips expected to be "diverted link" trips, and the regional commercial uses having a broader draw with potential for attracting trips from smaller communities in the area, this study estimates that 60% of the home-based other and non-home-based trips will be internal.

Office/Research & Development

The office/research & development land uses in the project are expected to predominantly be services and research uses that have a lower proportion of home-based other and non-home-based trips when compared to commercial retail and school uses (see Table A-6). However, these offices may also include medical, financial, and other services that will be frequented by Grapevine residents and workers. Therefore, they will still generate some home-based other and non-home-based trips that will primarily serve the local community.

As a result, this study assumes that 85% of the home-based other and non-home-based trips associated with office/research & development land uses in the project are expected to be internal.

Light Industrial/Warehouse

The light industrial/warehouse land uses in the project are expected to predominantly be employment and small-scale warehouse distribution industrial uses that have the lowest proportion of home-based other and non-home-based trips (see Table A-7). While some of these trips may be generated by

Grapevine residents and workers needing to access storage units or accessing more industrial type services, such as home improvement suppliers, this study assumes that many of these trips will be external trips. These external trips may include shipping vehicles traveling to and from these industrial uses.

Therefore, this study assumes that 20% of the home-based other and non-home-based trips for industrial uses will be internal.

School Trips

Since the schools within Grapevine will predominantly serve the proposed project, this study assumes that the vast majority of school trips will remain internal at project build out. For purposes of this analysis, 95% of school trips are anticipated to be internal.

Overall Home-Based Other & Non-Home-Based Trip Internalization

Table A-12 presents the overall home-based other/non-home-based trip internalization calculation estimate based on the assumptions identified above and the data presented in Tables A-8 and A-11.

TABLE A-12
HBO/NHB TRIP INTERNALIZATION ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour			P.M. Peak Hour		
		HBO/NHB[1]	*Internal %*[2]	*Internal HBO/NHB*	*HBO/NHB*[1]	*Internal %*[2]	*Internal HBO/NHB*
Non-Residential							
Village Center Comm. - Retail[3]	450 ksf	311	95%	295	1,436	95%	1,364
Village Center Comm. - Office[3]	350 ksf	186	95%	177	303	95%	288
Highway/Regional Commercial	750 ksf	518	60%	311	2,393	60%	1,436
Office/Research & Development	2,100 ksf	1,114	85%	947	1,815	85%	1,543
Light Industrial/Warehouse[4]	1,450 ksf	114	20%	23	280	20%	56
Non-Residential Sub-Total		*2,243*	*77.0%*	*1,753*	*6,227*	*73.3%*	*4,687*

TABLE A-12
HBO/NHB TRIP INTERNALIZATION ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour			P.M. Peak Hour		
		HBO/NHB[1]	*Internal %[2]*	*Internal HBO/NHB*	*HBO/NHB[1]*	*Internal %[2]*	*Internal HBO/NHB*
Schools							
Elementary Schools	3,520 students	1,515	95%	1,439	472	95%	448
Middle Schools	1,760 students	915	95%	869	254	95%	241
High Schools	2,454 students	1,007	95%	957	280	95%	266
Schools Sub-Total		*3,437*	*95.0%*	*3,265*	*1,006*	*95.0%*	*955*
Total		**5,680**	**88.3%**	**5,018**	**7,233**	**78.0%**	**5,642**

Notes: ksf = thousand square feet
[1]Home-based other and non-home-based trip estimate based on data presented in Table 8.
[2]Internalization percentage based on discussion provided in Attachment A.
[3]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[4]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

VALIDATION OF HOME-BASED OTHER & NON-HOME-BASED INTERNALIZATION

This study uses cell phone travel pattern data for southern Bakersfield to verify that the internalization projected for Grapevine home-based other and non-home-based trips are appropriate. Based on this cell phone data, approximately 93.4% of trips to and from Bakersfield remain within Bakersfield and Kern County.

Using this as a benchmark, the projected 88.3% and 78.0% internalization estimate during the a.m. and p.m. peak hours, respectively, for Grapevine home-based other and non-home-based trips seems appropriate.

INTENTIONALLY LEFT BLANK

Appendix F:

Existing Plus Project Conditions (2015) – Intersection Operations & Queuing Analysis

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	120	10	20	180	90	10
Number	5	12	4	14	3	8
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1624	950	1267	1624	1005	950
Adj Flow Rate, veh/h	140	0	23	36	105	12
Adj No. of Lanes	2	1	1	2	1	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	17	100	50	17	89	100
Cap, veh/h	591	159	170	325	157	432
Arrive On Green	0.20	0.00	0.13	0.13	0.16	0.45
Sat Flow, veh/h	3000	807	1267	2429	957	950
Grp Volume(v), veh/h	140	0	23	36	105	12
Grp Sat Flow(s),veh/h/ln	1500	807	1267	1215	957	950
Q Serve(g_s), s	1.0	0.0	0.4	0.3	2.6	0.2
Cycle Q Clear(g_c), s	1.0	0.0	0.4	0.3	2.6	0.2
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	591	159	170	325	157	432
V/C Ratio(X)	0.24	0.00	0.14	0.11	0.67	0.03
Avail Cap(c_a), veh/h	2347	632	1239	2375	749	929
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.6	0.0	9.8	9.7	10.0	3.8
Incr Delay (d2), s/veh	0.1	0.0	1.0	0.4	3.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.4	0.0	0.2	0.1	0.8	0.1
LnGrp Delay(d),s/veh	8.8	0.0	10.8	10.2	13.0	3.9
LnGrp LOS	A		B	B	B	A
Approach Vol, veh/h	140		59			117
Approach Delay, s/veh	8.8		10.4			12.1
Approach LOS	A		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		9.9	8.2	7.4				15.6
Change Period (Y+Rc), s		4.9	4.0	4.0				4.0
Max Green Setting (Gmax), s		20.0	20.0	25.0				25.0
Max Q Clear Time (g_c+I1), s		3.0	4.6	2.4				2.2
Green Ext Time (p_c), s		0.2	0.2	0.6				0.6

Intersection Summary			
HCM 2010 Ctrl Delay			10.3
HCM 2010 LOS			B

Notes
User approved pedestrian interval to be less than phase max green.
User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	280	10	50	160	270	10	10	40	230	20	10
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1346	1900	1583	1377	1827	1863	1579	1900	1827	1707	1900
Adj Flow Rate, veh/h	11	301	9	54	172	84	11	11	0	271	0	0
Adj No. of Lanes	1	2	0	2	3	1	1	1	0	2	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	100	39	39	20	38	4	2	2	2	4	2	2
Cap, veh/h	21	578	17	256	1101	455	76	68	0	757	371	0
Arrive On Green	0.02	0.23	0.23	0.09	0.29	0.29	0.04	0.04	0.00	0.22	0.00	0.00
Sat Flow, veh/h	905	2536	76	2925	3759	1553	1774	1579	0	3480	1707	0
Grp Volume(v), veh/h	11	151	159	54	172	84	11	11	0	271	0	0
Grp Sat Flow(s),veh/h/ln	905	1279	1333	1463	1253	1553	1774	1579	0	1740	1707	0
Q Serve(g_s), s	0.5	4.6	4.6	0.8	1.5	1.8	0.3	0.3	0.0	2.9	0.0	0.0
Cycle Q Clear(g_c), s	0.5	4.6	4.6	0.8	1.5	1.8	0.3	0.3	0.0	2.9	0.0	0.0
Prop In Lane	1.00		0.06	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	21	292	304	256	1101	455	76	68	0	757	371	0
V/C Ratio(X)	0.53	0.52	0.52	0.21	0.16	0.18	0.14	0.16	0.00	0.36	0.00	0.00
Avail Cap(c_a), veh/h	408	634	661	1319	2543	1051	800	712	0	2747	1348	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.4	15.0	15.0	18.8	11.6	11.7	20.4	20.5	0.0	14.7	0.0	0.0
Incr Delay (d2), s/veh	12.3	2.0	2.0	0.2	0.1	0.3	0.5	0.7	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.2	1.8	1.8	0.3	0.5	0.8	0.1	0.1	0.0	1.5	0.0	0.0
LnGrp Delay(d),s/veh	33.8	17.0	17.0	19.0	11.7	12.0	21.0	21.1	0.0	15.3	0.0	0.0
LnGrp LOS	C	B	B	B	B	B	C	C		B		
Approach Vol, veh/h		321			310			22			271	
Approach Delay, s/veh		17.6			13.1			21.1			15.3	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.8	16.0		13.6	5.9	18.9		5.9
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0
Max Green Setting (Gmax), s	20.0	22.0		35.0	20.0	30.0		20.0
Max Q Clear Time (g_c+I1), s	2.8	6.6		4.9	2.5	3.8		2.3
Green Ext Time (p_c), s	0.1	3.7		2.1	0.0	4.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	15.5
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	320	230	10	280	230	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1638	1462	1863	1667	1557	0
Adj Flow Rate, veh/h	352	0	11	308	253	0
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	16	30	2	14	22	0
Cap, veh/h	484	385	31	1347	915	0
Arrive On Green	0.31	0.00	0.02	0.43	0.31	0.00
Sat Flow, veh/h	1560	1242	1774	3250	3115	0
Grp Volume(v), veh/h	352	0	11	308	253	0
Grp Sat Flow(s),veh/h/ln	1560	1242	1774	1583	1480	0
Q Serve(g_s), s	7.5	0.0	0.2	2.3	2.4	0.0
Cycle Q Clear(g_c), s	7.5	0.0	0.2	2.3	2.4	0.0
Prop In Lane	1.00	1.00	1.00			0.00
Lane Grp Cap(c), veh/h	484	385	31	1347	915	0
V/C Ratio(X)	0.73	0.00	0.36	0.23	0.28	0.00
Avail Cap(c_a), veh/h	1250	996	1185	2961	2767	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	11.5	0.0	18.2	6.8	9.8	0.0
Incr Delay (d2), s/veh	4.2	0.0	6.9	0.2	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.8	0.0	0.2	1.0	1.0	0.0
LnGrp Delay(d),s/veh	15.7	0.0	25.1	7.0	10.2	0.0
LnGrp LOS	B		C	A	B	
Approach Vol, veh/h	352			319	253	
Approach Delay, s/veh	15.7			7.6	10.2	
Approach LOS	B			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		21.2		16.2	4.3	16.9		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 35		30.0	25.0	35.0		
Max Q Clear Time (g_c+I1), s		4.3		9.5	2.2	4.4		
Green Ext Time (p_c), s		7.2		2.4	0.0	7.2		

Intersection Summary			
HCM 2010 Ctrl Delay			11.4
HCM 2010 LOS			B

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	180	800	390	460	0	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.7	4.0	6.0	4.0		4.0
Lane Util. Factor	0.97	0.91	0.95	1.00		1.00
Frt	1.00	1.00	1.00	0.85		0.86
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	2870	4590	3139	1429		1274
Flt Permitted	0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)	2870	4590	3139	1429		1274
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	207	920	448	529	0	80
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	207	920	448	529	0	80
Heavy Vehicles (%)	22%	13%	15%	13%	2%	29%
Turn Type	Prot	NA	NA	Free		Free
Protected Phases	5	Free	6			
Permitted Phases				Free		Free
Actuated Green, G (s)	10.1	37.1	17.3	37.1		37.1
Effective Green, g (s)	10.1	37.1	17.3	37.1		37.1
Actuated g/C Ratio	0.27	1.00	0.47	1.00		1.00
Clearance Time (s)	3.7		6.0			
Vehicle Extension (s)	2.0		6.1			
Lane Grp Cap (vph)	781	4590	1463	1429		1274
v/s Ratio Prot	0.07	0.20	0.14			
v/s Ratio Perm				c0.37		0.06
v/c Ratio	0.27	0.20	0.31	0.37		0.06
Uniform Delay, d1	10.6	0.0	6.2	0.0		0.0
Progression Factor	0.99	1.00	1.00	1.00		1.00
Incremental Delay, d2	0.1	0.1	0.3	0.7		0.1
Delay (s)	10.6	0.1	6.5	0.7		0.1
Level of Service	B	A	A	A		A
Approach Delay (s)		2.0	3.4		0.1	
Approach LOS		A	A		A	

Intersection Summary			
HCM 2000 Control Delay	2.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	37.1	Sum of lost time (s)	9.7
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	10	10	580	0	60	0	350	320	80	260	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	950	1863	1900	1624	1900	1863	1508	1900	1681	1301	1900
Adj Flow Rate, veh/h	0	12	0	690	0	20	0	417	57	95	310	0
Adj No. of Lanes	1	1	1	2	1	0	1	3	1	1	3	0
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	100	2	0	2	2	2	26	0	13	46	46
Cap, veh/h	3	23	39	872	0	493	3	1219	478	133	1604	0
Arrive On Green	0.00	0.02	0.00	0.25	0.00	0.36	0.00	0.30	0.30	0.08	0.45	0.00
Sat Flow, veh/h	1774	950	1583	3510	0	1380	1774	4117	1615	1601	3670	0
Grp Volume(v), veh/h	0	12	0	690	0	20	0	417	57	95	310	0
Grp Sat Flow(s),veh/h/ln	1774	950	1583	1755	0	1380	1774	1372	1615	1601	1184	0
Q Serve(g_s), s	0.0	0.7	0.0	10.2	0.0	0.5	0.0	4.4	1.4	3.2	2.9	0.0
Cycle Q Clear(g_c), s	0.0	0.7	0.0	10.2	0.0	0.5	0.0	4.4	1.4	3.2	2.9	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	3	23	39	872	0	493	3	1219	478	133	1604	0
V/C Ratio(X)	0.00	0.52	0.00	0.79	0.00	0.04	0.00	0.34	0.12	0.71	0.19	0.00
Avail Cap(c_a), veh/h	192	137	228	1930	0	796	256	3116	1223	577	3458	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	26.7	0.0	19.5	0.0	11.6	0.0	15.3	14.2	24.8	9.1	0.0
Incr Delay (d2), s/veh	0.0	27.6	0.0	1.0	0.0	0.0	0.0	0.3	0.2	4.3	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.0	0.4	0.0	5.0	0.0	0.2	0.0	1.7	0.7	1.6	1.0	0.0
LnGrp Delay(d),s/veh	0.0	54.3	0.0	20.5	0.0	11.6	0.0	15.6	14.5	29.1	9.3	0.0
LnGrp LOS		D		C		B		B	B	C	A	
Approach Vol, veh/h		12			710			474			405	
Approach Delay, s/veh		54.3			20.3			15.5			13.9	
Approach LOS		D			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.5	7.1	0.0	29.9	0.0	25.5	8.6	21.3
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9
Max Green Setting (Gmax), s	* 31	8.0	* 8	54.0	* 6	32.0	20.0	42.0
Max Q Clear Time (g_c+I1), s	12.2	2.7	0.0	4.9	0.0	2.5	5.2	6.4
Green Ext Time (p_c), s	1.6	0.0	0.0	10.8	0.0	0.1	0.1	10.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.5
HCM 2010 LOS	B

Notes

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (veh/h)	100	10	0	310	90	10	220
Number	1	16		8	18	7	4
Initial Q (Qb), veh	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00			1.00	1.00	
Parking Bus, Adj	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1118	950		1681	1429	1863	1610
Adj Flow Rate, veh/h	116	0		360	32	12	256
Adj No. of Lanes	1	1		2	1	1	2
Peak Hour Factor	0.86	0.86		0.86	0.86	0.86	0.86
Percent Heavy Veh, %	70	100		13	33	2	18
Cap, veh/h	165	125		919	349	45	1397
Arrive On Green	0.16	0.00		0.29	0.29	0.03	0.46
Sat Flow, veh/h	1064	807		3279	1214	1774	3140
Grp Volume(v), veh/h	116	0		360	32	12	256
Grp Sat Flow(s),veh/h/ln	1064	807		1597	1214	1774	1530
Q Serve(g_s), s	3.6	0.0		3.1	0.7	0.2	1.7
Cycle Q Clear(g_c), s	3.6	0.0		3.1	0.7	0.2	1.7
Prop In Lane	1.00	1.00			1.00	1.00	
Lane Grp Cap(c), veh/h	165	125		919	349	45	1397
V/C Ratio(X)	0.70	0.00		0.39	0.09	0.27	0.18
Avail Cap(c_a), veh/h	919	697		4135	1572	1531	3960
HCM Platoon Ratio	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.9	0.0		9.9	9.1	16.6	5.6
Incr Delay (d2), s/veh	2.0	0.0		0.2	0.1	1.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	1.1	0.0		1.4	0.5	0.1	0.7
LnGrp Delay(d),s/veh	16.0	0.0		10.1	9.1	17.8	5.6
LnGrp LOS	B			B	A	B	A
Approach Vol, veh/h	116			392			268
Approach Delay, s/veh	16.0			10.1			6.2
Approach LOS	B			B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				23.4		11.4	5.9	17.5
Change Period (Y+Rc), s				7.5		6.0	5.0	7.5
Max Green Setting (Gmax), s				45.0		30.0	30.0	45.0
Max Q Clear Time (g_c+I1), s				3.7		5.6	2.2	5.1
Green Ext Time (p_c), s				3.3		0.2	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	9.6
HCM 2010 LOS	A

Notes

User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	110	0	0	0	0	20	0	510	0	10	310	70
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1727	1900	1863	1681	1863
Adj Flow Rate, veh/h	120	0	0	0	0	0	0	554	0	11	337	46
Adj No. of Lanes	2	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	10	10	2	13	2
Cap, veh/h	484	277	0	3	3	0	3	2009	0	30	2251	1116
Arrive On Green	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.02	0.70	0.70
Sat Flow, veh/h	3442	1863	0	1774	1863	0	1774	3368	0	1774	3195	1583
Grp Volume(v), veh/h	120	0	0	0	0	0	0	554	0	11	337	46
Grp Sat Flow(s),veh/h/ln	1721	1863	0	1774	1863	0	1774	1641	0	1774	1597	1583
Q Serve(g_s), s	1.9	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.4	2.2	0.5
Cycle Q Clear(g_c), s	1.9	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.4	2.2	0.5
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	484	277	0	3	3	0	3	2009	0	30	2251	1116
V/C Ratio(X)	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.37	0.15	0.04
Avail Cap(c_a), veh/h	638	1215	0	171	1050	0	229	2009	0	200	2251	1116
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.7	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	30.2	3.0	2.8
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	7.6	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.9	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.2	1.0	0.3
LnGrp Delay(d),s/veh	24.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	37.7	3.2	2.9
LnGrp LOS	C							A		D	A	A
Approach Vol, veh/h		120			0			554			394	
Approach Delay, s/veh		24.0			0.0			6.0			4.1	
Approach LOS		C						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.7	42.9	0.0	13.4	0.0	48.6	13.4	0.0
Change Period (Y+Rc), s	* 4.7	4.9	* 4.7	* 4.2	* 4.7	4.9	* 4.7	* 4.2
Max Green Setting (Gmax), s	* 7	38.0	* 6	* 41	* 8	37.0	* 12	* 35
Max Q Clear Time (g_c+I1), s	2.4	6.9	0.0	0.0	0.0	4.2	3.9	0.0
Green Ext Time (p_c), s	0.0	6.1	0.0	0.0	0.0	6.1	0.2	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	7.3
HCM 2010 LOS	A

Notes

User approved ignoring U-Turning movement.

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	10	340	20	10	10	490	20	20	10	20	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1652	1863	1863	1900	1727	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	11	0	22	11	1	533	22	7	11	22	0
Adj No. of Lanes	0	1	1	1	1	0	2	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	15	2	2	2	10	2	2	2	2	2
Cap, veh/h	0	86	65	40	336	31	885	376	120	80	160	0
Arrive On Green	0.00	0.05	0.00	0.02	0.20	0.20	0.28	0.28	0.28	0.13	0.13	0.00
Sat Flow, veh/h	0	1863	1404	1774	1683	153	3191	1355	431	611	1221	0
Grp Volume(v), veh/h	0	11	0	22	0	12	533	0	29	33	0	0
Grp Sat Flow(s),veh/h/ln	0	1863	1404	1774	0	1836	1596	0	1787	1832	0	0
Q Serve(g_s), s	0.0	0.2	0.0	0.4	0.0	0.2	4.4	0.0	0.4	0.5	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.2	0.0	0.4	0.0	0.2	4.4	0.0	0.4	0.5	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.08	1.00		0.24	0.33		0.00
Lane Grp Cap(c), veh/h	0	86	65	40	0	366	885	0	495	240	0	0
V/C Ratio(X)	0.00	0.13	0.00	0.56	0.00	0.03	0.60	0.00	0.06	0.14	0.00	0.00
Avail Cap(c_a), veh/h	0	1645	1240	232	0	2101	2817	0	1577	959	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	14.0	0.0	14.8	0.0	9.9	9.6	0.0	8.1	11.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	11.6	0.0	0.0	0.7	0.0	0.0	0.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.0	0.1	0.0	0.3	0.0	0.1	2.0	0.0	0.2	0.3	0.0	0.0
LnGrp Delay(d),s/veh	0.0	14.6	0.0	26.4	0.0	9.9	10.3	0.0	8.2	12.0	0.0	0.0
LnGrp LOS		B		C		A	B		A	B		
Approach Vol, veh/h		11			34			562			33	
Approach Delay, s/veh		14.6			20.6			10.1			12.0	
Approach LOS		B			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6		8
Phs Duration (G+Y+Rc), s		12.5	4.7	5.4		8.0		10.1
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s		27.0	4.0	27.0		16.0		35.0
Max Q Clear Time (g_c+I1), s		6.4	2.4	2.2		2.5		2.2
Green Ext Time (p_c), s		2.1	0.0	0.1		0.1		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	10.9
HCM 2010 LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	250	140	290	370	60	130
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1724	1900	1766	1900	1624	1652
Adj Flow Rate, veh/h	272	125	315	93	65	141
Adj No. of Lanes	0	0	2	0	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	7	7	17	15
Cap, veh/h	344	158	668	194	84	1372
Arrive On Green	0.32	0.32	0.26	0.26	0.05	0.44
Sat Flow, veh/h	1081	497	2656	746	1547	3222
Grp Volume(v), veh/h	398	0	204	204	65	141
Grp Sat Flow(s),veh/h/ln	1582	0	1678	1635	1547	1570
Q Serve(g_s), s	7.5	0.0	3.3	3.4	1.4	0.9
Cycle Q Clear(g_c), s	7.5	0.0	3.3	3.4	1.4	0.9
Prop In Lane	0.68	0.31		0.46	1.00	
Lane Grp Cap(c), veh/h	503	0	437	425	84	1372
V/C Ratio(X)	0.79	0.00	0.47	0.48	0.77	0.10
Avail Cap(c_a), veh/h	1162	0	1130	1101	804	4130
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.2	0.0	10.2	10.2	15.2	5.4
Incr Delay (d2), s/veh	2.8	0.0	0.8	0.8	13.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.6	0.0	1.6	1.6	0.9	0.4
LnGrp Delay(d),s/veh	13.0	0.0	11.0	11.1	28.9	5.5
LnGrp LOS	B		B	B	C	A
Approach Vol, veh/h	398		408			206
Approach Delay, s/veh	13.0		11.0			12.9
Approach LOS	B		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	5.8	12.5				18.3		14.4
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	17.0	22.0				43.0		24.0
Max Q Clear Time (g_c+I1), s	3.4	5.4				2.9		9.5
Green Ext Time (p_c), s	0.1	3.1				3.8		1.2

Intersection Summary	
HCM 2010 Ctrl Delay	12.2
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	530	170	90	10	160	10	100	80	10	10	40	330
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1743	1696	1863	1863	1608	1900	1863	1863	1900	950	1863	1652
Adj Flow Rate, veh/h	576	185	44	11	174	6	109	87	6	11	43	0
Adj No. of Lanes	2	1	1	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	9	12	2	2	13	13	2	2	2	100	2	15
Cap, veh/h	778	653	609	20	466	16	142	353	24	10	254	530
Arrive On Green	0.24	0.38	0.38	0.01	0.15	0.15	0.08	0.20	0.20	0.01	0.14	0.00
Sat Flow, veh/h	3221	1696	1583	1774	3013	104	1774	1723	119	905	1863	1404
Grp Volume(v), veh/h	576	185	44	11	88	92	109	0	93	11	43	0
Grp Sat Flow(s),veh/h/ln	1610	1696	1583	1774	1527	1590	1774	0	1842	905	1863	1404
Q Serve(g_s), s	8.5	3.9	0.9	0.3	2.7	2.7	3.1	0.0	2.2	0.6	1.1	0.0
Cycle Q Clear(g_c), s	8.5	3.9	0.9	0.3	2.7	2.7	3.1	0.0	2.2	0.6	1.1	0.0
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	778	653	609	20	236	246	142	0	377	10	254	530
V/C Ratio(X)	0.74	0.28	0.07	0.55	0.37	0.37	0.77	0.00	0.25	1.08	0.17	0.00
Avail Cap(c_a), veh/h	1561	1283	1197	275	651	678	378	0	893	140	794	938
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.1	11.0	10.0	25.4	19.6	19.6	23.3	0.0	17.2	25.5	19.7	0.0
Incr Delay (d2), s/veh	1.4	0.2	0.0	21.3	1.0	0.9	8.4	0.0	0.3	153.6	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.9	1.8	0.4	0.3	1.2	1.2	1.8	0.0	1.1	0.6	0.6	0.0
LnGrp Delay(d),s/veh	19.5	11.2	10.1	46.7	20.5	20.5	31.7	0.0	17.5	181.6	20.0	0.0
LnGrp LOS	B	B	B	D	C	C	C		B	F	C	
Approach Vol, veh/h		805			191			202			54	
Approach Delay, s/veh		17.1			22.0			25.2			52.9	
Approach LOS		B			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.6	15.6	5.6	24.9	9.1	12.0	17.5	13.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	8.0	25.0	8.0	39.0	11.0	22.0	25.0	22.0
Max Q Clear Time (g_c+I1), s	2.6	4.2	2.3	5.9	5.1	3.1	10.5	4.7
Green Ext Time (p_c), s	0.0	0.6	0.0	2.4	0.1	0.6	1.9	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	20.7
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	8.6
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	10	10	70	0	10	10	10	0	150	50	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	14	2	2	2	2	2	7	20	2
Mvmt Flow	0	11	11	76	0	11	11	11	0	163	54	11
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.8	7.8	9.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	71%	11%	33%	17%
Vol Thru, %	24%	11%	33%	67%
Vol Right, %	5%	78%	33%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	210	90	30	60
LT Vol	150	10	10	10
Through Vol	50	10	10	40
RT Vol	10	70	10	10
Lane Flow Rate	228	98	33	65
Geometry Grp	1	1	1	1
Degree of Util (X)	0.28	0.114	0.042	0.08
Departure Headway (Hd)	4.411	4.212	4.595	4.409
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	801	855	782	815
Service Time	2.509	2.219	2.605	2.423
HCM Lane V/C Ratio	0.285	0.115	0.042	0.08
HCM Control Delay	9.3	7.8	7.8	7.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.1	0.4	0.1	0.3

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	10	40	10
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	25	2
Mvmt Flow	0	11	43	11
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.8
HCM LOS	A

Lane

MOVEMENT SUMMARY

Site: Intersection 12

Existing Plus Project AM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Street D											
8	T1	130	17.0	0.175	1.7	LOS A	1.0	28.5	0.13	0.24	27.8
18	R2	65	33.0	0.175	2.4	LOS A	1.0	28.5	0.13	0.24	27.0
Approach		196	22.3	0.175	1.9	LOS A	1.0	28.5	0.13	0.24	27.5
East: Street S											
1	L2	33	67.0	0.078	7.1	LOS A	0.3	10.7	0.34	0.45	26.8
16	R2	22	2.0	0.078	2.5	LOS A	0.3	10.7	0.34	0.45	24.3
Approach		54	41.0	0.078	5.3	LOS A	0.3	10.7	0.34	0.45	25.7
North: Street T											
7	L2	22	2.0	0.161	7.5	LOS A	0.9	24.6	0.22	0.29	30.1
4	T1	152	14.0	0.161	1.9	LOS A	0.9	24.6	0.22	0.29	29.7
Approach		174	12.5	0.161	2.6	LOS A	0.9	24.6	0.22	0.29	29.8
All Vehicles		424	20.7	0.175	2.6	LOS A	1.0	28.5	0.20	0.29	28.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

Intersection	
Int Delay, s/veh	5.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	30	40	40	30	70	40
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	33	25	2	33	29	2
Mvmt Flow	33	43	43	33	76	43

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	76	0	174	54
Stage 1	-	-	-	-	54	-
Stage 2	-	-	-	-	120	-
Critical Hdwy	-	-	4.12	-	6.69	6.22
Critical Hdwy Stg 1	-	-	-	-	5.69	-
Critical Hdwy Stg 2	-	-	-	-	5.69	-
Follow-up Hdwy	-	-	2.218	-	3.761	3.318
Pot Cap-1 Maneuver	-	-	1523	-	758	1013
Stage 1	-	-	-	-	904	-
Stage 2	-	-	-	-	842	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1523	-	737	1013
Mov Cap-2 Maneuver	-	-	-	-	737	-
Stage 1	-	-	-	-	904	-
Stage 2	-	-	-	-	818	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.2	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	818	-	-	1523	-
HCM Lane V/C Ratio	0.146	-	-	0.029	-
HCM Control Delay (s)	10.2	-	-	7.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Intersection 14 **Street C/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	120	124	103.2%	22.2	3.3	C
	Right Turn	990	1,026	103.6%	7.6	1.1	A
	Subtotal	1,110	1,150	103.6%	9.2	1.0	A
SB	Left Turn	430	417	97.0%	24.4	2.5	C
	Through	120	112	93.7%	11.5	2.6	B
	Right Turn						
	Subtotal	550	530	96.3%	21.7	2.3	C
EB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
WB	Left Turn	730	675	92.4%	17.4	2.5	B
	Through						
	Right Turn	520	505	97.1%	9.5	1.3	A
	Subtotal	1,250	1,180	94.4%	14.0	1.5	B
Total		2,910	2,859	98.3%	13.5	1.1	B

Intersection 15 **Street D/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	220	188	85.7%	109.3	44.0	F
	Through	80	78	97.9%	42.4	7.2	D
	Right Turn	20	24	121.6%	17.1	7.1	B
	Subtotal	320	291	91.0%	83.7	28.8	F
SB	Left Turn	190	197	103.8%	49.4	5.4	D
	Through	90	103	114.8%	39.0	5.3	D
	Right Turn	430	424	98.6%	38.2	9.7	D
	Subtotal	710	725	102.1%	41.5	5.9	D
EB	Left Turn	550	518	94.2%	54.1	12.9	D
	Through	640	622	97.1%	15.5	3.0	B
	Right Turn	220	215	97.9%	5.9	1.1	A
	Subtotal	1,410	1,355	96.1%	28.7	6.2	C
WB	Left Turn	30	30	100.1%	96.9	22.1	F
	Through	1,200	999	83.2%	89.5	16.9	F
	Right Turn	240	220	91.5%	40.9	15.3	D
	Subtotal	1,470	1,248	84.9%	81.0	15.5	F
Total		3,910	3,619	92.6%	53.8	7.0	D

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	660	20	10	1170	10	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	12	2	2	7	2	2
Mvmt Flow	717	22	11	1272	11	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	739	0	1386	370
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	658	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	863	-	134	627
Stage 1	-	-	-	-	439	-
Stage 2	-	-	-	-	477	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	863	-	132	627
Mov Cap-2 Maneuver	-	-	-	-	132	-
Stage 1	-	-	-	-	439	-
Stage 2	-	-	-	-	471	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	23.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	218	-	-	863	-
HCM Lane V/C Ratio	0.1	-	-	0.013	-
HCM Control Delay (s)	23.3	-	-	9.2	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	260	170	10	470	230	10
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1696	1532	1863	1792	1624	1863
Adj Flow Rate, veh/h	283	118	11	511	250	2
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	12	24	2	6	17	2
Cap, veh/h	602	755	21	901	347	355
Arrive On Green	0.36	0.36	0.01	0.50	0.22	0.22
Sat Flow, veh/h	1696	1302	1774	1792	1547	1583
Grp Volume(v), veh/h	283	118	11	511	250	2
Grp Sat Flow(s),veh/h/ln	1696	1302	1774	1792	1547	1583
Q Serve(g_s), s	4.7	1.5	0.2	7.3	5.5	0.0
Cycle Q Clear(g_c), s	4.7	1.5	0.2	7.3	5.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	602	755	21	901	347	355
V/C Ratio(X)	0.47	0.16	0.54	0.57	0.72	0.01
Avail Cap(c_a), veh/h	1758	1642	387	2493	1223	1252
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.2	3.6	18.0	6.3	13.2	11.0
Incr Delay (d2), s/veh	0.6	0.1	20.0	0.6	2.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	2.3	0.8	0.2	3.7	2.6	0.0
LnGrp Delay(d),s/veh	9.7	3.7	38.0	6.9	16.0	11.1
LnGrp LOS	A	A	D	A	B	B
Approach Vol, veh/h	401			522	252	
Approach Delay, s/veh	7.9			7.6	15.9	
Approach LOS	A			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		13.2	5.4	18.0				23.4
Change Period (Y+Rc), s		5.0	5.0	5.0				5.0
Max Green Setting (Gmax), s		29.0	8.0	38.0				51.0
Max Q Clear Time (g_c+I1), s		7.5	2.2	6.7				9.3
Green Ext Time (p_c), s		0.7	0.0	6.3				6.5

Intersection Summary	
HCM 2010 Ctrl Delay	9.5
HCM 2010 LOS	A

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	20	70	10	0	130	50	10	0	10	10	280
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	29	2	2	2	40	2	2	2	2	2
Mvmt Flow	0	22	76	11	0	141	54	11	0	11	11	304
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.9	10	9.8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	20%	68%	33%
Vol Thru, %	3%	70%	26%	33%
Vol Right, %	93%	10%	5%	33%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	300	100	190	30
LT Vol	10	20	130	10
Through Vol	10	70	50	10
RT Vol	280	10	10	10
Lane Flow Rate	326	109	207	33
Geometry Grp	1	1	1	1
Degree of Util (X)	0.381	0.15	0.284	0.045
Departure Headway (Hd)	4.208	4.965	4.957	4.961
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	854	717	721	717
Service Time	2.246	3.031	3.019	3.026
HCM Lane V/C Ratio	0.382	0.152	0.287	0.046
HCM Control Delay	9.8	8.9	10	8.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.8	0.5	1.2	0.1

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	10	10	10
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	11	11	11
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.3
HCM LOS	A

Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	270	110	20	70	100	110	20	280	70	90	240	130
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1776	1766	1900	1667	1727	1743	1863	1712	1667	1712	1681	1652
Adj Flow Rate, veh/h	215	229	18	76	109	28	22	304	13	98	261	42
Adj No. of Lanes	1	1	0	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	7	9	9	14	10	9	2	11	14	11	13	15
Cap, veh/h	367	351	28	255	277	349	38	666	290	123	827	364
Arrive On Green	0.22	0.22	0.22	0.16	0.16	0.16	0.02	0.20	0.20	0.08	0.26	0.26
Sat Flow, veh/h	1691	1616	127	1587	1727	1482	1774	3252	1417	1630	3195	1404
Grp Volume(v), veh/h	215	0	247	76	109	28	22	304	13	98	261	42
Grp Sat Flow(s),veh/h/ln	1691	0	1743	1587	1727	1482	1774	1626	1417	1630	1597	1404
Q Serve(g_s), s	5.3	0.0	6.0	2.0	2.6	0.7	0.6	3.8	0.3	2.8	3.1	1.1
Cycle Q Clear(g_c), s	5.3	0.0	6.0	2.0	2.6	0.7	0.6	3.8	0.3	2.8	3.1	1.1
Prop In Lane	1.00		0.07	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	367	0	378	255	277	349	38	666	290	123	827	364
V/C Ratio(X)	0.59	0.00	0.65	0.30	0.39	0.08	0.58	0.46	0.04	0.80	0.32	0.12
Avail Cap(c_a), veh/h	1013	0	1045	951	1035	1000	304	1670	728	488	2051	902
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.4	0.0	16.7	17.3	17.6	13.9	22.7	16.3	14.9	21.2	14.0	13.2
Incr Delay (d2), s/veh	1.5	0.0	1.9	0.6	0.9	0.1	13.5	0.5	0.1	11.1	0.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	2.6	0.0	3.1	0.9	1.3	0.3	0.4	1.7	0.1	1.6	1.4	0.4
LnGrp Delay(d),s/veh	17.9	0.0	18.6	17.9	18.5	14.0	36.1	16.8	15.0	32.3	14.2	13.4
LnGrp LOS	B		B	B	B	B	D	B	B	C	B	B
Approach Vol, veh/h		462			213			339			401	
Approach Delay, s/veh		18.3			17.7			18.0			18.5	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.5	13.6		14.1	5.0	16.1		11.5
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	14.0	24.0		28.0	8.0	30.0		28.0
Max Q Clear Time (g_c+I1), s	4.8	5.8		8.0	2.6	5.1		4.6
Green Ext Time (p_c), s	0.1	3.7		2.1	0.0	4.1		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	18.2
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Grapevine Transportation Impact Study
Existing Plus Project
AM Peak Hour

Intersection 20 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn	440	425	96.6%	20.5	2.4	C
	Through						
	Right Turn	400	398	99.6%	18.1	1.7	B
	Subtotal	840	823	98.0%	19.3	1.8	B
EB	Left Turn						
	Through	1,200	1,235	102.9%	17.8	3.3	B
	Right Turn	220	216	98.1%	5.5	1.1	A
	Subtotal	1,420	1,451	102.2%	16.0	3.1	B
WB	Left Turn						
	Through	850	794	93.4%	13.5	1.4	B
	Right Turn	350	291	83.3%	5.7	0.9	A
	Subtotal	1,200	1,086	90.5%	11.4	1.2	B
Total		3,460	3,360	97.1%	15.3	1.4	B

Intersection 21 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	310	305	98.3%	22.1	2.6	C
	Through						
	Right Turn	450	423	94.0%	11.2	1.8	B
	Subtotal	760	728	95.8%	15.7	1.8	B
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	960	936	97.5%	12.8	1.4	B
	Right Turn	680	676	99.5%	9.6	0.8	A
	Subtotal	1,640	1,612	98.3%	11.5	1.1	B
WB	Left Turn						
	Through	890	768	86.3%	12.8	0.7	B
	Right Turn	960	838	87.3%	11.7	1.0	B
	Subtotal	1,850	1,606	86.8%	12.2	0.7	B
Total		4,250	3,946	92.8%	12.6	0.6	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	170	60	30	200	90	60	120	20	50	140	30
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1696	1624	1863	1727	1712	1624	1655	1900	1583	1667	1863
Adj Flow Rate, veh/h	43	185	14	33	217	34	65	130	10	54	152	7
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	12	17	2	10	11	17	17	17	20	14	2
Cap, veh/h	69	411	334	55	405	409	82	685	52	70	711	355
Arrive On Green	0.04	0.24	0.24	0.03	0.23	0.23	0.05	0.23	0.23	0.05	0.22	0.22
Sat Flow, veh/h	1774	1696	1380	1774	1727	1455	1547	2961	226	1508	3167	1583
Grp Volume(v), veh/h	43	185	14	33	217	34	65	68	72	54	152	7
Grp Sat Flow(s),veh/h/ln	1774	1696	1380	1774	1727	1455	1547	1572	1615	1508	1583	1583
Q Serve(g_s), s	0.9	3.3	0.3	0.7	3.9	0.6	1.5	1.2	1.3	1.3	1.4	0.1
Cycle Q Clear(g_c), s	0.9	3.3	0.3	0.7	3.9	0.6	1.5	1.2	1.3	1.3	1.4	0.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	69	411	334	55	405	409	82	363	373	70	711	355
V/C Ratio(X)	0.62	0.45	0.04	0.59	0.54	0.08	0.79	0.19	0.19	0.77	0.21	0.02
Avail Cap(c_a), veh/h	945	1618	1316	647	1357	1210	737	1102	1132	1353	3553	1776
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.9	11.5	10.3	17.0	11.9	9.4	16.7	11.0	11.0	16.8	11.3	10.8
Incr Delay (d2), s/veh	8.8	0.8	0.1	9.8	1.1	0.1	15.2	0.2	0.2	16.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.6	1.6	0.1	0.5	2.0	0.3	1.0	0.6	0.6	0.8	0.6	0.1
LnGrp Delay(d),s/veh	25.7	12.3	10.4	26.8	13.0	9.5	31.9	11.3	11.3	32.9	11.4	10.8
LnGrp LOS	C	B	B	C	B	A	C	B	B	C	B	B
Approach Vol, veh/h		242			284			205			213	
Approach Delay, s/veh		14.5			14.2			17.8			16.8	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.7	12.2	5.1	12.6	5.9	12.0	5.4	12.4
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	32.0	25.0	13.0	34.0	17.0	40.0	19.0	28.0
Max Q Clear Time (g_c+I1), s	3.3	3.3	2.7	5.3	3.5	3.4	2.9	5.9
Green Ext Time (p_c), s	0.1	1.7	0.0	2.7	0.1	1.9	0.1	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	15.7
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	190	230	10	10	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	11	9	2	2	2
Mvmt Flow	11	207	250	11	11	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	261	0	-	0	483	255
Stage 1	-	-	-	-	255	-
Stage 2	-	-	-	-	228	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1303	-	-	-	542	784
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	810	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1303	-	-	-	537	784
Mov Cap-2 Maneuver	-	-	-	-	537	-
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	803	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1303	-	-	-	637
HCM Lane V/C Ratio	0.008	-	-	-	0.034
HCM Control Delay (s)	7.8	-	-	-	10.9
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	120	40	10	160	140	40	260	10	40	130	30
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1784	1900	1863	1825	1900	1863	1828	1900	1863	1778	1900
Adj Flow Rate, veh/h	33	130	14	11	174	76	43	283	10	43	141	22
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	8	8	2	6	6	2	4	4	2	8	8
Cap, veh/h	477	485	52	567	369	161	577	573	20	478	490	77
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1125	1583	171	1239	1205	526	1218	1755	62	1082	1502	234
Grp Volume(v), veh/h	33	0	144	11	0	250	43	0	293	43	0	163
Grp Sat Flow(s),veh/h/ln	1125	0	1754	1239	0	1732	1218	0	1817	1082	0	1737
Q Serve(g_s), s	0.7	0.0	1.7	0.2	0.0	3.2	0.7	0.0	3.5	0.9	0.0	1.9
Cycle Q Clear(g_c), s	3.9	0.0	1.7	1.9	0.0	3.2	2.6	0.0	3.5	4.4	0.0	1.9
Prop In Lane	1.00		0.10	1.00		0.30	1.00		0.03	1.00		0.13
Lane Grp Cap(c), veh/h	477	0	537	567	0	530	577	0	593	478	0	567
V/C Ratio(X)	0.07	0.00	0.27	0.02	0.00	0.47	0.07	0.00	0.49	0.09	0.00	0.29
Avail Cap(c_a), veh/h	2033	0	2963	2281	0	2925	1029	0	1268	879	0	1212
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.2	0.0	7.1	7.8	0.0	7.7	7.8	0.0	7.4	9.1	0.0	6.8
Incr Delay (d2), s/veh	0.1	0.0	0.3	0.0	0.0	0.7	0.1	0.0	0.6	0.1	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.2	0.0	0.8	0.1	0.0	1.6	0.3	0.0	1.8	0.3	0.0	0.9
LnGrp Delay(d),s/veh	9.3	0.0	7.4	7.9	0.0	8.3	7.9	0.0	8.0	9.2	0.0	7.1
LnGrp LOS	A		A	A		A	A		A	A		A
Approach Vol, veh/h		177			261			336			206	
Approach Delay, s/veh		7.8			8.3			8.0			7.5	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		13.9		13.3		13.9		13.3
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0
Max Green Setting (Gmax), s		19.0		46.0		19.0		46.0
Max Q Clear Time (g_c+I1), s		5.5		5.9		6.4		5.2
Green Ext Time (p_c), s		2.7		2.8		2.6		2.8

Intersection Summary	
HCM 2010 Ctrl Delay	7.9
HCM 2010 LOS	A

MOVEMENT SUMMARY

Site: Intersection 25

Existing Plus Project AM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Street K											
3	L2	152	2.0	0.169	6.6	LOS A	0.9	22.7	0.36	0.56	25.7
18	R2	11	2.0	0.169	2.9	LOS A	0.9	22.7	0.36	0.56	25.1
Approach		163	2.0	0.169	6.4	LOS A	0.9	22.7	0.36	0.56	25.7
East: Street B											
1	L2	43	2.0	0.235	8.3	LOS A	1.4	35.2	0.41	0.49	26.6
6	T1	174	6.0	0.235	4.0	LOS A	1.4	35.2	0.41	0.49	28.5
Approach		217	5.2	0.235	4.9	LOS A	1.4	35.2	0.41	0.49	28.1
West: Street B											
2	T1	130	8.0	0.155	3.0	LOS A	0.9	23.0	0.20	0.34	29.2
12	R2	43	2.0	0.155	3.1	LOS A	0.9	23.0	0.20	0.34	26.4
Approach		174	6.5	0.155	3.0	LOS A	0.9	23.0	0.20	0.34	28.4
All Vehicles		554	4.7	0.235	4.7	LOS A	1.4	35.2	0.33	0.47	27.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: Intersection 26

Existing Plus Project AM
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Street K											
8	T1	76	2.0	0.075	1.6	LOS A	0.4	9.2	0.14	0.22	25.1
18	R2	11	2.0	0.075	2.0	LOS A	0.4	9.2	0.14	0.22	24.6
Approach		87	2.0	0.075	1.7	LOS A	0.4	9.2	0.14	0.22	25.0
East: Street M											
1	L2	11	2.0	0.021	7.5	LOS A	0.1	2.5	0.23	0.50	28.6
16	R2	11	2.0	0.021	3.3	LOS A	0.1	2.5	0.23	0.50	27.9
Approach		22	2.0	0.021	5.4	LOS A	0.1	2.5	0.23	0.50	28.2
North: Street K											
7	L2	33	2.0	0.044	7.0	LOS A	0.2	5.4	0.07	0.50	28.6
4	T1	22	2.0	0.044	2.7	LOS A	0.2	5.4	0.07	0.50	28.6
Approach		54	2.0	0.044	5.3	LOS A	0.2	5.4	0.07	0.50	28.6
All Vehicles		163	2.0	0.075	3.4	LOS A	0.4	9.2	0.13	0.35	26.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: Intersection 27

Existing Plus Project AM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Street C											
3	L2	11	2.0	0.078	5.8	LOS A	0.4	9.6	0.17	0.32	25.1
8	T1	22	2.0	0.078	1.7	LOS A	0.4	9.6	0.17	0.32	26.8
18	R2	54	2.0	0.078	2.1	LOS A	0.4	9.6	0.17	0.32	26.3
Approach		87	2.0	0.078	2.4	LOS A	0.4	9.6	0.17	0.32	26.3
East: Street Q											
1	L2	33	2.0	0.060	7.3	LOS A	0.3	7.3	0.17	0.49	26.6
6	T1	11	2.0	0.060	3.0	LOS A	0.3	7.3	0.17	0.49	26.4
16	R2	22	2.0	0.060	3.0	LOS A	0.3	7.3	0.17	0.49	27.9
Approach		65	2.0	0.060	5.1	LOS A	0.3	7.3	0.17	0.49	27.0
North: Street C											
7	L2	22	2.0	0.041	8.0	LOS A	0.2	4.9	0.19	0.51	29.5
4	T1	11	2.0	0.041	3.6	LOS A	0.2	4.9	0.19	0.51	27.2
14	R2	11	2.0	0.041	3.6	LOS A	0.2	4.9	0.19	0.51	26.6
Approach		43	2.0	0.041	5.8	LOS A	0.2	4.9	0.19	0.51	28.1
West: Street Q											
5	L2	11	2.0	0.031	6.0	LOS A	0.1	3.7	0.21	0.38	26.6
2	T1	11	2.0	0.031	1.8	LOS A	0.1	3.7	0.21	0.38	26.5
12	R2	11	2.0	0.031	2.2	LOS A	0.1	3.7	0.21	0.38	24.2
Approach		33	2.0	0.031	3.3	LOS A	0.1	3.7	0.21	0.38	25.7
All Vehicles		228	2.0	0.078	4.0	LOS A	0.4	9.6	0.18	0.41	26.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

Intersection	
Intersection Delay, s/veh	8.2
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	10	20	10	0	50	30	20	0	10	10	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	20	2	2	2	2	2	17
Mvmt Flow	0	11	22	11	0	54	33	22	0	11	11	65
Number of Lanes	0	0	1	0	0	0	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	3
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	3	2	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	3	1
HCM Control Delay	7.9	8.9	7.7
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	25%	50%	100%	0%	0%
Vol Thru, %	0%	14%	50%	30%	0%	100%	0%
Vol Right, %	0%	86%	25%	20%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	10	70	40	100	10	10	10
LT Vol	10	0	10	50	10	0	0
Through Vol	0	10	20	30	0	10	0
RT Vol	0	60	10	20	0	0	10
Lane Flow Rate	11	76	43	109	11	11	11
Geometry Grp	8	8	7	7	7	7	7
Degree of Util (X)	0.017	0.094	0.059	0.156	0.017	0.015	0.013
Departure Headway (Hd)	5.572	4.465	4.86	5.273	5.527	5.024	4.32
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	646	807	740	685	651	716	832
Service Time	3.277	2.171	2.571	2.973	3.234	2.731	2.028
HCM Lane V/C Ratio	0.017	0.094	0.058	0.159	0.017	0.015	0.013
HCM Control Delay	8.4	7.6	7.9	8.9	8.3	7.8	7.1
HCM Lane LOS	A	A	A	A	A	A	A
HCM 95th-tile Q	0.1	0.3	0.2	0.6	0.1	0	0

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	10	10	10
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	11	11	11
Number of Lanes	0	1	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.7
HCM LOS	A

Lane

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	20	70	90	140	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	15	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	14	11	2	2	2
Mvmt Flow	22	76	98	152	43	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	250	0	-	0	294	174
Stage 1	-	-	-	-	174	-
Stage 2	-	-	-	-	120	-
Critical Hdwy	4.12	-	-	-	9.42	7.72
Critical Hdwy Stg 1	-	-	-	-	8.42	-
Critical Hdwy Stg 2	-	-	-	-	8.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1316	-	-	-	546	809
Stage 1	-	-	-	-	741	-
Stage 2	-	-	-	-	819	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1316	-	-	-	537	809
Mov Cap-2 Maneuver	-	-	-	-	537	-
Stage 1	-	-	-	-	741	-
Stage 2	-	-	-	-	805	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1316	-	-	-	576
HCM Lane V/C Ratio	0.017	-	-	-	0.094
HCM Control Delay (s)	7.8	0	-	-	11.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	110	230	70	20	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	9	4	2	2	2
Mvmt Flow	11	120	250	76	22	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	326	0	-	0	429	288
Stage 1	-	-	-	-	288	-
Stage 2	-	-	-	-	141	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1234	-	-	-	583	751
Stage 1	-	-	-	-	761	-
Stage 2	-	-	-	-	886	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1234	-	-	-	577	751
Mov Cap-2 Maneuver	-	-	-	-	577	-
Stage 1	-	-	-	-	761	-
Stage 2	-	-	-	-	877	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	11.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1234	-	-	-	625
HCM Lane V/C Ratio	0.009	-	-	-	0.052
HCM Control Delay (s)	7.9	0	-	-	11.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

SimTraffic Post-Processor | **Grapevine Transportation Impact Study**
Average Results from 10 Runs | **Existing Plus Project**
Volume and Delay by Movement | **AM Peak Hour**

Intersection 31 **Street C/Street G** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	Total Delay (sec/veh) LOS
NB	Left Turn	200	171	85.5%	53.4	5.6	D
	Through	440	432	98.1%	2.9	0.6	A
	Right Turn						
	Subtotal	640	603	94.2%	17.2	2.6	B
SB	Left Turn						
	Through	390	388	99.4%	8.4	2.1	A
	Right Turn	10	8	83.6%	3.4	4.4	A
	Subtotal	400	396	99.0%	8.3	2.1	A
EB	Left Turn	10	11	110.2%	61.4	30.7	E
	Through						
	Right Turn	160	154	96.4%	4.1	1.4	A
	Subtotal	170	165	97.2%	8.4	2.7	A
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
	Total	1,210	1,164	96.2%	13.0	1.9	B

Intersection 32 **Street C/Street H** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	Total Delay (sec/veh) LOS
NB	Left Turn	50	59	117.0%	30.6	6.1	C
	Through	910	949	104.3%	10.4	2.4	B
	Right Turn						
	Subtotal	960	1,008	105.0%	11.5	2.5	B
SB	Left Turn						
	Through	700	656	93.7%	5.6	0.5	A
	Right Turn	150	127	84.9%	3.5	0.6	A
	Subtotal	850	783	92.1%	5.2	0.5	A
EB	Left Turn	200	187	93.5%	23.2	2.3	C
	Through						
	Right Turn	40	43	106.4%	5.8	1.6	A
	Subtotal	240	230	95.6%	20.0	1.9	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
	Total	2,050	2,020	98.6%	10.1	1.5	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	540	10	130	290	70	40
Number	5	12	4	14	3	8
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1681	950	1759	1624	1022	1520
Adj Flow Rate, veh/h	720	1	173	32	93	53
Adj No. of Lanes	2	1	1	2	1	1
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Percent Heavy Veh, %	13	100	8	17	86	25
Cap, veh/h	933	242	408	563	128	710
Arrive On Green	0.30	0.30	0.23	0.23	0.13	0.47
Sat Flow, veh/h	3107	807	1759	2429	973	1520
Grp Volume(v), veh/h	720	1	173	32	93	53
Grp Sat Flow(s),veh/h/ln	1553	807	1759	1215	973	1520
Q Serve(g_s), s	8.1	0.0	3.2	0.4	3.5	0.7
Cycle Q Clear(g_c), s	8.1	0.0	3.2	0.4	3.5	0.7
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	933	242	408	563	128	710
V/C Ratio(X)	0.77	0.00	0.42	0.06	0.73	0.07
Avail Cap(c_a), veh/h	1623	422	1149	1586	508	992
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.2	9.4	12.5	11.5	16.0	5.6
Incr Delay (d2), s/veh	0.9	0.0	2.0	0.1	4.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.5	0.0	1.8	0.1	1.1	0.3
LnGrp Delay(d),s/veh	13.1	9.4	14.6	11.6	20.8	5.8
LnGrp LOS	B	A	B	B	C	A
Approach Vol, veh/h	721		205			146
Approach Delay, s/veh	13.1		14.1			15.3
Approach LOS	B		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		16.4	9.0	12.9				21.9
Change Period (Y+Rc), s		4.9	4.0	4.0				4.0
Max Green Setting (Gmax), s		20.0	20.0	25.0				25.0
Max Q Clear Time (g_c+I1), s		10.1	5.5	5.2				2.7
Green Ext Time (p_c), s		1.4	0.1	2.8				3.0

Intersection Summary		
HCM 2010 Ctrl Delay		13.6
HCM 2010 LOS		B

Notes
User approved pedestrian interval to be less than phase max green.
User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	10	350	10	120	600	300	10	20	120	410	20	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1482	1900	1759	1545	1845	1863	1774	1900	1863	1786	1900
Adj Flow Rate, veh/h	11	376	10	129	645	106	11	22	6	474	0	0
Adj No. of Lanes	1	2	0	2	3	1	1	1	0	2	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	100	29	29	8	23	3	2	2	2	2	2	2
Cap, veh/h	20	757	20	392	1554	578	114	86	24	783	394	0
Arrive On Green	0.02	0.27	0.27	0.12	0.37	0.37	0.06	0.06	0.06	0.22	0.00	0.00
Sat Flow, veh/h	905	2802	74	3250	4217	1568	1774	1343	366	3548	1786	0
Grp Volume(v), veh/h	11	189	197	129	645	106	11	0	28	474	0	0
Grp Sat Flow(s),veh/h/ln	905	1408	1469	1625	1406	1568	1774	0	1709	1774	1786	0
Q Serve(g_s), s	0.7	6.6	6.6	2.1	6.6	2.7	0.3	0.0	0.9	7.0	0.0	0.0
Cycle Q Clear(g_c), s	0.7	6.6	6.6	2.1	6.6	2.7	0.3	0.0	0.9	7.0	0.0	0.0
Prop In Lane	1.00		0.05	1.00		1.00	1.00		0.21	1.00		0.00
Lane Grp Cap(c), veh/h	20	381	397	392	1554	578	114	0	110	783	394	0
V/C Ratio(X)	0.54	0.50	0.50	0.33	0.41	0.18	0.10	0.00	0.25	0.61	0.00	0.00
Avail Cap(c_a), veh/h	312	534	557	1120	2180	811	611	0	589	2140	1077	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	28.1	17.8	17.8	23.4	13.7	12.4	25.6	0.0	25.8	20.3	0.0	0.0
Incr Delay (d2), s/veh	13.1	1.4	1.4	0.3	0.3	0.2	0.2	0.0	0.7	1.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.2	2.7	2.8	1.0	2.6	1.2	0.2	0.0	0.5	3.6	0.0	0.0
LnGrp Delay(d),s/veh	41.1	19.3	19.2	23.7	13.9	12.6	25.8	0.0	26.6	21.8	0.0	0.0
LnGrp LOS	D	B	B	C	B	B	C		C	C		
Approach Vol, veh/h		397			880			39			474	
Approach Delay, s/veh		19.8			15.2			26.3			21.8	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.9	21.6		16.8	6.2	27.3		7.7
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0
Max Green Setting (Gmax), s	20.0	22.0		35.0	20.0	30.0		20.0
Max Q Clear Time (g_c+I1), s	4.1	8.6		9.0	2.7	8.6		2.9
Green Ext Time (p_c), s	0.2	7.1		3.8	0.0	9.4		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	18.2
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	530	350	10	480	170	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1652	1712	1863	1681	1696	0
Adj Flow Rate, veh/h	552	0	10	500	177	0
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	15	11	2	13	12	0
Cap, veh/h	670	619	28	1163	870	0
Arrive On Green	0.43	0.00	0.02	0.36	0.27	0.00
Sat Flow, veh/h	1573	1455	1774	3279	3393	0
Grp Volume(v), veh/h	552	0	10	500	177	0
Grp Sat Flow(s),veh/h/ln	1573	1455	1774	1597	1612	0
Q Serve(g_s), s	14.6	0.0	0.3	5.6	2.0	0.0
Cycle Q Clear(g_c), s	14.6	0.0	0.3	5.6	2.0	0.0
Prop In Lane	1.00	1.00	1.00			0.00
Lane Grp Cap(c), veh/h	670	619	28	1163	870	0
V/C Ratio(X)	0.82	0.00	0.36	0.43	0.20	0.00
Avail Cap(c_a), veh/h	1002	926	941	2373	2395	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.0	0.0	23.0	11.3	13.3	0.0
Incr Delay (d2), s/veh	5.8	0.0	7.7	0.5	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	7.4	0.0	0.2	2.5	0.9	0.0
LnGrp Delay(d),s/veh	17.8	0.0	30.7	11.8	13.6	0.0
LnGrp LOS	B		C	B	B	
Approach Vol, veh/h	552			510	177	
Approach Delay, s/veh	17.8			12.2	13.6	
Approach LOS	B			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		22.5		24.7	4.4	18.0		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 35		30.0	25.0	35.0		
Max Q Clear Time (g_c+I1), s		7.6		16.6	2.3	4.0		
Green Ext Time (p_c), s		8.3		3.4	0.0	8.7		

Intersection Summary			
HCM 2010 Ctrl Delay			14.9
HCM 2010 LOS			B

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	310	1040	440	600	0	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.7	4.0	6.0	4.0		4.0
Lane Util. Factor	0.97	0.91	0.95	1.00		1.00
Frt	1.00	1.00	1.00	0.85		0.86
Flt Protected	0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)	3099	4550	3374	1404		1096
Flt Permitted	0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)	3099	4550	3374	1404		1096
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	323	1083	458	625	0	83
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	323	1083	458	625	0	83
Heavy Vehicles (%)	13%	14%	7%	15%	2%	50%
Turn Type	Prot	NA	NA	Free		Free
Protected Phases	5	Free	6			
Permitted Phases				Free		Free
Actuated Green, G (s)	10.2	34.4	14.5	34.4		34.4
Effective Green, g (s)	10.2	34.4	14.5	34.4		34.4
Actuated g/C Ratio	0.30	1.00	0.42	1.00		1.00
Clearance Time (s)	3.7		6.0			
Vehicle Extension (s)	2.0		6.1			
Lane Grp Cap (vph)	918	4550	1422	1404		1096
v/s Ratio Prot	0.10	0.24	0.14			
v/s Ratio Perm				c0.45		0.08
v/c Ratio	0.35	0.24	0.32	0.45		0.08
Uniform Delay, d1	9.5	0.0	6.7	0.0		0.0
Progression Factor	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	0.1	0.1	0.4	1.0		0.1
Delay (s)	9.6	0.1	7.0	1.0		0.1
Level of Service	A	A	A	A		A
Approach Delay (s)		2.3	3.6		0.1	
Approach LOS		A	A		A	

Intersection Summary			
HCM 2000 Control Delay	2.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	34.4	Sum of lost time (s)	9.7
Intersection Capacity Utilization	29.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	730	0	210	0	310	490	350	310	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1727	1900	1863	1310	1900	1712	1357	1900
Adj Flow Rate, veh/h	0	0	0	785	0	55	0	333	117	376	333	0
Adj No. of Lanes	1	1	1	2	1	0	1	3	1	1	3	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	0	2	2	2	45	0	11	40	40
Cap, veh/h	3	3	3	977	0	382	3	879	397	379	2037	0
Arrive On Green	0.00	0.00	0.00	0.28	0.00	0.26	0.00	0.25	0.25	0.23	0.55	0.00
Sat Flow, veh/h	1774	1863	1583	3510	0	1468	1774	3577	1615	1630	3827	0
Grp Volume(v), veh/h	0	0	0	785	0	55	0	333	117	376	333	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1755	0	1468	1774	1192	1615	1630	1235	0
Q Serve(g_s), s	0.0	0.0	0.0	11.6	0.0	1.6	0.0	4.3	3.3	12.9	2.5	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	11.6	0.0	1.6	0.0	4.3	3.3	12.9	2.5	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	3	3	3	977	0	382	3	879	397	379	2037	0
V/C Ratio(X)	0.00	0.00	0.00	0.80	0.00	0.14	0.00	0.38	0.29	0.99	0.16	0.00
Avail Cap(c_a), veh/h	190	267	227	3392	0	1471	254	1645	743	379	2037	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	18.7	0.0	15.9	0.0	17.5	17.1	21.4	6.2	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.0	0.0	0.1	0.0	0.5	0.8	43.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.0	0.0	0.0	5.7	0.0	0.7	0.0	1.5	1.6	10.3	0.8	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	19.7	0.0	16.0	0.0	18.1	17.9	65.2	6.3	0.0
LnGrp LOS				B		B		B	B	E	A	
Approach Vol, veh/h		0			840			450			709	
Approach Delay, s/veh		0.0			19.5			18.0			37.5	
Approach LOS					B			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	20.3	0.0	0.0	35.6	0.0	20.3	17.0	18.6
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9
Max Green Setting (Gmax), s	* 54	8.0	* 8	30.5	* 6	56.0	13.0	25.7
Max Q Clear Time (g_c+I1), s	13.6	0.0	0.0	4.5	0.0	3.6	14.9	6.3
Green Ext Time (p_c), s	1.9	0.0	0.0	8.7	0.0	0.2	0.0	7.4

Intersection Summary	
HCM 2010 Ctrl Delay	25.6
HCM 2010 LOS	C

Notes
User approved ignoring U-Turning movement.
* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Volume (veh/h)	90	20	0	370	80	10	540
Number	1	16		8	18	7	4
Initial Q (Qb), veh	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00			1.00	1.00	
Parking Bus, Adj	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1138	1267		1638	1086	950	1743
Adj Flow Rate, veh/h	102	6		420	18	11	614
Adj No. of Lanes	1	1		2	1	1	2
Peak Hour Factor	0.88	0.88		0.88	0.88	0.88	0.88
Percent Heavy Veh, %	67	50		16	75	100	9
Cap, veh/h	158	157		1015	301	21	1609
Arrive On Green	0.15	0.15		0.33	0.33	0.02	0.49
Sat Flow, veh/h	1084	1077		3194	923	905	3399
Grp Volume(v), veh/h	102	6		420	18	11	614
Grp Sat Flow(s),veh/h/ln	1084	1077		1556	923	905	1656
Q Serve(g_s), s	3.3	0.2		3.9	0.5	0.4	4.3
Cycle Q Clear(g_c), s	3.3	0.2		3.9	0.5	0.4	4.3
Prop In Lane	1.00	1.00			1.00	1.00	
Lane Grp Cap(c), veh/h	158	157		1015	301	21	1609
V/C Ratio(X)	0.65	0.04		0.41	0.06	0.53	0.38
Avail Cap(c_a), veh/h	888	882		3824	1134	741	4070
HCM Platoon Ratio	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.8	13.4		9.6	8.5	17.7	5.9
Incr Delay (d2), s/veh	1.7	0.0		0.2	0.1	7.4	0.1
Initial Q Delay(d3),s/veh	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	1.0	0.1		1.7	0.3	0.1	1.9
LnGrp Delay(d),s/veh	16.4	13.5		9.8	8.5	25.1	6.1
LnGrp LOS	B	B		A	A	C	A
Approach Vol, veh/h	108			438			625
Approach Delay, s/veh	16.2			9.8			6.4
Approach LOS	B			A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				25.3		11.3	5.8	19.4
Change Period (Y+Rc), s				7.5		6.0	5.0	7.5
Max Green Setting (Gmax), s				45.0		30.0	30.0	45.0
Max Q Clear Time (g_c+I1), s				6.3		5.3	2.4	5.9
Green Ext Time (p_c), s				6.1		0.2	0.0	6.1

Intersection Summary	
HCM 2010 Ctrl Delay	8.6
HCM 2010 LOS	A

Notes

User approved ignoring U-Turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	250	0	0	0	0	20	0	640	0	10	790	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1712	1900	1863	1727	1863
Adj Flow Rate, veh/h	272	0	0	0	0	0	0	696	0	11	859	36
Adj No. of Lanes	2	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	11	11	2	10	2
Cap, veh/h	747	425	0	4	4	0	4	1444	0	30	1860	897
Arrive On Green	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.02	0.57	0.57
Sat Flow, veh/h	3442	1863	0	1774	1863	0	1774	3338	0	1774	3282	1583
Grp Volume(v), veh/h	272	0	0	0	0	0	0	696	0	11	859	36
Grp Sat Flow(s),veh/h/ln	1721	1863	0	1774	1863	0	1774	1626	0	1774	1641	1583
Q Serve(g_s), s	3.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.3	6.8	0.4
Cycle Q Clear(g_c), s	3.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.3	6.8	0.4
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	747	425	0	4	4	0	4	1444	0	30	1860	897
V/C Ratio(X)	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.36	0.46	0.04
Avail Cap(c_a), veh/h	891	1697	0	239	1467	0	319	2415	0	479	2732	1318
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.8	0.0	0.0	0.0	0.0	0.0	0.0	8.7	0.0	21.6	5.6	4.3
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	7.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	1.4	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.2	3.0	0.2
LnGrp Delay(d),s/veh	15.1	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.0	28.7	5.8	4.3
LnGrp LOS	B							A		C	A	A
Approach Vol, veh/h		272			0			696			906	
Approach Delay, s/veh		15.1			0.0			9.0			6.0	
Approach LOS		B						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.5	24.6	0.0	14.4	0.0	30.1	14.4	0.0
Change Period (Y+Rc), s	* 4.7	4.9	* 4.7	* 4.2	* 4.7	4.9	* 4.7	* 4.2
Max Green Setting (Gmax), s	* 12	33.0	* 6	* 41	* 8	37.0	* 12	* 35
Max Q Clear Time (g_c+I1), s	2.3	8.7	0.0	0.0	0.0	8.8	5.0	0.0
Green Ext Time (p_c), s	0.0	11.0	0.0	0.0	0.0	11.8	0.5	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	8.5
HCM 2010 LOS	A

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	10	880	10	10	10	740	50	30	10	70	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1727	1863	1863	1900	1712	1679	1900	1900	1689	1900
Adj Flow Rate, veh/h	0	11	0	11	11	1	804	54	11	11	76	0
Adj No. of Lanes	0	1	1	1	1	0	2	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	10	2	2	2	11	20	20	14	14	14
Cap, veh/h	0	85	67	21	289	26	1171	501	102	24	168	0
Arrive On Green	0.00	0.05	0.00	0.01	0.17	0.17	0.37	0.37	0.37	0.11	0.11	0.00
Sat Flow, veh/h	0	1863	1468	1774	1683	153	3163	1354	276	212	1466	0
Grp Volume(v), veh/h	0	11	0	11	0	12	804	0	65	87	0	0
Grp Sat Flow(s),veh/h/ln	0	1863	1468	1774	0	1836	1581	0	1630	1679	0	0
Q Serve(g_s), s	0.0	0.2	0.0	0.2	0.0	0.2	7.5	0.0	0.9	1.7	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.2	0.0	0.2	0.0	0.2	7.5	0.0	0.9	1.7	0.0	0.0
Prop In Lane	0.00		1.00	1.00		0.08	1.00		0.17	0.13		0.00
Lane Grp Cap(c), veh/h	0	85	67	21	0	316	1171	0	603	192	0	0
V/C Ratio(X)	0.00	0.13	0.00	0.53	0.00	0.04	0.69	0.00	0.11	0.45	0.00	0.00
Avail Cap(c_a), veh/h	0	1439	1135	203	0	1839	2444	0	1260	769	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	16.0	0.0	17.2	0.0	12.1	9.3	0.0	7.2	14.4	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.7	0.0	19.9	0.0	0.0	0.7	0.0	0.1	1.7	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.0	0.1	0.0	0.2	0.0	0.1	3.4	0.0	0.4	0.9	0.0	0.0
LnGrp Delay(d),s/veh	0.0	16.7	0.0	37.0	0.0	12.1	10.0	0.0	7.3	16.1	0.0	0.0
LnGrp LOS		B		D		B	B		A	B		
Approach Vol, veh/h		11			23			869			87	
Approach Delay, s/veh		16.7			24.0			9.8			16.1	
Approach LOS		B			C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6		8
Phs Duration (G+Y+Rc), s		16.9	4.4	5.6		8.0		10.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s		27.0	4.0	27.0		16.0		35.0
Max Q Clear Time (g_c+I1), s		9.5	2.2	2.2		3.7		2.2
Green Ext Time (p_c), s		3.4	0.0	0.0		0.3		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	10.8
HCM 2010 LOS	B

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	430	120	780	240	180	730
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1772	1900	1765	1900	1792	1759
Adj Flow Rate, veh/h	467	114	848	212	196	793
Adj No. of Lanes	0	0	2	0	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	6	6	6	8
Cap, veh/h	489	119	900	225	184	1697
Arrive On Green	0.37	0.37	0.34	0.34	0.11	0.51
Sat Flow, veh/h	1323	323	2748	665	1707	3431
Grp Volume(v), veh/h	582	0	534	526	196	793
Grp Sat Flow(s),veh/h/ln	1649	0	1677	1648	1707	1671
Q Serve(g_s), s	22.4	0.0	20.1	20.1	7.0	10.0
Cycle Q Clear(g_c), s	22.4	0.0	20.1	20.1	7.0	10.0
Prop In Lane	0.80	0.20		0.40	1.00	
Lane Grp Cap(c), veh/h	609	0	568	558	184	1697
V/C Ratio(X)	0.96	0.00	0.94	0.94	1.07	0.47
Avail Cap(c_a), veh/h	609	0	568	558	184	1697
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.0	0.0	20.9	20.9	29.0	10.3
Incr Delay (d2), s/veh	25.9	0.0	24.2	24.6	85.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	14.4	0.0	13.0	12.9	7.6	4.6
LnGrp Delay(d),s/veh	45.9	0.0	45.1	45.5	114.0	10.5
LnGrp LOS	D		D	D	F	B
Approach Vol, veh/h	582		1060			989
Approach Delay, s/veh	45.9		45.3			31.0
Approach LOS	D		D			C

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	11.0	26.0				37.0		28.0
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	7.0	22.0				33.0		24.0
Max Q Clear Time (g_c+I1), s	9.0	22.1				12.0		24.4
Green Ext Time (p_c), s	0.0	0.0				13.3		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		40.1
HCM 2010 LOS		D

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	640	240	160	10	270	10	130	70	10	10	110	1030
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1681	1681	1863	1863	1663	1900	1863	1863	1900	950	1863	1743
Adj Flow Rate, veh/h	696	261	66	11	293	9	141	76	11	11	120	0
Adj No. of Lanes	2	1	1	1	2	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	13	13	2	2	11	11	2	2	2	100	2	9
Cap, veh/h	805	708	667	20	542	17	185	355	51	10	242	193
Arrive On Green	0.26	0.42	0.42	0.01	0.17	0.17	0.10	0.22	0.22	0.01	0.13	0.00
Sat Flow, veh/h	3107	1681	1583	1774	3131	96	1774	1592	230	905	1863	1482
Grp Volume(v), veh/h	696	261	66	11	148	154	141	0	87	11	120	0
Grp Sat Flow(s),veh/h/ln	1553	1681	1583	1774	1580	1647	1774	0	1822	905	1863	1482
Q Serve(g_s), s	12.8	6.4	1.5	0.4	5.1	5.1	4.6	0.0	2.3	0.7	3.6	0.0
Cycle Q Clear(g_c), s	12.8	6.4	1.5	0.4	5.1	5.1	4.6	0.0	2.3	0.7	3.6	0.0
Prop In Lane	1.00		1.00	1.00		0.06	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	805	708	667	20	274	285	185	0	406	10	242	193
V/C Ratio(X)	0.87	0.37	0.10	0.56	0.54	0.54	0.76	0.00	0.21	1.09	0.50	0.00
Avail Cap(c_a), veh/h	881	898	846	237	607	632	533	0	973	121	684	544
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.2	11.9	10.5	29.5	22.6	22.6	26.1	0.0	19.0	29.6	24.2	0.0
Incr Delay (d2), s/veh	8.4	0.3	0.1	22.1	1.6	1.6	6.4	0.0	0.3	158.7	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	6.4	3.0	0.7	0.3	2.3	2.4	2.6	0.0	1.2	0.6	1.9	0.0
LnGrp Delay(d),s/veh	29.6	12.2	10.5	51.5	24.2	24.2	32.6	0.0	19.3	191.8	25.8	0.0
LnGrp LOS	C	B	B	D	C	C	C		B	F	C	
Approach Vol, veh/h		1023			313			228			131	
Approach Delay, s/veh		24.0			25.2			27.5			39.7	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.7	18.3	5.7	30.2	11.2	12.8	20.5	15.4
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	8.0	32.0	8.0	32.0	18.0	22.0	17.0	23.0
Max Q Clear Time (g_c+I1), s	2.7	4.3	2.4	8.4	6.6	5.6	14.8	7.1
Green Ext Time (p_c), s	0.0	1.2	0.0	3.7	0.3	1.0	0.7	3.2

Intersection Summary	
HCM 2010 Ctrl Delay	25.9
HCM 2010 LOS	C

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	10	10	190	0	10	10	10	0	130	30	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	5	2	2	2	2	2	8	2	2
Mvmt Flow	0	11	11	207	0	11	11	11	0	141	33	11
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.5	7.9	9.4
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	76%	5%	33%	14%
Vol Thru, %	18%	5%	33%	71%
Vol Right, %	6%	90%	33%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	170	210	30	70
LT Vol	130	10	10	10
Through Vol	30	10	10	50
RT Vol	10	190	10	10
Lane Flow Rate	185	228	33	76
Geometry Grp	1	1	1	1
Degree of Util (X)	0.246	0.259	0.042	0.099
Departure Headway (Hd)	4.801	4.078	4.687	4.662
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	748	881	763	767
Service Time	2.834	2.099	2.72	2.699
HCM Lane V/C Ratio	0.247	0.259	0.043	0.099
HCM Control Delay	9.4	8.5	7.9	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1	1	0.1	0.3

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	10	50	10
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	11	54	11
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.2
HCM LOS	A

Lane

MOVEMENT SUMMARY

Site: Intersection 12

Existing Plus Project PM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Street D											
8	T1	185	12.0	0.226	1.6	LOS A	1.3	36.5	0.13	0.24	27.8
18	R2	87	25.0	0.226	2.3	LOS A	1.3	36.5	0.13	0.24	27.0
Approach		272	16.2	0.226	1.9	LOS A	1.3	36.5	0.13	0.24	27.5
East: Street S											
1	L2	22	15.0	0.175	6.9	LOS A	0.9	23.5	0.42	0.42	27.3
16	R2	141	2.0	0.175	2.6	LOS A	0.9	23.5	0.42	0.42	24.4
Approach		163	3.7	0.175	3.1	LOS A	0.9	23.5	0.42	0.42	24.8
North: Street T											
7	L2	22	2.0	0.154	7.3	LOS A	0.9	24.2	0.14	0.26	30.3
4	T1	163	13.0	0.154	1.6	LOS A	0.9	24.2	0.14	0.26	29.9
Approach		185	11.7	0.154	2.3	LOS A	0.9	24.2	0.14	0.26	30.0
All Vehicles		620	11.6	0.226	2.3	LOS A	1.3	36.5	0.21	0.29	27.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

Intersection	
Int Delay, s/veh	11.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	180	270	80	140	210	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	22	11	2	14	14	2
Mvmt Flow	196	293	87	152	228	98

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	489	0	668	342
Stage 1	-	-	-	-	342	-
Stage 2	-	-	-	-	326	-
Critical Hdwy	-	-	4.12	-	6.54	6.22
Critical Hdwy Stg 1	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	-	5.54	-
Follow-up Hdwy	-	-	2.218	-	3.626	3.318
Pot Cap-1 Maneuver	-	-	1074	-	405	701
Stage 1	-	-	-	-	693	-
Stage 2	-	-	-	-	705	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1074	-	372	701
Mov Cap-2 Maneuver	-	-	-	-	372	-
Stage 1	-	-	-	-	693	-
Stage 2	-	-	-	-	648	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.1	34.6
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	433	-	-	1074	-
HCM Lane V/C Ratio	0.753	-	-	0.081	-
HCM Control Delay (s)	34.6	-	-	8.6	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	6.2	-	-	0.3	-

SimTraffic Post-Processor | **Grapevine Transportation Impact Study**
Average Results from 10 Runs | **Existing Plus Project**
Volume and Delay by Movement | **PM Peak Hour**

Intersection 14 **Street C/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	200	218	108.9%	53.6	5.1	D
	Right Turn	970	918	94.7%	16.9	2.9	B
	Subtotal	1,170	1,136	97.1%	23.9	2.7	C
SB	Left Turn	730	719	98.5%	57.0	9.0	E
	Through	210	209	99.5%	20.2	4.5	C
	Right Turn						
	Subtotal	940	928	98.8%	48.7	7.3	D
EB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
WB	Left Turn	1,170	884	75.5%	38.8	6.9	D
	Through						
	Right Turn	680	573	84.2%	16.5	3.8	B
	Subtotal	1,850	1,456	78.7%	30.2	5.5	C
Total		3,960	3,521	88.9%	33.1	3.8	C

Intersection 15 **Street D/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	520	401	77.1%	126.8	30.6	F
	Through	180	179	99.2%	50.5	4.2	D
	Right Turn	70	68	96.6%	47.1	8.1	D
	Subtotal	770	647	84.0%	97.4	17.3	F
SB	Left Turn	520	520	100.0%	62.4	5.3	E
	Through	180	176	97.5%	65.6	11.4	E
	Right Turn	770	567	73.6%	148.0	21.4	F
	Subtotal	1,470	1,262	85.9%	101.4	11.3	F
EB	Left Turn	440	390	88.6%	57.6	7.0	E
	Through	1,510	1,413	93.6%	37.9	5.3	D
	Right Turn	510	471	92.3%	17.7	5.0	B
	Subtotal	2,460	2,274	92.4%	37.1	5.2	D
WB	Left Turn	80	59	74.1%	118.3	36.5	F
	Through	990	787	79.5%	129.9	22.5	F
	Right Turn	370	299	80.9%	65.4	20.9	E
	Subtotal	1,440	1,145	79.5%	112.7	23.5	F
Total		6,140	5,328	86.8%	75.8	6.4	E

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1710	20	30	1150	10	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	2	2	8	2	2
Mvmt Flow	1859	22	33	1250	11	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1880	0	2560	940
Stage 1	-	-	-	-	1870	-
Stage 2	-	-	-	-	690	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	315	-	22	265
Stage 1	-	-	-	-	107	-
Stage 2	-	-	-	-	459	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	315	-	20	265
Mov Cap-2 Maneuver	-	-	-	-	20	-
Stage 1	-	-	-	-	107	-
Stage 2	-	-	-	-	411	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	153.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	52	-	-	315	-
HCM Lane V/C Ratio	0.627	-	-	0.104	-
HCM Control Delay (s)	153.3	-	-	17.7	-
HCM Lane LOS	F	-	-	C	-
HCM 95th %tile Q(veh)	2.5	-	-	0.3	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	620	470	10	420	350	10
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1743	1863	1776	1712	1900
Adj Flow Rate, veh/h	674	377	11	457	380	3
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	9	2	7	11	0
Cap, veh/h	889	1120	20	1030	432	428
Arrive On Green	0.49	0.49	0.01	0.58	0.26	0.26
Sat Flow, veh/h	1810	1482	1774	1776	1630	1615
Grp Volume(v), veh/h	674	377	11	457	380	3
Grp Sat Flow(s),veh/h/ln	1810	1482	1774	1776	1630	1615
Q Serve(g_s), s	19.5	5.4	0.4	9.4	14.4	0.1
Cycle Q Clear(g_c), s	19.5	5.4	0.4	9.4	14.4	0.1
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	889	1120	20	1030	432	428
V/C Ratio(X)	0.76	0.34	0.56	0.44	0.88	0.01
Avail Cap(c_a), veh/h	1264	1427	220	1599	557	551
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.3	2.6	31.7	7.6	22.7	17.4
Incr Delay (d2), s/veh	1.7	0.2	22.5	0.3	12.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	10.0	4.6	0.3	4.7	7.9	0.0
LnGrp Delay(d),s/veh	15.0	2.7	54.2	7.9	35.2	17.5
LnGrp LOS	B	A	D	A	D	B
Approach Vol, veh/h	1051			468	383	
Approach Delay, s/veh	10.6			9.0	35.1	
Approach LOS	B			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		22.1	5.7	36.7				42.4
Change Period (Y+Rc), s		5.0	5.0	5.0				5.0
Max Green Setting (Gmax), s		22.0	8.0	45.0				58.0
Max Q Clear Time (g_c+I1), s		16.4	2.4	21.5				11.4
Green Ext Time (p_c), s		0.7	0.0	10.2				12.7

Intersection Summary	
HCM 2010 Ctrl Delay	15.1
HCM 2010 LOS	B

Intersection	
Intersection Delay, s/veh	13.7
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	20	190	10	0	330	110	10	0	10	10	110
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	11	2	2	2	18	2	2	2	2	2
Mvmt Flow	0	22	207	11	0	359	120	11	0	11	11	120
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	10.6	16.8	9.7
HCM LOS	B	C	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	9%	73%	25%
Vol Thru, %	8%	86%	24%	25%
Vol Right, %	85%	5%	2%	50%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	130	220	450	40
LT Vol	10	20	330	10
Through Vol	10	190	110	10
RT Vol	110	10	10	20
Lane Flow Rate	141	239	489	43
Geometry Grp	1	1	1	1
Degree of Util (X)	0.209	0.331	0.657	0.07
Departure Headway (Hd)	5.32	5.098	4.834	5.768
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	678	710	739	624
Service Time	3.323	3.098	2.926	3.774
HCM Lane V/C Ratio	0.208	0.337	0.662	0.069
HCM Control Delay	9.7	10.6	16.8	9.2
HCM Lane LOS	A	B	C	A
HCM 95th-tile Q	0.8	1.4	5	0.2

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	10	10	20
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	11	11	22
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	9.2
HCM LOS	A

Lane

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	210	190	20	90	180	120	20	300	100	130	330	350
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1727	1806	1900	1712	1792	1759	1863	1727	1727	1759	1743	1792
Adj Flow Rate, veh/h	227	208	20	98	196	39	22	326	17	141	359	110
Adj No. of Lanes	1	1	0	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	10	5	5	11	6	8	2	10	10	8	9	6
Cap, veh/h	332	327	31	269	296	413	37	745	333	185	1049	483
Arrive On Green	0.20	0.20	0.20	0.17	0.17	0.17	0.02	0.23	0.23	0.11	0.32	0.32
Sat Flow, veh/h	1645	1623	156	1630	1792	1495	1774	3282	1468	1675	3312	1524
Grp Volume(v), veh/h	227	0	228	98	196	39	22	326	17	141	359	110
Grp Sat Flow(s),veh/h/ln	1645	0	1779	1630	1792	1495	1774	1641	1468	1675	1656	1524
Q Serve(g_s), s	6.9	0.0	6.4	2.9	5.5	1.0	0.7	4.6	0.5	4.4	4.5	2.9
Cycle Q Clear(g_c), s	6.9	0.0	6.4	2.9	5.5	1.0	0.7	4.6	0.5	4.4	4.5	2.9
Prop In Lane	1.00		0.09	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	332	0	359	269	296	413	37	745	333	185	1049	483
V/C Ratio(X)	0.68	0.00	0.64	0.36	0.66	0.09	0.60	0.44	0.05	0.76	0.34	0.23
Avail Cap(c_a), veh/h	851	0	920	843	927	939	328	2425	1085	1053	3916	1802
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.0	0.0	19.8	20.1	21.2	14.6	26.3	18.0	16.4	23.4	14.2	13.6
Incr Delay (d2), s/veh	2.5	0.0	1.9	0.8	2.5	0.1	14.4	0.4	0.1	6.3	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	3.4	0.0	3.3	1.4	2.9	0.4	0.5	2.1	0.2	2.4	2.1	1.2
LnGrp Delay(d),s/veh	22.5	0.0	21.7	20.9	23.7	14.7	40.7	18.4	16.4	29.7	14.4	13.9
LnGrp LOS	C		C	C	C	B	D	B	B	C	B	B
Approach Vol, veh/h		455			333			365			610	
Approach Delay, s/veh		22.1			21.8			19.6			17.8	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	10.0	16.3		14.9	5.1	21.1		12.9
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	34.0	40.0		28.0	10.0	64.0		28.0
Max Q Clear Time (g_c+I1), s	6.4	6.6		8.9	2.7	6.5		7.5
Green Ext Time (p_c), s	0.4	5.7		2.0	0.0	5.9		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	20.0
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Intersection 20 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn	1,060	998	94.2%	34.2	2.0	C
	Through						
	Right Turn	610	557	91.3%	41.2	11.5	D
	Subtotal	1,670	1,555	93.1%	36.7	4.7	D
EB	Left Turn						
	Through	1,270	1,186	93.4%	29.2	6.0	C
	Right Turn	430	405	94.2%	10.7	4.0	B
	Subtotal	1,700	1,591	93.6%	24.5	5.4	C
WB	Left Turn						
	Through	1,240	1,029	83.0%	24.3	6.8	C
	Right Turn	720	540	75.1%	10.2	1.6	B
	Subtotal	1,960	1,569	80.1%	19.4	4.9	B
Total		5,330	4,715	88.5%	26.8	3.4	C

Intersection 21 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	450	436	96.9%	45.0	12.8	D
	Through						
	Right Turn	680	687	101.0%	26.6	3.3	C
	Subtotal	1,130	1,123	99.4%	33.9	5.4	C
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	1,780	1,649	92.7%	18.2	5.8	B
	Right Turn	550	480	87.3%	11.2	2.5	B
	Subtotal	2,330	2,130	91.4%	16.7	5.1	B
WB	Left Turn						
	Through	1,510	1,157	76.6%	16.0	1.0	B
	Right Turn	770	595	77.3%	9.7	0.9	A
	Subtotal	2,280	1,753	76.9%	13.9	0.8	B
Total		5,740	5,005	87.2%	19.6	2.4	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	120	250	50	20	220	190	60	160	30	200	130	110
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1759	1863	1863	1743	1810	1863	1708	1900	1810	1652	1863
Adj Flow Rate, veh/h	130	272	17	22	239	86	65	174	17	217	141	27
Adj No. of Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	8	2	2	9	5	2	13	13	5	15	2
Cap, veh/h	172	545	491	38	408	614	86	503	49	284	892	450
Arrive On Green	0.10	0.31	0.31	0.02	0.23	0.23	0.05	0.17	0.17	0.16	0.28	0.28
Sat Flow, veh/h	1774	1759	1583	1774	1743	1538	1774	2990	289	1723	3139	1583
Grp Volume(v), veh/h	130	272	17	22	239	86	65	94	97	217	141	27
Grp Sat Flow(s),veh/h/ln	1774	1759	1583	1774	1743	1538	1774	1623	1657	1723	1570	1583
Q Serve(g_s), s	3.4	6.0	0.4	0.6	5.8	1.7	1.7	2.4	2.5	5.7	1.6	0.6
Cycle Q Clear(g_c), s	3.4	6.0	0.4	0.6	5.8	1.7	1.7	2.4	2.5	5.7	1.6	0.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.17	1.00		1.00
Lane Grp Cap(c), veh/h	172	545	491	38	408	614	86	273	278	284	892	450
V/C Ratio(X)	0.76	0.50	0.03	0.58	0.59	0.14	0.76	0.34	0.35	0.76	0.16	0.06
Avail Cap(c_a), veh/h	596	1293	1164	335	1025	1158	969	1091	1114	1014	2242	1131
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.0	13.4	11.5	23.1	16.2	9.1	22.4	17.5	17.5	19.0	12.8	12.4
Incr Delay (d2), s/veh	6.6	0.7	0.0	13.6	1.3	0.1	12.6	0.7	0.7	4.3	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	2.0	3.0	0.2	0.4	2.9	0.7	1.1	1.1	1.2	3.0	0.7	0.3
LnGrp Delay(d),s/veh	27.6	14.1	11.5	36.7	17.5	9.2	35.0	18.2	18.3	23.3	12.8	12.5
LnGrp LOS	C	B	B	D	B	A	C	B	B	C	B	B
Approach Vol, veh/h		419			347			256			385	
Approach Delay, s/veh		18.2			16.7			22.5			18.7	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.8	12.0	5.0	18.8	6.3	17.5	8.6	15.2
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	28.0	32.0	9.0	35.0	26.0	34.0	16.0	28.0
Max Q Clear Time (g_c+I1), s	7.7	4.5	2.6	8.0	3.7	3.6	5.4	7.8
Green Ext Time (p_c), s	0.6	2.2	0.0	3.6	0.1	2.2	0.2	3.4

Intersection Summary			
HCM 2010 Ctrl Delay			18.7
HCM 2010 LOS			B

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	350	340	10	10	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	-	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	6	6	2	2	2
Mvmt Flow	11	380	370	11	11	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	380	0	-	0	777	375
Stage 1	-	-	-	-	375	-
Stage 2	-	-	-	-	402	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1178	-	-	-	365	671
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	676	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1178	-	-	-	362	671
Mov Cap-2 Maneuver	-	-	-	-	362	-
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	670	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	13
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1178	-	-	-	470
HCM Lane V/C Ratio	0.009	-	-	-	0.046
HCM Control Delay (s)	8.1	-	-	-	13
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	40	250	60	10	240	60	60	190	10	140	320	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1834	1900	1863	1834	1900	1863	1812	1900	1863	1847	1900
Adj Flow Rate, veh/h	43	272	44	11	261	43	65	207	8	152	348	35
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	4	4	2	4	4	2	5	5	2	3	3
Cap, veh/h	428	529	86	419	528	87	409	646	25	538	615	62
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.37	0.37	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1071	1541	249	1059	1536	253	996	1733	67	1162	1651	166
Grp Volume(v), veh/h	43	0	316	11	0	304	65	0	215	152	0	383
Grp Sat Flow(s),veh/h/ln	1071	0	1790	1059	0	1789	996	0	1800	1162	0	1817
Q Serve(g_s), s	1.2	0.0	5.0	0.3	0.0	4.7	2.0	0.0	3.0	3.8	0.0	5.9
Cycle Q Clear(g_c), s	5.9	0.0	5.0	5.3	0.0	4.7	7.9	0.0	3.0	6.8	0.0	5.9
Prop In Lane	1.00		0.14	1.00		0.14	1.00		0.04	1.00		0.09
Lane Grp Cap(c), veh/h	428	0	615	419	0	615	409	0	671	538	0	677
V/C Ratio(X)	0.10	0.00	0.51	0.03	0.00	0.49	0.16	0.00	0.32	0.28	0.00	0.57
Avail Cap(c_a), veh/h	1003	0	1574	987	0	1574	575	0	971	732	0	980
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.5	0.0	9.2	11.3	0.0	9.1	11.9	0.0	7.9	10.3	0.0	8.8
Incr Delay (d2), s/veh	0.1	0.0	0.7	0.0	0.0	0.6	0.2	0.0	0.3	0.3	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	0.4	0.0	2.5	0.1	0.0	2.4	0.5	0.0	1.5	1.2	0.0	3.0
LnGrp Delay(d),s/veh	11.6	0.0	9.9	11.3	0.0	9.8	12.1	0.0	8.1	10.6	0.0	9.5
LnGrp LOS	B		A	B		A	B		A	B		A
Approach Vol, veh/h		359			315			280			535	
Approach Delay, s/veh		10.1			9.8			9.1			9.8	
Approach LOS		B			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		18.1		17.1		18.1		17.1
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0
Max Green Setting (Gmax), s		19.0		31.0		19.0		31.0
Max Q Clear Time (g_c+I1), s		9.9		7.9		8.8		7.3
Green Ext Time (p_c), s		3.3		4.2		3.5		4.3

Intersection Summary	
HCM 2010 Ctrl Delay	9.7
HCM 2010 LOS	A

MOVEMENT SUMMARY

Site: Intersection 25

Existing Plus Project PM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Street K											
3	L2	65	2.0	0.104	7.6	LOS A	0.5	12.9	0.46	0.60	25.7
18	R2	22	2.0	0.104	3.8	LOS A	0.5	12.9	0.46	0.60	25.2
Approach		87	2.0	0.104	6.6	LOS A	0.5	12.9	0.46	0.60	25.6
East: Street B											
1	L2	22	2.0	0.250	7.5	LOS A	1.6	40.4	0.27	0.37	27.0
6	T1	261	4.0	0.250	3.2	LOS A	1.6	40.4	0.27	0.37	28.9
Approach		283	3.8	0.250	3.5	LOS A	1.6	40.4	0.27	0.37	28.8
West: Street B											
2	T1	272	4.0	0.314	2.8	LOS A	2.1	53.6	0.14	0.34	29.3
12	R2	152	2.0	0.314	2.9	LOS A	2.1	53.6	0.14	0.34	26.5
Approach		424	3.3	0.314	2.9	LOS A	2.1	53.6	0.14	0.34	28.2
All Vehicles		793	3.3	0.314	3.5	LOS A	2.1	53.6	0.22	0.38	28.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: Intersection 26

Existing Plus Project PM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Street K											
8	T1	33	2.0	0.043	2.1	LOS A	0.2	5.1	0.26	0.28	24.9
18	R2	11	2.0	0.043	2.4	LOS A	0.2	5.1	0.26	0.28	24.4
Approach		43	2.0	0.043	2.2	LOS A	0.2	5.1	0.26	0.28	24.8
East: Street M											
1	L2	11	2.0	0.058	7.2	LOS A	0.3	7.3	0.15	0.43	29.2
16	R2	54	2.0	0.058	3.0	LOS A	0.3	7.3	0.15	0.43	28.4
Approach		65	2.0	0.058	3.7	LOS A	0.3	7.3	0.15	0.43	28.6
North: Street K											
7	L2	98	2.0	0.128	7.0	LOS A	0.7	16.9	0.07	0.49	28.7
4	T1	76	2.0	0.128	2.7	LOS A	0.7	16.9	0.07	0.49	28.6
Approach		174	2.0	0.128	5.2	LOS A	0.7	16.9	0.07	0.49	28.7
All Vehicles		283	2.0	0.128	4.4	LOS A	0.7	16.9	0.12	0.45	28.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: Intersection 27

Existing Plus Project PM
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Street C											
3	L2	11	2.0	0.061	5.9	LOS A	0.3	7.5	0.20	0.35	25.0
8	T1	11	2.0	0.061	1.8	LOS A	0.3	7.5	0.20	0.35	26.8
18	R2	43	2.0	0.061	2.2	LOS A	0.3	7.5	0.20	0.35	26.2
Approach		65	2.0	0.061	2.7	LOS A	0.3	7.5	0.20	0.35	26.1
East: Street Q											
1	L2	54	2.0	0.075	7.2	LOS A	0.4	9.3	0.14	0.51	26.5
6	T1	11	2.0	0.075	2.9	LOS A	0.4	9.3	0.14	0.51	26.3
16	R2	22	2.0	0.075	3.0	LOS A	0.4	9.3	0.14	0.51	27.8
Approach		87	2.0	0.075	5.6	LOS A	0.4	9.3	0.14	0.51	26.8
North: Street C											
7	L2	33	2.0	0.063	7.9	LOS A	0.3	7.7	0.24	0.51	29.2
4	T1	22	2.0	0.063	3.6	LOS A	0.3	7.7	0.24	0.51	26.9
14	R2	11	2.0	0.063	3.6	LOS A	0.3	7.7	0.24	0.51	26.3
Approach		65	2.0	0.063	5.8	LOS A	0.3	7.7	0.24	0.51	27.9
West: Street Q											
5	L2	11	2.0	0.033	6.3	LOS A	0.2	3.9	0.28	0.40	26.5
2	T1	11	2.0	0.033	2.1	LOS A	0.2	3.9	0.28	0.40	26.4
12	R2	11	2.0	0.033	2.5	LOS A	0.2	3.9	0.28	0.40	24.1
Approach		33	2.0	0.033	3.6	LOS A	0.2	3.9	0.28	0.40	25.6
All Vehicles		250	2.0	0.075	4.6	LOS A	0.4	9.3	0.20	0.45	26.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	10	30	10	0	60	20	30	0	10	10	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	17	2	2	2	2	2	17
Mvmt Flow	0	11	33	11	0	65	22	33	0	11	11	65
Number of Lanes	0	0	1	0	0	0	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	3
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	3	2	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	3	1
HCM Control Delay	8.1	9.1	7.9
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	WBLn1	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	20%	55%	100%	0%	0%
Vol Thru, %	0%	14%	60%	18%	0%	100%	0%
Vol Right, %	0%	86%	20%	27%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	10	70	50	110	30	10	10
LT Vol	10	0	10	60	30	0	0
Through Vol	0	10	30	20	0	10	0
RT Vol	0	60	10	30	0	0	10
Lane Flow Rate	11	76	54	120	33	11	11
Geometry Grp	8	8	7	7	7	7	7
Degree of Util (X)	0.017	0.097	0.075	0.175	0.051	0.015	0.013
Departure Headway (Hd)	5.684	4.577	4.945	5.256	5.586	5.083	4.379
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	631	784	726	685	643	706	818
Service Time	3.404	2.297	2.664	2.972	3.306	2.803	2.099
HCM Lane V/C Ratio	0.017	0.097	0.074	0.175	0.051	0.016	0.013
HCM Control Delay	8.5	7.8	8.1	9.1	8.6	7.9	7.2
HCM Lane LOS	A	A	A	A	A	A	A
HCM 95th-tile Q	0.1	0.3	0.2	0.6	0.2	0	0

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	30	10	10
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	33	11	11
Number of Lanes	0	1	1	1

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.2
HCM LOS	A

Lane

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	110	90	60	140	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	15	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	9	11	2	2	2
Mvmt Flow	11	120	98	65	152	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	163	0	-	0	271	130
Stage 1	-	-	-	-	130	-
Stage 2	-	-	-	-	141	-
Critical Hdwy	4.12	-	-	-	9.42	7.72
Critical Hdwy Stg 1	-	-	-	-	8.42	-
Critical Hdwy Stg 2	-	-	-	-	8.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1416	-	-	-	573	871
Stage 1	-	-	-	-	804	-
Stage 2	-	-	-	-	788	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1416	-	-	-	568	871
Mov Cap-2 Maneuver	-	-	-	-	568	-
Stage 1	-	-	-	-	804	-
Stage 2	-	-	-	-	782	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1416	-	-	-	594
HCM Lane V/C Ratio	0.008	-	-	-	0.293
HCM Control Delay (s)	7.6	0	-	-	13.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	1.2

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	250	150	30	70	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	4	7	2	2	2
Mvmt Flow	11	272	163	33	76	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	196	0	-	0	472	179
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	293	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1377	-	-	-	551	864
Stage 1	-	-	-	-	852	-
Stage 2	-	-	-	-	757	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1377	-	-	-	546	864
Mov Cap-2 Maneuver	-	-	-	-	546	-
Stage 1	-	-	-	-	852	-
Stage 2	-	-	-	-	750	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1377	-	-	-	572
HCM Lane V/C Ratio	0.008	-	-	-	0.152
HCM Control Delay (s)	7.6	0	-	-	12.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.5

SimTraffic Post-Processor | **Grapevine Transportation Impact Study**
Average Results from 10 Runs | **Existing Plus Project**
Volume and Delay by Movement | **PM Peak Hour**

Intersection 31 **Street C/Street G** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	280	217	77.5%	56.6	6.1	E
	Through	600	552	92.0%	2.4	0.8	A
	Right Turn						
	Subtotal	880	769	87.4%	17.7	2.4	B
SB	Left Turn						
	Through	650	635	97.6%	18.5	4.7	B
	Right Turn	10	11	110.2%	10.4	11.0	B
	Subtotal	660	646	97.8%	18.3	4.7	B
EB	Left Turn	10	10	98.8%	58.5	33.6	E
	Through						
	Right Turn	290	279	96.3%	21.1	7.7	C
	Subtotal	300	289	96.4%	22.6	7.6	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,840	1,704	92.6%	18.8	3.3	B

Intersection 32 **Street C/Street H** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	60	54	89.9%	38.5	8.4	D
	Through	930	924	99.3%	9.7	3.3	A
	Right Turn						
	Subtotal	990	978	98.8%	11.4	2.9	B
SB	Left Turn						
	Through	1,100	898	81.7%	7.7	1.1	A
	Right Turn	280	226	80.8%	5.3	0.9	A
	Subtotal	1,380	1,124	81.5%	7.3	0.8	A
EB	Left Turn	240	233	97.2%	31.5	7.8	C
	Through						
	Right Turn	60	60	100.7%	10.7	4.4	B
	Subtotal	300	294	97.9%	27.2	6.1	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,670	2,396	89.7%	11.4	1.4	B

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	352	253	11	308	253
v/c Ratio	0.54	0.20	0.04	0.28	0.29
Control Delay	13.7	0.4	21.3	11.1	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	13.7	0.4	21.3	11.1	14.4
Queue Length 50th (ft)	50	0	2	24	20
Queue Length 95th (ft)	170	0	18	63	72
Internal Link Dist (ft)	140			478	598
Turn Bay Length (ft)			200		
Base Capacity (vph)	1179	1242	1117	3162	2553
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.30	0.20	0.01	0.10	0.10

Intersection Summary

Intersection 14 **Street C/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
NB	Through	425	75	10	125	23	125	29	0%	0%
	Right Turn	425	125	28	200	47	200	59	0%	0%
SB	Left Turn	475	150	19	225	42	225	56	0%	0%
	Through	475	50	11	100	21	100	29	0%	0%
WB	Left Turn	675	150	20	225	38	225	44	0%	0%
	Right Turn	675	125	19	200	33	200	35	0%	0%
0										

Intersection 15 **Street D/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	425	250	36	375	66	375	69	1%	0%
	Through	1,100	150	37	250	79	250	99	0%	0%
	Right Turn	425	75	13	100	23	125	32	0%	0%
NB	Left Turn	2,900	200	91	300	123	300	124	21%	0%
	Through	2,900	50	5	75	13	75	20	0%	0%
	Through/Right	2,900	50	8	100	21	100	31	0%	0%
SB	Left Turn	2,475	100	18	175	26	175	27	0%	0%
	Through	2,475	100	16	150	25	150	30	0%	0%
	Right Turn	2,475	300	61	450	105	425	99	0%	0%
WB	Left Turn	325	125	45	300	123	325	124	0%	0%
	Through	3,200	725	119	1,075	206	1,225	274	46%	0%
	Right Turn	525	375	117	725	80	600	0	0%	0%

Intersection 20 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	675	225	37	325	73	325	80	2%	0%
	Right Turn	325	25	29	50	105	100	157	0%	0%
SB	Left Turn	5,725	125	23	200	34	200	35	0%	0%
	Right Turn	525	150	25	225	44	225	45	0%	0%
WB	Through	975	175	26	225	45	225	54	0%	0%
0										

Intersection 21 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	975	175	69	375	262	450	369	0%	0%
NB	Left Turn	525	150	21	225	42	225	56	0%	0%
	Right Turn	3,625	100	15	150	35	150	39	0%	0%
WB	Through	1,100	200	150	525	463	550	475	0%	0%
0										

Intersection 31 **Street C/Street G** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Left Turn	275	25	8	50	17	50	15	0%	0%
	Right Turn	1,225	50	13	75	29	75	32	0%	0%
NB	Left Turn	125	125	8	150	7	125	0	34%	0%
	Through	475	150	40	325	57	275	61	0%	0%
SB	Through	2,625	100	34	200	83	200	83	0%	0%
	Through/Right	2,625	50	9	100	22	100	31	0%	0%
0										

Intersection 32 **Street C/Street H** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Left Turn	1,300	125	17	175	33	175	34	2%	0%
	Right Turn	175	25	10	75	40	75	58	0%	0%
NB	Left Turn	175	50	10	100	14	100	21	0%	0%
	Through	1,525	175	66	275	112	275	111	0%	0%
SB	Through	425	75	14	125	29	150	36	0%	0%
	Right Turn	225	50	10	75	15	75	17	0%	0%
0										

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	552	365	10	500	177
v/c Ratio	0.66	0.25	0.05	0.52	0.22
Control Delay	15.6	0.4	25.0	18.2	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.6	0.4	25.0	18.2	18.2
Queue Length 50th (ft)	114	0	3	72	23
Queue Length 95th (ft)	#290	0	16	108	55
Internal Link Dist (ft)	140			512	598
Turn Bay Length (ft)			200		
Base Capacity (vph)	840	1455	789	3195	2012
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.66	0.25	0.01	0.16	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Intersection 14 **Street C/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
NB	Through	425	225	36	300	70	300	65	0%	0%
	Right Turn	425	225	45	300	85	300	77	1%	0%
SB	Left Turn	475	375	62	500	81	475	66	21%	6%
	Through	475	125	17	200	18	200	36	0%	0%
WB	Left Turn	675	450	96	700	146	650	73	23%	3%
	Right Turn	675	325	135	650	247	650	115	0%	3%
0										

Intersection 15 **Street D/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	425	250	54	450	118	425	107	0%	0%
	Through	1,100	475	125	650	232	650	205	13%	0%
	Right Turn	425	250	75	525	137	475	3	0%	0%
NB	Left Turn	2,900	450	110	700	186	700	177	27%	0%
	Through	2,900	125	12	175	35	200	54	0%	0%
	Through/Right	225	125	12	200	22	200	24	1%	0%
SB	Left Turn	2,475	275	27	375	47	375	61	0%	0%
	Through	2,475	475	241	1,100	516	1,125	356	0%	0%
	Right Turn	2,475	1,225	191	1,950	326	1,925	323	0%	0%
WB	Left Turn	325	175	65	400	122	350	79	0%	0%
	Through	3,200	900	181	1,425	311	1,450	345	58%	0%
	Right Turn	525	450	99	725	94	600	0	0%	0%

Intersection 20 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	675	375	66	575	160	550	127	9%	1%
	Right Turn	325	175	62	425	69	350	0	0%	0%
SB	Left Turn	5,725	200	17	275	30	275	32	0%	0%
	Right Turn	525	250	57	375	98	375	100	0%	0%
WB	Through	975	250	37	350	75	375	144	0%	0%
	Right Turn	450	25	27	75	136	100	189	0%	0%
0										

Intersection 21 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	975	250	65	375	149	375	185	1%	0%
	Right Turn	450	25	41	50	146	50	142	0%	0%
NB	Left Turn	525	300	82	450	140	425	122	2%	0%
	Right Turn	3,625	175	24	250	28	250	43	0%	0%
WB	Through	1,100	200	26	275	56	275	50	0%	0%
0										

Intersection 31 **Street C/Street G** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Left Turn	275	25	5	25	12	25	14	0%	0%
	Right Turn	1,225	125	38	225	64	225	70	1%	0%
NB	Left Turn	125	125	6	150	9	125	1	46%	0%
	Through	475	250	49	400	101	375	97	0%	0%
SB	Through	2,625	225	61	375	92	375	100	0%	0%
	Through/Right	2,625	100	23	175	51	175	61	0%	0%
0										

Intersection 32 **Street C/Street H** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Left Turn	1,300	150	32	250	77	250	72	10%	0%
	Right Turn	175	50	6	75	17	75	20	0%	0%
NB	Left Turn	175	50	11	100	15	100	20	0%	0%
	Through	1,525	175	47	300	110	275	135	0%	0%
SB	Through	425	150	27	250	38	250	55	1%	0%
	Right Turn	225	75	18	175	42	200	57	0%	0%
0										

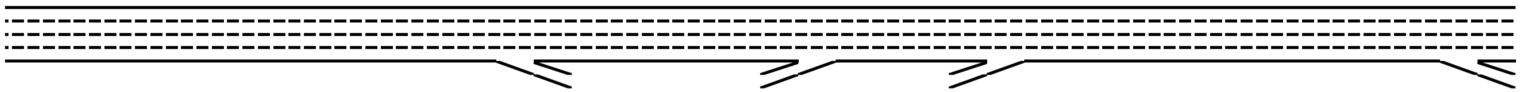
INTENTIONALLY LEFT BLANK

Appendix G:

Existing Plus Project Conditions (2015) – Freeway Operations

Project: Grapevine
Freeway Corridor: Northbound I-5

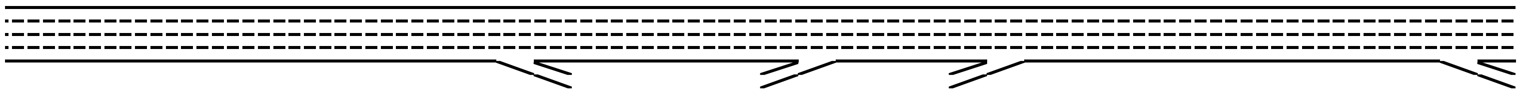
Alternative: Existing Plus Project Condition
Time Period: AM Peak Hour



Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4	5	6	7	8
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Define Freeway Segment								
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500
Accel Length					500	500		
Decel Length			500					170
Mainline Volume	2,270	2,270	2,270	1,510	1,510	2,190	3,150	3,150
On Ramp Volume					680	960		
Off Ramp Volume			760					380
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	2,270	2,270	2,270	1,510	2,190	3,150	3,150	3,150
PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
GP Lanes	4	4	4	4	4	4	4	4
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	18.1%	18.1%	18.1%	21.9%	21.9%	21.9%	13.3%	13.3%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.734	0.917	0.917	0.901	0.901	0.901	0.938	0.938
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,324	2,662	2,662	1,801	2,613	3,758	3,612	3,612
GP Flow (pcphpl)	831	665	665	450	653	939	903	903
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS	65.0	65.0	65.0	65.0	65.0			
FFS Curve	65	65	65	65	65	65	70	70

Location	1	2	3	4	5	6	7	8
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Calculate Operations in General Purpose Lanes								
v/c ratio	0.35	0.28	0.28	0.19	0.28	0.40	0.38	0.38
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	70.0	70.0
Density (pcphpl)	12.8	10.2	10.2	6.9	10.0	14.5	12.9	12.9
LOS	B	A	A	A	A	B	B	B
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)			2,662		1,852	2,687		3,612
GP_{IN} Cap (pcph)			9,400		9,400	9,400		9,600
GP_{IN} v/c ratio			0.28		0.20	0.29		0.38
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)			1,792		2,613	3,758		3,172
GP_{OUT} Cap (pcph)			9,400		9,400	9,400		9,600
GP_{OUT} v/c ratio			0.19		0.28	0.40		0.33
Calculate On Ramp Flow Rate								
On Volume (vph)					680	960		
PHF					0.92	0.92		
Total Lanes					1	1		
Terrain					Level	Level		
Grade %					0.0%	0.0%		
Grade Length (mi)					0.00	0.00		
Truck & Bus %					5.9%	5.2%		
RV %					0.0%	0.0%		
E_T					1.5	1.5		
E_R					1.2	1.2		
f_{HV}					0.971	0.975		
f_P					1.00	1.00		
On Flow (pcph)					761	1,071		
On Flow (pcphpl)					761	1,071		
Calculate On Ramp Roadway Operations								
On Ramp Type					Right	Right		
On Ramp Speed (mph)					25	45		
On Ramp Cap (pcph)					1,900	2,100		
On Ramp v/c ratio					0.40	0.51		
Calculate Off Ramp Flow Rate								

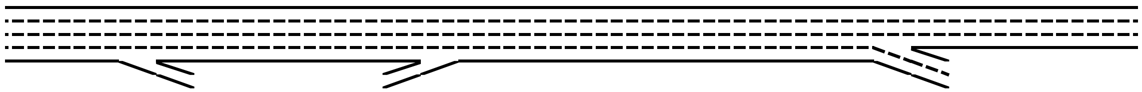


Location	1	2	3	4	5	6	7	8
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Off Volume (vph)			760					380
PHF			0.92					0.92
Total Lanes			1					1
Terrain			Level					Level
Grade %			0.0%					0.0%
Grade Length (mi)			0.00					0.00
Truck & Bus %			10.5%					13.2%
RV %			0.0%					0.0%
E_T			1.5					1.5
E_R			1.2					1.2
f_{HV}			0.950					0.938
f_P			1.00					1.00
Off Flow (pcph)			869					440
Off Flow (pcphpl)			869					440
Calculate Off Ramp Roadway Operations								
Off Ramp Type			Right					Right
Off Ramp Speed			45					45
Off Ramp Cap (pcph)			2,100					2,100
Off Ramp v/c ratio			0.41					0.21
Determine Adjacent Ramp for Three-Lane Mainline Segments								
Up Type								
Up Distance								
Up Flow (pcph)								
Down Type								
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area Operations								
Effective v_P (pcph)					1,852	2,687		
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)					0.592	0.592		
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}					0.123	0.208		
v_{12} (pcph)					227	559		

Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4	5	6	7	8
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
v_3 (pcph)								
v_{34} (pcph)					1,625	2,129		
v_{12a} (pcph)					741	1,075		
v_{R12a} (pcph)					1,502	2,146		
Merge Speed Index					0.31	0.31		
Merge Area Speed					57.8	57.9		
Outer Lanes Volume					556	806		
Outer Lanes Speed					64.8	63.9		
Segment Speed					60.6	60.3		
Merge v/c ratio					0.33	0.47		
Merge Density					13.7	18.6		
Merge LOS					B	B		
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)			2,662					3,612
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)			0.653					0.649
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}			0.436					0.436
v_{12} (pcph)			1,651					1,823
v_3 (pcph)								
v_{34} (pcph)			1,011					1,789
v_{12a} (pcph)			1,651					1,823
Diverge Speed Index			0.38					0.34
Diverge Area Speed			56.3					60.5
Outer Lanes Volume			505					895
Outer Lanes Speed			71.3					76.8
Segment Speed			61.2					67.6
Diverge v/c ratio			0.38					0.41
Diverge Density			13.9					18.4
Diverge LOS			B					B
Summarize Segment Operations								
Segment v/c ratio	0.35	0.28	0.38	0.19	0.33	0.47	0.38	0.41
Segment Density	12.8	10.2	13.9	6.9	13.7	18.6	12.9	18.4
Segment LOS	B	A	B	A	B	B	B	B
Over Capacity								

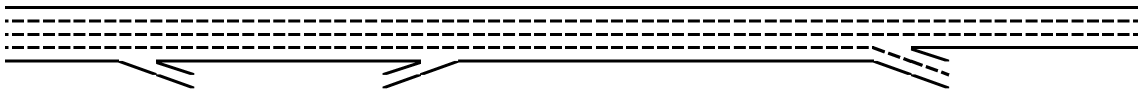
Location	9	10	11	12	13	14



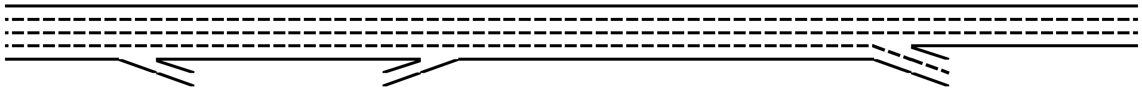
Key
<> Express Lane (HOV)
No Trucks

Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment						
Type	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	1,240	1,470	1,500	3,336	2,000	2,000
Accel Length			500			
Decel Length	185					
Mainline Volume	2,770	2,700	2,700	3,340	3,340	2,200
On Ramp Volume			640			
Off Ramp Volume	70				1,140	
Express Lane Volume						
EL On Ramp Volume						
EL Off Ramp Volume						
Calculate Flow Rate in General Pu						
GP Volume (vph)	2,770	2,700	3,340	3,340	3,340	2,200
PHF	0.93	0.93	0.93	0.93	0.93	0.93
GP Lanes	4	4	4	4	4	3
Terrain	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	13.3%	13.0%	13.0%	14.1%	14.1%	14.1%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.938	0.939	0.939	0.934	0.934	0.934
f_P	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,177	3,092	3,825	3,845	3,845	2,532
GP Flow (pcphpl)	794	773	956	961	961	844
Calculate Speed in General Purpo						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calculated FFS						
Measured FFS						
FFS Curve	70	70	70	70	70	70

Location	9	10	11	12	13	14

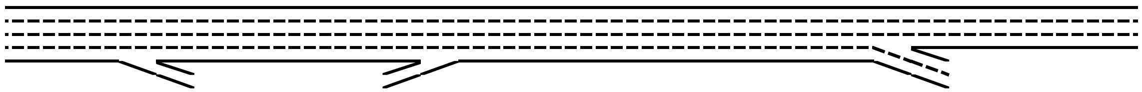


Key						
<> Express Lane (HOV)						
No Trucks						
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Calculate Operations in General P						
v/c ratio	0.33	0.32	0.40	0.40	0.40	0.35
Speed (mph)	70.0	70.0	70.0	70.0	70.0	70.0
Density (pcphpl)	11.3	11.0	13.7	13.7	13.7	12.1
LOS	B	B	B	B	B	B
Calculate Operations for Entering						
GP_{IN} Vol (pcph)	3,177		3,064			
GP_{IN} Cap (pcph)	9,600		9,600			
GP_{IN} v/c ratio	0.33		0.32			
Calculate Operations for Exiting G						
GP_{OUT} Vol (pcph)	3,090		3,825		2,519	
GP_{OUT} Cap (pcph)	9,600		9,600		7,200	
GP_{OUT} v/c ratio	0.32		0.40		0.35	
Calculate On Ramp Flow Rate						
On Volume (vph)			640			
PHF			0.92			
Total Lanes			1			
Terrain			Level			
Grade %			0.0%			
Grade Length (mi)			0.00			
Truck & Bus %			18.8%			
RV %			0.0%			
E_T			1.5			
E_R			1.2			
f_{HV}			0.914			
f_P			1.00			
On Flow (pcph)			761			
On Flow (pcphpl)			761			
Calculate On Ramp Roadway Ope						
On Ramp Type			Right			
On Ramp Speed (mph)			45			
On Ramp Cap (pcph)			2,100			
On Ramp v/c ratio			0.36			
Calculate Off Ramp Flow Rate						



Key
<> Express Lane (HOV)
No Trucks

Location	9	10	11	12	13	14
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Off Volume (vph)	70				1,140	
PHF	0.92				0.92	
Total Lanes	1				2	
Terrain	Level				Level	
Grade %	0.0%				0.0%	
Grade Length (mi)	0.00				0.00	
Truck & Bus %	28.6%				14.0%	
RV %	0.0%				0.0%	
E_T	1.5				1.5	
E_R	1.2				1.2	
f_{HV}	0.875				0.935	
f_P	1.00				1.00	
Off Flow (pcph)	87				1,326	
Off Flow (pcphpl)	87				663	
Calculate Off Ramp Roadway Ope						
Off Ramp Type	Right				Major	
Off Ramp Speed	25				65	
Off Ramp Cap (pcph)	1,900				4,700	
Off Ramp v/c ratio	0.05				0.28	
Determine Adjacent Ramp for Thr						
Up Type						
Up Distance						
Up Flow (pcph)						
Down Type						
Down Distance						
Down Flow (pcph)						
Calculate Merge Influence Area O						
Effective v_P (pcph)			3,064			
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FM} (Eqn 13-3)			0.592			
P_{FM} (Eqn 13-4)						
P_{FM} (Eqn 13-5)						
P_{FM}			0.247			
v_{12} (pcph)			755			

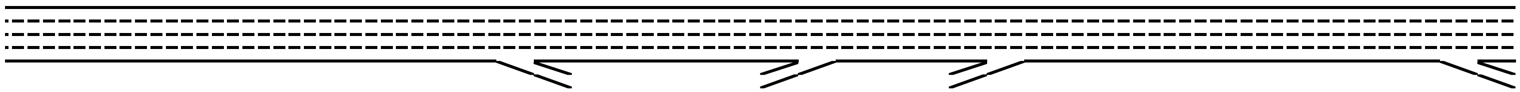


Key
<> Express Lane (HOV)
No Trucks

Location	9	10	11	12	13	14
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
v_3 (pcph)						
v_{34} (pcph)			2,308			
v_{12a} (pcph)			1,226			
v_{R12a} (pcph)			1,987			
Merge Speed Index			0.30			
Merge Area Speed			61.5			
Outer Lanes Volume			919			
Outer Lanes Speed			68.5			
Segment Speed			64.7			
Merge v/c ratio			0.43			
Merge Density			17.5			
Merge LOS			B			
Calculate Diverge Influence Area (						
Effective v_P (pcph)	3,177					
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FD} (Eqn 13-9)	0.677					
P_{FD} (Eqn 13-10)						
P_{FD} (Eqn 13-11)						
P_{FD}	0.436					
v_{12} (pcph)	1,434					
v_3 (pcph)						
v_{34} (pcph)	1,743					
v_{12a} (pcph)	1,434					
Diverge Speed Index	0.57					
Diverge Area Speed	54.2					
Outer Lanes Volume	871					
Outer Lanes Speed	76.8					
Segment Speed	64.6					
Diverge v/c ratio	0.33					
Diverge Density	14.9					
Diverge LOS	B					
Summarize Segment Operations						
Segment v/c ratio	0.33	0.32	0.43	0.40	0.40	0.35
Segment Density	14.9	11.0	17.5	13.7	13.7	12.1
Segment LOS	B	B	B	B	B	B
Over Capacity						

Location	1
Key	
<> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	1,140
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	1,140
PHF	0.92
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	14.0%
RV %	0.0%
E_T	1.5
E_R	1.2
f_{HV}	0.935
f_P	1.00
GP Flow (pcph)	1,326
GP Flow (pcphpl)	663
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f_{LW}	
f_{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.28
Speed (mph)	70.0
Density (pcphpl)	9.5
LOS	A
Calculate Operations for Entering GP Lanes	
GP_{IN} Vol (pcph)	
GP_{IN} Cap (pcph)	
GP_{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP_{OUT} Vol (pcph)	
GP_{OUT} Cap (pcph)	
GP_{OUT} v/c ratio	
Summarize Segment Operations	
Segment v/c ratio	0.28
Segment Density	9.5
Segment LOS	A
Over Capacity	

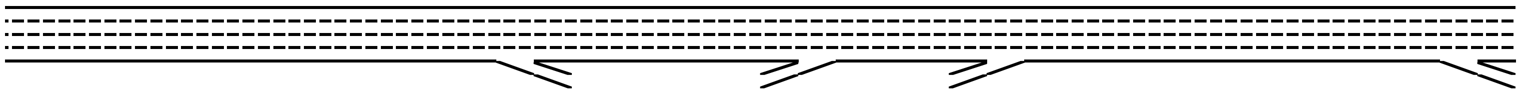
Location	1	2	3	4	5	6	7	8



Key
<> Express Lane (HOV)
No Trucks

Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Define Freeway Segment								
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500
Accel Length					500	500		
Decel Length			500					170
Mainline Volume	3,030	3,030	3,030	1,900	1,900	2,450	3,220	3,220
On Ramp Volume					550	770		
Off Ramp Volume			1,130					340
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	3,030	3,030	3,030	1,900	2,450	3,220	3,220	3,220
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
GP Lanes	4	4	4	4	4	4	4	4
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	21.8%	21.8%	21.8%	30.5%	30.5%	30.5%	21.7%	21.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.696	0.902	0.902	0.868	0.868	0.868	0.902	0.902
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	4,729	3,652	3,652	2,380	3,069	4,034	3,880	3,880
GP Flow (pcphpl)	1,182	913	913	595	767	1,008	970	970
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS	65.0	65.0	65.0	65.0	65.0			
FFS Curve	65	65	65	65	65	65	70	70
Calculate Operations in General Purpose Lanes								
v/c ratio	0.50	0.39	0.39	0.25	0.33	0.43	0.40	0.40
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	70.0	70.0

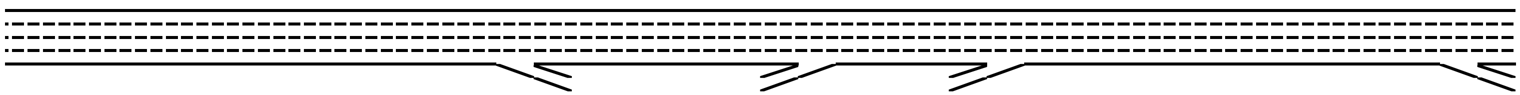
Location	1	2	3	4	5	6	7	8
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Density (pcphpl)	18.2	14.0	14.0	9.2	11.8	15.5	13.9	13.9
LOS	C	B	B	A	B	B	B	B
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)			3,652		2,450	3,153		3,880
GP_{IN} Cap (pcph)			9,400		9,400	9,400		9,600
GP_{IN} v/c ratio			0.39		0.26	0.34		0.40
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)			2,381		3,069	4,034		3,478
GP_{OUT} Cap (pcph)			9,400		9,400	9,400		9,600
GP_{OUT} v/c ratio			0.25		0.33	0.43		0.36
Calculate On Ramp Flow Rate								
On Volume (vph)					550	770		
PHF					0.92	0.92		
Total Lanes					1	1		
Terrain					Level	Level		
Grade %					0.0%	0.0%		
Grade Length (mi)					0.00	0.00		
Truck & Bus %					7.3%	10.4%		
RV %					0.0%	0.0%		
E_T					1.5	1.5		
E_R					1.2	1.2		
f_{HV}					0.965	0.951		
f_P					1.00	1.00		
On Flow (pcph)					620	880		
On Flow (pcphpl)					620	880		
Calculate On Ramp Roadway Operations								
On Ramp Type					Right	Right		
On Ramp Speed (mph)					25	45		
On Ramp Cap (pcph)					1,900	2,100		
On Ramp v/c ratio					0.33	0.42		
Calculate Off Ramp Flow Rate								
Off Volume (vph)			1,130					340
PHF			0.92					0.92
Total Lanes			1					1



Key
<> Express Lane (HOV)
No Trucks

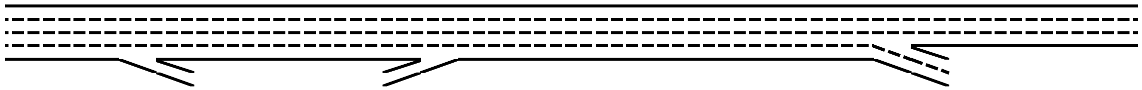
Location	1	2	3	4	5	6	7	8
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Terrain			Level					Level
Grade %			0.0%					0.0%
Grade Length (mi)			0.00					0.00
Truck & Bus %			7.1%					17.6%
RV %			0.0%					0.0%
E_T			1.5					1.5
E_R			1.2					1.2
f_{HV}			0.966					0.919
f_P			1.00					1.00
Off Flow (pcph)			1,272					402
Off Flow (pcphpl)			1,272					402
Calculate Off Ramp Roadway Operations								
Off Ramp Type			Right					Right
Off Ramp Speed			45					45
Off Ramp Cap (pcph)			2,100					2,100
Off Ramp v/c ratio			0.61					0.19
Determine Adjacent Ramp for Three-Lane Mainline Segments								
Up Type								
Up Distance								
Up Flow (pcph)								
Down Type								
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area Operations								
Effective v_P (pcph)					2,450	3,153		
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)					0.592	0.592		
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}					0.140	0.232		
v_{12} (pcph)					344	730		
v_3 (pcph)								
v_{34} (pcph)					2,106	2,423		

Location	1	2	3	4	5	6	7	8



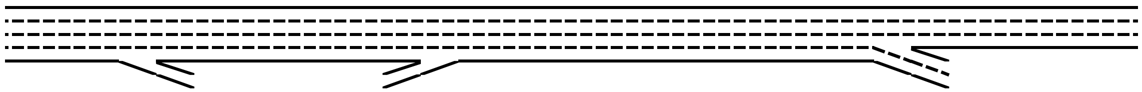
Key
<> Express Lane (HOV)
No Trucks

Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
v_{12a} (pcph)					980	1,261		
v_{R12a} (pcph)					1,599	2,142		
Merge Speed Index					0.32	0.31		
Merge Area Speed					57.7	57.9		
Outer Lanes Volume					735	946		
Outer Lanes Speed					64.2	63.4		
Segment Speed					60.6	60.3		
Merge v/c ratio					0.35	0.47		
Merge Density					14.5	18.6		
Merge LOS					B	B		
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)			3,652					3,880
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)			0.610					0.645
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}			0.436					0.436
v_{12} (pcph)			2,310					1,918
v_3 (pcph)								
v_{34} (pcph)			1,343					1,961
v_{12a} (pcph)			2,310					1,918
Diverge Speed Index			0.41					0.33
Diverge Area Speed			55.5					60.6
Outer Lanes Volume			671					981
Outer Lanes Speed			71.3					76.8
Segment Speed			60.4					67.9
Diverge v/c ratio			0.52					0.44
Diverge Density			19.6					19.2
Diverge LOS			B					B
Summarize Segment Operations								
Segment v/c ratio	0.50	0.39	0.52	0.25	0.35	0.47	0.40	0.44
Segment Density	18.2	14.0	19.6	9.2	14.5	18.6	13.9	19.2
Segment LOS	C	B	B	A	B	B	B	B
Over Capacity								



Key
<> Express Lane (HOV)
No Trucks

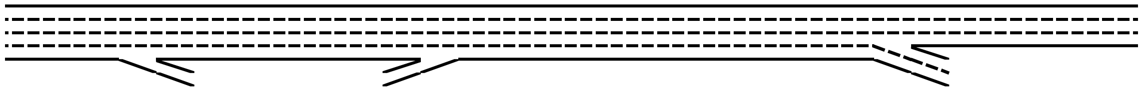
Location	9	10	11	12	13	14
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment						
Type	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	1,240	1,470	1,500	3,336	1,500	
Accel Length			500			
Decel Length	185					
Mainline Volume	2,880	2,800	2,800	3,710	3,710	2,460
On Ramp Volume			910			
Off Ramp Volume	80				1,250	
Express Lane Volume						
EL On Ramp Volume						
EL Off Ramp Volume						
Calculate Flow Rate in General Pu						
GP Volume (vph)	2,880	2,800	3,710	3,710	3,710	2,460
PHF	0.92	0.92	0.92	0.92	0.92	0.97
GP Lanes	4	4	4	4	4	3
Terrain	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	21.7%	21.8%	21.8%	20.2%	20.2%	17.1%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.902	0.902	0.902	0.908	0.908	0.921
f_P	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,470	3,375	4,472	4,440	4,440	2,753
GP Flow (pcphpl)	868	844	1,118	1,110	1,110	918
Calculate Speed in General Purpo						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calculated FFS						
Measured FFS						
FFS Curve	70	70	70	70	70	70
Calculate Operations in General P						
v/c ratio	0.36	0.35	0.47	0.46	0.46	0.38
Speed (mph)	70.0	70.0	70.0	70.0	70.0	70.0



Key
<> Express Lane (HOV)
No Trucks

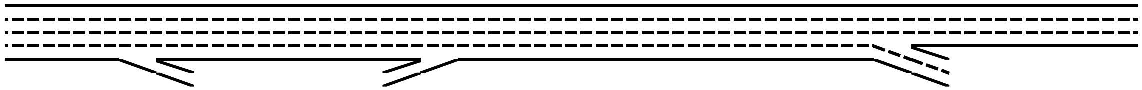
Location	9	10	11	12	13	14
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Density (pcphpl)	12.4	12.1	16.0	15.9	15.9	13.1
LOS	B	B	B	B	B	B
Calculate Operations for Entering						
GP_{IN} Vol (pcph)	3,470		3,407			
GP_{IN} Cap (pcph)	9,600		9,600			
GP_{IN} v/c ratio	0.36		0.35			
Calculate Operations for Exiting G						
GP_{OUT} Vol (pcph)	3,367		4,472		2,902	
GP_{OUT} Cap (pcph)	9,600		9,600		7,200	
GP_{OUT} v/c ratio	0.35		0.47		0.40	
Calculate On Ramp Flow Rate						
On Volume (vph)			910			
PHF			0.92			
Total Lanes			1			
Terrain			Level			
Grade %			0.0%			
Grade Length (mi)			0.00			
Truck & Bus %			15.4%			
RV %			0.0%			
E_T			1.5			
E_R			1.2			
f_{HV}			0.929			
f_P			1.00			
On Flow (pcph)			1,065			
On Flow (pcphpl)			1,065			
Calculate On Ramp Roadway Ope						
On Ramp Type			Right			
On Ramp Speed (mph)			45			
On Ramp Cap (pcph)			2,100			
On Ramp v/c ratio			0.51			
Calculate Off Ramp Flow Rate						
Off Volume (vph)	80				1,250	
PHF	0.92				0.92	
Total Lanes	1				2	

Location	9	10	11	12	13	14



Key
<> Express Lane (HOV)
No Trucks

Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Terrain	Level				Level	
Grade %	0.0%				0.0%	
Grade Length (mi)	0.00				0.00	
Truck & Bus %	37.5%				26.4%	
RV %	0.0%				0.0%	
E_T	1.5				1.5	
E_R	1.2				1.2	
f_{HV}	0.842				0.883	
f_P	1.00				1.00	
Off Flow (pcph)	103				1,538	
Off Flow (pcphpl)	103				769	
Calculate Off Ramp Roadway Ope						
Off Ramp Type	Right				Major	
Off Ramp Speed	25				65	
Off Ramp Cap (pcph)	1,900				4,700	
Off Ramp v/c ratio	0.05				0.33	
Determine Adjacent Ramp for Thr						
Up Type						
Up Distance						
Up Flow (pcph)						
Down Type						
Down Distance						
Down Flow (pcph)						
Calculate Merge Influence Area O						
Effective v_P (pcph)			3,407			
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FM} (Eqn 13-3)			0.592			
P_{FM} (Eqn 13-4)						
P_{FM} (Eqn 13-5)						
P_{FM}			0.085			
v_{12} (pcph)			288			
v_3 (pcph)						
v_{34} (pcph)			3,119			



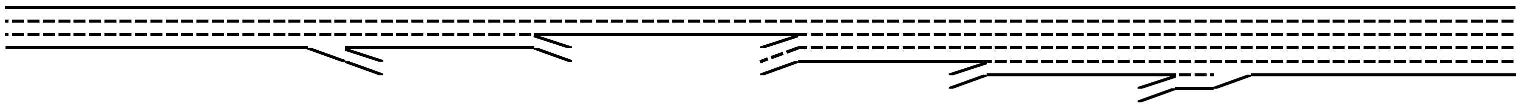
Key
<> Express Lane (HOV)
No Trucks

Location	9	10	11	12	13	14
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
v_{12a} (pcph)			1,363			
v_{R12a} (pcph)			2,428			
Merge Speed Index			0.32			
Merge Area Speed			61.0			
Outer Lanes Volume			1,022			
Outer Lanes Speed			68.1			
Segment Speed			64.1			
Merge v/c ratio			0.53			
Merge Density			20.8			
Merge LOS			C			
Calculate Diverge Influence Area (						
Effective v_P (pcph)	3,470					
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FD} (Eqn 13-9)	0.668					
P_{FD} (Eqn 13-10)						
P_{FD} (Eqn 13-11)						
P_{FD}	0.436					
v_{12} (pcph)	1,571					
v_3 (pcph)						
v_{34} (pcph)	1,899					
v_{12a} (pcph)	1,571					
Diverge Speed Index	0.57					
Diverge Area Speed	54.1					
Outer Lanes Volume	949					
Outer Lanes Speed	76.8					
Segment Speed	64.5					
Diverge v/c ratio	0.36					
Diverge Density	16.1					
Diverge LOS	B					
Summarize Segment Operations						
Segment v/c ratio	0.36	0.35	0.53	0.46	0.46	0.38
Segment Density	16.1	12.1	20.8	15.9	15.9	13.1
Segment LOS	B	B	C	B	B	B
Over Capacity						

Location	1

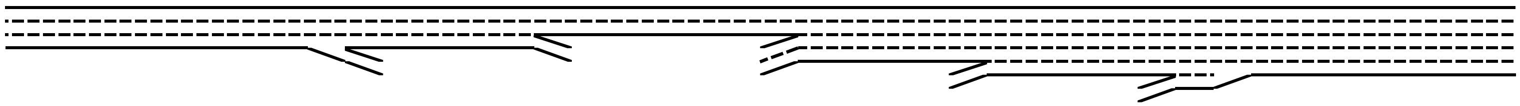
Key
<> Express Lane (HOV)
No Trucks

Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	1,250
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	1,250
PHF	0.92
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	26.4%
RV %	0.0%
E_T	1.5
E_R	1.2
f_{HV}	0.883
f_P	1.00
GP Flow (pcph)	1,538
GP Flow (pcphpl)	769
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f_{LW}	
f_{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.32
Speed (mph)	70.0
Density (pcphpl)	11.0
LOS	A
Calculate Operations for Entering GP Lanes	
GP_{IN} Vol (pcph)	
GP_{IN} Cap (pcph)	
GP_{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP_{OUT} Vol (pcph)	
GP_{OUT} Cap (pcph)	
GP_{OUT} v/c ratio	
Summarize Segment Operations	
Segment v/c ratio	0.32
Segment Density	11.0
Segment LOS	A
Over Capacity	



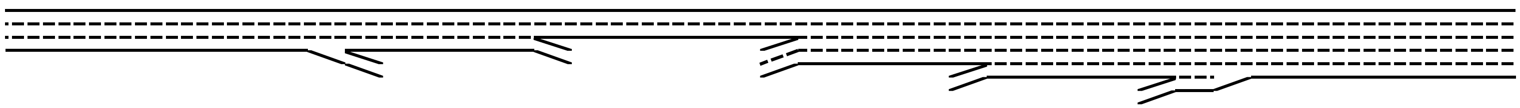
Key
<> Express Lane (HOV)
No Trucks

Location	4	5	6	7	8	9	10	11
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Define Freeway Segment								
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310
Accel Length							1,000	
Decel Length		150						
Mainline Volume	1,630	1,630	1,420	1,320	1,320	1,820	1,920	2,260
On Ramp Volume					500	100	340	
Off Ramp Volume		210	100					
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	1,630	1,630	1,420	1,320	1,820	1,920	2,260	2,260
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
GP Lanes	3	3	3	2	4	5	5	5
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	19.0%	19.0%	7.0%	0.0%	0.0%	3.5%	8.5%	22.1%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.913	0.913	0.966	1.000	1.000	0.983	0.959	0.900
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	1,940	1,940	1,598	1,435	1,978	2,123	2,561	2,728
GP Flow (pcphpl)	647	647	533	717	495	425	512	546
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65



Key
<> Express Lane (HOV)
No Trucks

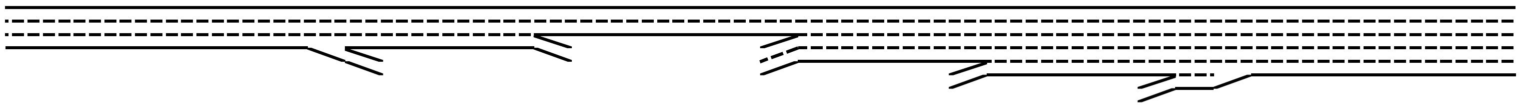
Location	4	5	6	7	8	9	10	11
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Calculate Operations in General Purpose Lanes								
v/c ratio	0.28	0.28	0.23	0.31	0.21	0.18	0.22	0.23
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Density (pcphpl)	9.9	9.9	8.2	11.0	7.6	6.5	7.9	8.4
LOS	A	A	A	B	A	A	A	A
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)		1,940			1,401	1,960	2,007	
GP_{IN} Cap (pcph)		7,050			4,700	9,400	11,750	
GP_{IN} v/c ratio		0.28			0.30	0.21	0.17	
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)		1,598	1,435				2,561	
GP_{OUT} Cap (pcph)		7,050	4,700				11,750	
GP_{OUT} v/c ratio		0.23	0.31				0.22	
Calculate On Ramp Flow Rate								
On Volume (vph)					500	100	340	
PHF					0.92	0.92	0.92	
Total Lanes					2	1	1	
Terrain					Level	Level	Level	
Grade %					0.0%	0.0%	0.0%	
Grade Length (mi)					0.00	0.00	0.00	
Truck & Bus %					12.5%	100.0%	100.0%	
RV %					0.0%	0.0%	0.0%	
E_T					1.5	1.5	1.5	
E_R					1.2	1.2	1.2	
f_{HV}					0.941	0.667	0.667	
f_P					1.00	1.00	1.00	
On Flow (pcph)					577	163	554	
On Flow (pcphpl)					289	163	554	
Calculate On Ramp Roadway Operations								
On Ramp Type					Major	Major	Right	
On Ramp Speed (mph)					70	55	55	
On Ramp Cap (pcph)					4,800	2,250	2,200	
On Ramp v/c ratio					0.12	0.07	0.25	



Key
<> Express Lane (HOV)
No Trucks

Location	4	5	6	7	8	9	10	11
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Calculate Off Ramp Flow Rate								
Off Volume (vph)		210	100					
PHF		0.92	0.92					
Total Lanes		1	1					
Terrain		Level	Level					
Grade %		0.0%	0.0%					
Grade Length (mi)		0.00	0.00					
Truck & Bus %		100.0%	100.0%					
RV %		0.0%	0.0%					
E_T		1.5	1.5					
E_R		1.2	1.2					
f_{HV}		0.667	0.667					
f_P		1.00	1.00					
Off Flow (pcph)		342	163					
Off Flow (pcphpl)		342	163					
Calculate Off Ramp Roadway Operations								
Off Ramp Type		Right	Right					
Off Ramp Speed		45	45					
Off Ramp Cap (pcph)		2,100	2,100					
Off Ramp v/c ratio		0.16	0.08					
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps								
Up Type		No	Off					
Up Distance			4,500					
Up Flow (pcph)			342					
Down Type		Off	No					
Down Distance		1,000						
Down Flow (pcph)		163						
Calculate Merge Influence Area Operations								
Effective v_P (pcph)							1,565	
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)							0.606	
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}							0.351	
v_{12} (pcph)							550	

Location	4	5	6	7	8	9	10	11

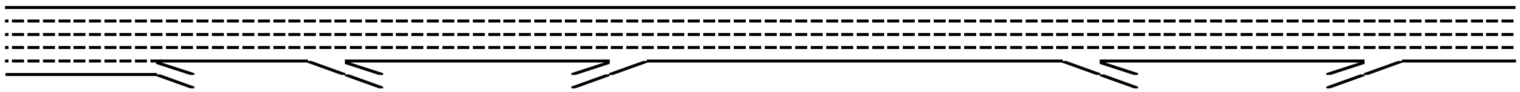


Key
<> Express Lane (HOV)
No Trucks

Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
v_3 (pcph)								
v_{34} (pcph)							1,015	
v_{12a} (pcph)							626	
v_{R12a} (pcph)							1,180	
Merge Speed Index							0.22	
Merge Area Speed							59.9	
Outer Lanes Volume							470	
Outer Lanes Speed							65.0	
Segment Speed							62.0	
Merge v/c ratio							0.26	
Merge Density							8.2	
Merge LOS							A	
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)		1,940						
Up Ramp L_{EQ}								
Down Ramp L_{EQ}		170						
P_{FD} (Eqn 13-9)		0.696						
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)		0.596						
P_{FD}		0.696						
v_{12} (pcph)		1,454						
v_3 (pcph)		486						
v_{34} (pcph)								
v_{12a} (pcph)		1,454						
Diverge Speed Index		0.33						
Diverge Area Speed		57.4						
Outer Lanes Volume		486						
Outer Lanes Speed		71.3						
Segment Speed		60.4						
Diverge v/c ratio		0.33						
Diverge Density		15.4						
Diverge LOS		B						
Summarize Segment Operations								
Segment v/c ratio	0.28	0.33	0.23	0.31	0.21	0.18	0.26	0.23
Segment Density	9.9	15.4	8.2	11.0	7.6	6.5	8.2	8.4
Segment LOS	A	B	A	B	A	A	A	A
Over Capacity								

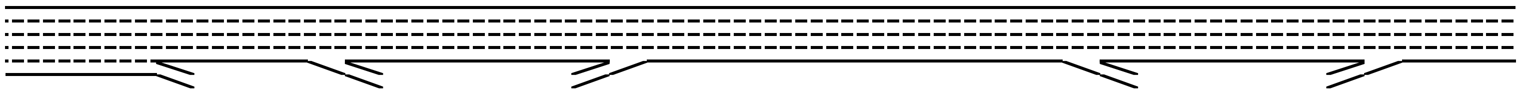
Key
<> Express Lane (HOV)
No Trucks

Location	12	13	14	15	16	17	18	19
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Define Freeway Segment								
Type	Basic	Diverge	Basic	Merge	Basic	Diverge	Basic	Merge
Length (ft)	1,500	1,250	1,760	1,500	3,175	1,500	975	1,500
Accel Length				560				500
Decel Length		170				500		
Mainline Volume	2,260	2,020	1,730	1,730	2,200	2,200	1,360	1,360
On Ramp Volume				470				360
Off Ramp Volume	240	290				840		
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Pu								
GP Volume (vph)	2,260	2,020	1,730	2,200	2,200	2,200	1,360	1,720
PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
GP Lanes	5	4	4	4	4	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	22.1%	22.1%	24.3%	24.3%	24.5%	24.5%	30.1%	30.1%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.900	0.900	0.892	0.892	0.891	0.891	0.869	0.869
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	2,728	2,438	2,109	2,682	2,684	2,684	1,701	2,151
GP Flow (pcphpl)	546	610	527	670	671	671	425	538
Calculate Speed in General Purpo								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65



Key
<> Express Lane (HOV)
No Trucks

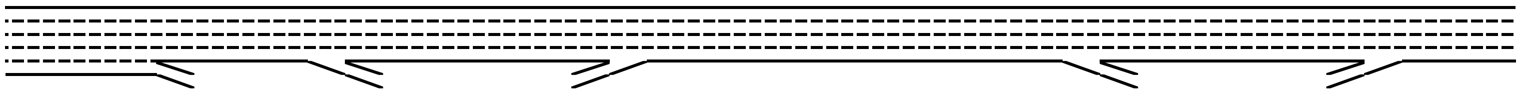
Location	12	13	14	15	16	17	18	19
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Calculate Operations in General P								
v/c ratio	0.23	0.26	0.22	0.29	0.29	0.29	0.18	0.23
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Density (pcphpl)	8.4	9.4	8.1	10.3	10.3	10.3	6.5	8.3
LOS	A	A	A	A	A	A	A	A
Calculate Operations for Entering								
GP_{IN} Vol (pcph)		2,438		2,106		2,684		1,732
GP_{IN} Cap (pcph)		9,400		9,400		9,400		9,400
GP_{IN} v/c ratio		0.26		0.22		0.29		0.18
Calculate Operations for Exiting G								
GP_{OUT} Vol (pcph)	2,451	2,096		2,682		1,700		2,151
GP_{OUT} Cap (pcph)	9,400	9,400		9,400		9,400		9,400
GP_{OUT} v/c ratio	0.26	0.22		0.29		0.18		0.23
Calculate On Ramp Flow Rate								
On Volume (vph)				470				360
PHF				0.92				0.92
Total Lanes				1				1
Terrain				Level				Level
Grade %				0.0%				0.0%
Grade Length (mi)				0.00				0.00
Truck & Bus %				25.5%				13.9%
RV %				0.0%				0.0%
E_T				1.5				1.5
E_R				1.2				1.2
f_{HV}				0.887				0.935
f_P				1.00				1.00
On Flow (pcph)				576				419
On Flow (pcphpl)				576				419
Calculate On Ramp Roadway Ope								
On Ramp Type				Right				Right
On Ramp Speed (mph)				45				25
On Ramp Cap (pcph)				2,100				1,900
On Ramp v/c ratio				0.27				0.22



Key
<> Express Lane (HOV)
No Trucks

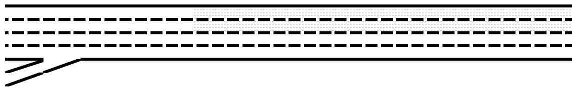
Location	12	13	14	15	16	17	18	19
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Calculate Off Ramp Flow Rate								
Off Volume (vph)	240	290				840		
PHF	0.92	0.92				0.92		
Total Lanes	1	1				1		
Terrain	Level	Level				Level		
Grade %	0.0%	0.0%				0.0%		
Grade Length (mi)	0.00	0.00				0.00		
Truck & Bus %	12.5%	17.2%				15.5%		
RV %	0.0%	0.0%				0.0%		
E_T	1.5	1.5				1.5		
E_R	1.2	1.2				1.2		
f_{HV}	0.941	0.921				0.928		
f_P	1.00	1.00				1.00		
Off Flow (pcph)	277	342				984		
Off Flow (pcphpl)	277	342				984		
Calculate Off Ramp Roadway Ope								
Off Ramp Type	Right	Right				Right		
Off Ramp Speed	45	20				45		
Off Ramp Cap (pcph)	2,100	1,900				2,100		
Off Ramp v/c ratio	0.13	0.18				0.47		
Determine Adjacent Ramp for Thr								
Up Type								
Up Distance								
Up Flow (pcph)								
Down Type								
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area O								
Effective v_P (pcph)				2,106				1,732
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)				0.593				0.592
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}				0.285				0.388
v_{12} (pcph)				599				673

Location	12	13	14	15	16	17	18	19



Key
<> Express Lane (HOV)
No Trucks

Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
v_3 (pcph)								
v_{34} (pcph)				1,507				1,059
v_{12a} (pcph)				842				693
v_{R12a} (pcph)				1,418				1,111
Merge Speed Index				0.29				0.31
Merge Area Speed				58.4				57.9
Outer Lanes Volume				632				520
Outer Lanes Speed				64.5				64.9
Segment Speed				61.1				61.1
Merge v/c ratio				0.31				0.24
Merge Density				12.8				10.8
Merge LOS				B				B
Calculate Diverge Influence Area C								
Effective v_P (pcph)		2,438				2,684		
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)		0.683				0.648		
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}		0.436				0.436		
v_{12} (pcph)		1,256				1,725		
v_3 (pcph)								
v_{34} (pcph)		1,182				959		
v_{12a} (pcph)		1,256				1,725		
Diverge Speed Index		0.65				0.39		
Diverge Area Speed		50.0				56.1		
Outer Lanes Volume		591				480		
Outer Lanes Speed		71.3				71.3		
Segment Speed		58.4				60.7		
Diverge v/c ratio		0.29				0.39		
Diverge Density		13.5				14.6		
Diverge LOS		B				B		
Summarize Segment Operations								
Segment v/c ratio	0.23	0.29	0.22	0.31	0.29	0.39	0.18	0.24
Segment Density	8.4	13.5	8.1	12.8	10.3	14.6	6.5	10.8
Segment LOS	A	B	A	B	A	B	A	B
Over Capacity								



Key

<> Express Lane (HOV)

No Trucks

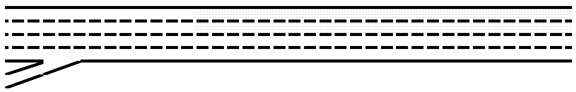
Location	20	21	22
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Define Freeway Segment			
Type	Merge	Basic	Basic
Length (ft)	1,500	3,200	22,312
Accel Length	500		
Decel Length			
Mainline Volume	1,720	1,940	1,940
On Ramp Volume	220		
Off Ramp Volume			
Express Lane Volume			
EL On Ramp Volume			
EL Off Ramp Volume			
Calculate Flow Rate in General Pu			
GP Volume (vph)	1,940	1,940	1,940
PHF	0.92	0.92	0.92
GP Lanes	4	4	4
Terrain	Level	Grade	Grade
Grade %	0.0%	0.0%	6.0%
Grade Length (mi)	0.00	0.00	5.00
Truck & Bus %	30.1%	22.1%	25.3%
RV %	0.0%	0.0%	0.0%
E_T	1.5	1.5	3.5
E_R	1.2	1.2	6.0
f_{HV}	0.869	0.900	0.613
f_P	1.00	1.00	1.00
GP Flow (pcph)	2,426	2,342	3,442
GP Flow (pcphpl)	607	585	861
Calculate Speed in General Purpo			
Lane Width (ft)			
Shoulder Width			
TRD			
f_{LW}			
f_{LC}			
Calculated FFS			
Measured FFS			
FFS Curve	65	65	55

Location	20	21	22
Key			
<> Express Lane (HOV)			
No Trucks			
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Calculate Operations in General P			
v/c ratio	0.26	0.25	0.38
Speed (mph)	65.0	65.0	55.0
Density (pcphpl)	9.3	9.0	15.6
LOS	A	A	B
Calculate Operations for Entering			
GP_{IN} Vol (pcph)	2,171		
GP_{IN} Cap (pcph)	9,400		
GP_{IN} v/c ratio	0.23		
Calculate Operations for Exiting G			
GP_{OUT} Vol (pcph)	2,426		
GP_{OUT} Cap (pcph)	9,400		
GP_{OUT} v/c ratio	0.26		
Calculate On Ramp Flow Rate			
On Volume (vph)	220		
PHF	0.92		
Total Lanes	1		
Terrain	Level		
Grade %	0.0%		
Grade Length (mi)	0.00		
Truck & Bus %	13.6%		
RV %	0.0%		
E_T	1.5		
E_R	1.2		
f_{HV}	0.936		
f_P	1.00		
On Flow (pcph)	255		
On Flow (pcphpl)	255		
Calculate On Ramp Roadway Ope			
On Ramp Type	Right		
On Ramp Speed (mph)	45		
On Ramp Cap (pcph)	2,100		
On Ramp v/c ratio	0.12		

Key
<> Express Lane (HOV)
No Trucks

Location	20	21	22
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Calculate Off Ramp Flow Rate			
Off Volume (vph)			
PHF			
Total Lanes			
Terrain			
Grade %			
Grade Length (mi)			
Truck & Bus %			
RV %			
E_T			
E_R			
f_{HV}			
f_P			
Off Flow (pcph)			
Off Flow (pcphpl)			
Calculate Off Ramp Roadway Ope			
Off Ramp Type			
Off Ramp Speed			
Off Ramp Cap (pcph)			
Off Ramp v/c ratio			
Determine Adjacent Ramp for Thr			
Up Type			
Up Distance			
Up Flow (pcph)			
Down Type			
Down Distance			
Down Flow (pcph)			
Calculate Merge Influence Area O			
Effective v_P (pcph)	2,171		
Up Ramp L_{EQ}			
Down Ramp L_{EQ}			
P_{FM} (Eqn 13-3)	0.592		
P_{FM} (Eqn 13-4)			
P_{FM} (Eqn 13-5)			
P_{FM}	0.310		
v_{12} (pcph)	672		

Location	20	21	22



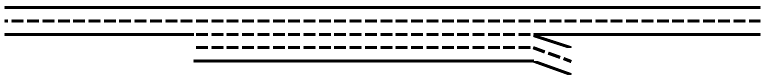
Key

<> Express Lane (HOV)

No Trucks

Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
v_3 (pcph)			
v_{34} (pcph)	1,498		
v_{12a} (pcph)	868		
v_{R12a} (pcph)	1,124		
Merge Speed Index	0.29		
Merge Area Speed	58.4		
Outer Lanes Volume	651		
Outer Lanes Speed	64.5		
Segment Speed	61.5		
Merge v/c ratio	0.24		
Merge Density	11.0		
Merge LOS	B		
Calculate Diverge Influence Area (			
Effective v_P (pcph)			
Up Ramp L_{EQ}			
Down Ramp L_{EQ}			
P_{FD} (Eqn 13-9)			
P_{FD} (Eqn 13-10)			
P_{FD} (Eqn 13-11)			
P_{FD}			
v_{12} (pcph)			
v_3 (pcph)			
v_{34} (pcph)			
v_{12a} (pcph)			
Diverge Speed Index			
Diverge Area Speed			
Outer Lanes Volume			
Outer Lanes Speed			
Segment Speed			
Diverge v/c ratio			
Diverge Density			
Diverge LOS			
Summarize Segment Operations			
Segment v/c ratio	0.24	0.25	0.38
Segment Density	11.0	9.0	15.6
Segment LOS	B	A	B
Over Capacity			

Location	1	2	3	4



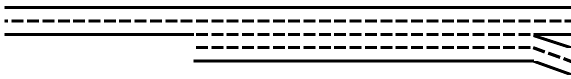
Key

<> Express Lane (HOV)

No Trucks

Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Off-ramp to CVEF	I-5 between truck off-ramp and SR99
Define Freeway Segment				
Type	Basic	Basic	Basic	Basic
Length (ft)	2,000	800	1,000	3,800
Accel Length				
Decel Length				
Mainline Volume	630	630	630	500
On Ramp Volume				
Off Ramp Volume			130	
Express Lane Volume				
EL On Ramp Volume				
EL Off Ramp Volume				
Calculate Flow Rate in General Purpose Lanes (GP)				
GP Volume (vph)	630	630	630	500
PHF	0.92	0.92	0.92	0.92
GP Lanes	2	4	4	2
Terrain	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00
Truck & Bus %	30.2%	30.2%	30.2%	12.7%
RV %	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2
f_{HV}	0.869	0.869	0.869	0.940
f_P	1.00	1.00	1.00	1.00
GP Flow (pcph)	788	788	788	578
GP Flow (pcphpl)	394	197	197	289
Calculate Speed in General Purpose Lanes				
Lane Width (ft)				
Shoulder Width				
TRD				
f_{LW}				
f_{LC}				
Calculated FFS				
Measured FFS				
FFS Curve	70	70	70	70
Calculate Operations in General Purpose Lanes				
v/c ratio	0.16	0.08	0.08	0.12
Speed (mph)	70.0	70.0	70.0	70.0
Density (pcphpl)	5.6	2.8	2.8	4.1
LOS	A	A	A	A
Calculate Operations for Entering GP Lanes				
GP_{IN} Vol (pcph)				
GP_{IN} Cap (pcph)				
GP_{IN} v/c ratio				
Calculate Operations for Exiting GP Lanes				
GP_{OUT} Vol (pcph)			576	
GP_{OUT} Cap (pcph)			4,800	
GP_{OUT} v/c ratio			0.12	
Calculate On Ramp Flow Rate				
On Volume (vph)				
PHF				

Location	1	2	3	4

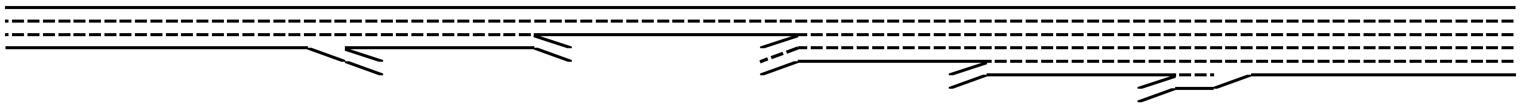


Key

<> Express Lane (HOV)

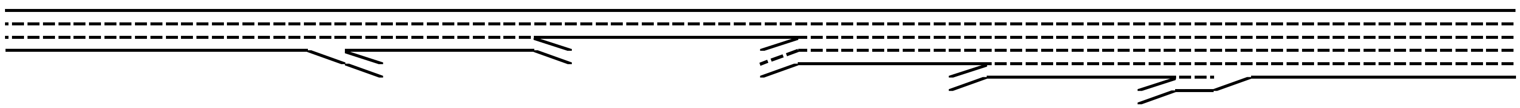
No Trucks

Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Off-ramp to CVEF	I-5 between truck off-ramp and SR99
Total Lanes				
Terrain				
Grade %				
Grade Length (mi)				
Truck & Bus %				
RV %				
E_T				
E_R				
f_{HV}				
f_P				
On Flow (pcph)				
On Flow (pcphpl)				
Calculate On Ramp Roadway Operations				
On Ramp Type				
On Ramp Speed (mph)				
On Ramp Cap (pcph)				
On Ramp v/c ratio				
Calculate Off Ramp Flow Rate				
Off Volume (vph)			130	
PHF			0.92	
Total Lanes			2	
Terrain			Level	
Grade %			0.0%	
Grade Length (mi)			0.00	
Truck & Bus %			100.0%	
RV %			0.0%	
E_T			1.5	
E_R			1.2	
f_{HV}			0.667	
f_P			1.00	
Off Flow (pcph)			212	
Off Flow (pcphpl)			106	
Calculate Off Ramp Roadway Operations				
Off Ramp Type			Major	
Off Ramp Speed			55	
Off Ramp Cap (pcph)			4,500	
Off Ramp v/c ratio			0.05	
Summarize Segment Operations				
Segment v/c ratio	0.16	0.08	0.08	0.12
Segment Density	5.6	2.8	2.8	4.1
Segment LOS	A	A	A	A
Over Capacity				



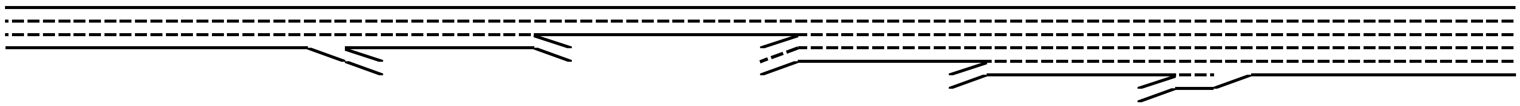
Key
<> Express Lane (HOV)
No Trucks

Location	4	5	6	7	8	9	10	11
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Define Freeway Segment								
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310
Accel Length							1,000	
Decel Length		150						
Mainline Volume	2,560	2,560	2,340	2,230	2,230	3,350	3,460	3,870
On Ramp Volume					1,120	110	410	
Off Ramp Volume		220	110					
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	2,560	2,560	2,340	2,230	3,350	3,460	3,870	3,870
PHF	0.92	0.92	0.92	0.92	0.92	0.93	0.93	0.93
GP Lanes	3	3	3	2	4	5	5	5
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	12.9%	12.9%	4.7%	0.0%	0.0%	2.8%	5.9%	15.8%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.939	0.939	0.977	1.000	1.000	0.986	0.971	0.927
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	2,962	2,962	2,603	2,424	3,641	3,773	4,284	4,490
GP Flow (pcphpl)	987	987	868	1,212	910	755	857	898
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes								



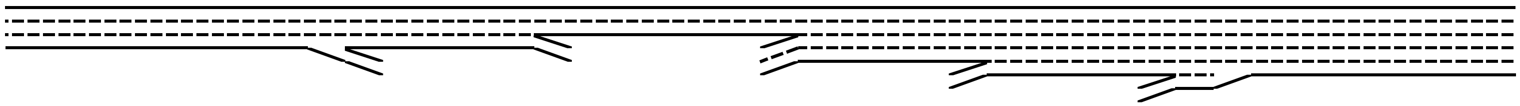
Location	4	5	6	7	8	9	10	11
Key								
<> Express Lane (HOV)								
No Trucks								
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
v/c ratio	0.42	0.42	0.37	0.52	0.39	0.32	0.36	0.38
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Density (pcphpl)	15.2	15.2	13.4	18.6	14.0	11.6	13.2	13.8
LOS	B	B	B	C	B	B	B	B
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)		2,962			2,373	3,593	3,616	
GP_{IN} Cap (pcph)		7,050			4,700	9,400	11,750	
GP_{IN} v/c ratio		0.42			0.50	0.38	0.31	
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)		2,603	2,424				4,284	
GP_{OUT} Cap (pcph)		7,050	4,700				11,750	
GP_{OUT} v/c ratio		0.37	0.52				0.36	
Calculate On Ramp Flow Rate								
On Volume (vph)					1,120	110	410	
PHF					0.92	0.92	0.92	
Total Lanes					2	1	1	
Terrain					Level	Level	Level	
Grade %					0.0%	0.0%	0.0%	
Grade Length (mi)					0.00	0.00	0.00	
Truck & Bus %					8.3%	100.0%	100.0%	
RV %					0.0%	0.0%	0.0%	
E_T					1.5	1.5	1.5	
E_R					1.2	1.2	1.2	
f_{HV}					0.960	0.667	0.667	
f_P					1.00	1.00	1.00	
On Flow (pcph)					1,268	179	668	
On Flow (pcphpl)					634	179	668	
Calculate On Ramp Roadway Operations								
On Ramp Type					Major	Major	Right	
On Ramp Speed (mph)					70	55	55	
On Ramp Cap (pcph)					4,800	2,250	2,200	
On Ramp v/c ratio					0.26	0.08	0.30	
Calculate Off Ramp Flow Rate								
Off Volume (vph)		220	110					
PHF		0.92	0.92					

Location	4	5	6	7	8	9	10	11



Key
<> Express Lane (HOV)
No Trucks

Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Total Lanes		1	1					
Terrain		Level	Level					
Grade %		0.0%	0.0%					
Grade Length (mi)		0.00	0.00					
Truck & Bus %		100.0%	100.0%					
RV %		0.0%	0.0%					
E_T		1.5	1.5					
E_R		1.2	1.2					
f_{HV}		0.667	0.667					
f_P		1.00	1.00					
Off Flow (pcph)		359	179					
Off Flow (pcphpl)		359	179					
Calculate Off Ramp Roadway Operations								
Off Ramp Type		Right	Right					
Off Ramp Speed		45	45					
Off Ramp Cap (pcph)		2,100	2,100					
Off Ramp v/c ratio		0.17	0.09					
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps								
Up Type		No	Off					
Up Distance			4,500					
Up Flow (pcph)			359					
Down Type		Off	No					
Down Distance		1,000						
Down Flow (pcph)		179						
Calculate Merge Influence Area Operations								
Effective v_P (pcph)							2,820	
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)							0.606	
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}							0.337	
v_{12} (pcph)							950	
v_3 (pcph)								
v_{34} (pcph)							1,870	



Key

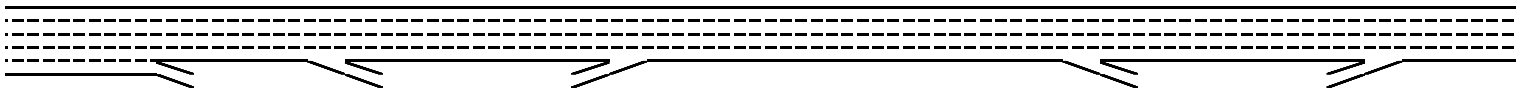
<> Express Lane (HOV)

No Trucks

Location	4	5	6	7	8	9	10	11
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
v_{12a} (pcph)							1,128	
v_{R12a} (pcph)							1,797	
Merge Speed Index							0.23	
Merge Area Speed							59.6	
Outer Lanes Volume							846	
Outer Lanes Speed							63.8	
Segment Speed							61.5	
Merge v/c ratio							0.39	
Merge Density							12.9	
Merge LOS							B	
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)		2,962						
Up Ramp L_{EQ}								
Down Ramp L_{EQ}		194						
P_{FD} (Eqn 13-9)		0.669						
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)		0.576						
P_{FD}		0.669						
v_{12} (pcph)		2,102						
v_3 (pcph)		861						
v_{34} (pcph)								
v_{12a} (pcph)		2,102						
Diverge Speed Index		0.33						
Diverge Area Speed		57.4						
Outer Lanes Volume		861						
Outer Lanes Speed		71.3						
Segment Speed		60.9						
Diverge v/c ratio		0.48						
Diverge Density		21.0						
Diverge LOS		C						
Summarize Segment Operations								
Segment v/c ratio	0.42	0.48	0.37	0.52	0.39	0.32	0.39	0.38
Segment Density	15.2	21.0	13.4	18.6	14.0	11.61	12.91	13.82
Segment LOS	B	C	B	C	B	B	B	B
Over Capacity								

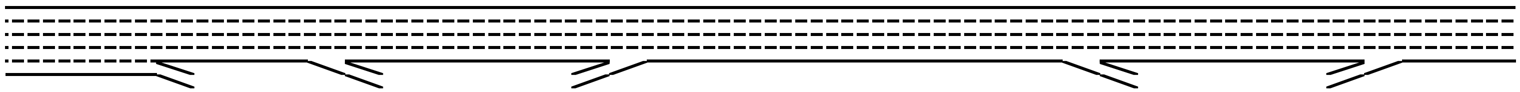
Key
<> Express Lane (HOV)
No Trucks

Location	12	13	14	15	16	17	18	19
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Define Freeway Segment								
Type	Basic	Diverge	Basic	Merge	Basic	Diverge	Basic	Merge
Length (ft)	1,500	1,250	1,760	1,500	3,175	1,500	975	1,500
Accel Length				560				500
Decel Length		170				500		
Mainline Volume	3,870	3,210	2,720	2,720	3,240	3,240	1,570	1,570
On Ramp Volume				520				720
Off Ramp Volume	660	490				1,670		
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Pu								
GP Volume (vph)	3,870	3,210	2,720	3,240	3,240	3,240	1,570	2,290
PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
GP Lanes	5	4	4	4	4	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	15.8%	15.8%	16.2%	16.2%	15.1%	15.1%	26.1%	26.1%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.927	0.927	0.925	0.925	0.930	0.930	0.885	0.885
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	4,490	3,724	3,162	3,766	3,747	3,747	1,908	2,784
GP Flow (pcphpl)	898	931	790	942	937	937	477	696
Calculate Speed in General Purpo								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65
Calculate Operations in General P								



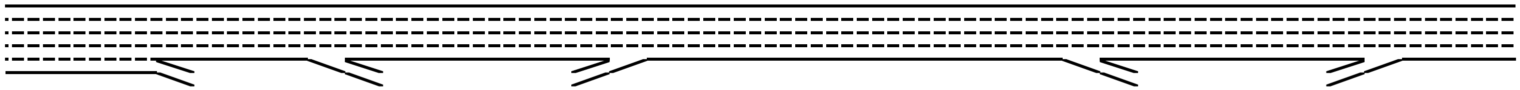
Location	12	13	14	15	16	17	18	19
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
v/c ratio	0.38	0.40	0.34	0.40	0.40	0.40	0.20	0.30
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Density (pcphpl)	13.8	14.3	12.2	14.5	14.4	14.4	7.3	10.7
LOS	B	B	B	B	B	B	A	A
Calculate Operations for Entering								
GP_{IN} Vol (pcph)		3,724		3,174		3,747		1,969
GP_{IN} Cap (pcph)		9,400		9,400		9,400		9,400
GP_{IN} v/c ratio		0.40		0.34		0.40		0.21
Calculate Operations for Exiting G								
GP_{OUT} Vol (pcph)	3,718	3,154		3,766		1,888		2,784
GP_{OUT} Cap (pcph)	9,400	9,400		9,400		9,400		9,400
GP_{OUT} v/c ratio	0.40	0.34		0.40		0.20		0.30
Calculate On Ramp Flow Rate								
On Volume (vph)				520				720
PHF				0.92				0.92
Total Lanes				1				1
Terrain				Level				Level
Grade %				0.0%				0.0%
Grade Length (mi)				0.00				0.00
Truck & Bus %				9.6%				8.3%
RV %				0.0%				0.0%
E_T				1.5				1.5
E_R				1.2				1.2
f_{HV}				0.954				0.960
f_P				1.00				1.00
On Flow (pcph)				592				815
On Flow (pcphpl)				592				815
Calculate On Ramp Roadway Ope								
On Ramp Type				Right				Right
On Ramp Speed (mph)				45				25
On Ramp Cap (pcph)				2,100				1,900
On Ramp v/c ratio				0.28				0.43
Calculate Off Ramp Flow Rate								
Off Volume (vph)	660	490				1,670		
PHF	0.92	0.92				0.92		

Location	12	13	14	15	16	17	18	19

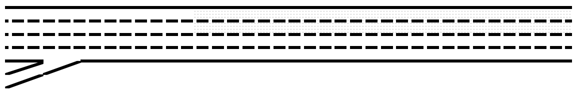


Key
<> Express Lane (HOV)
No Trucks

Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Total Lanes	1	1				1		
Terrain	Level	Level				Level		
Grade %	0.0%	0.0%				0.0%		
Grade Length (mi)	0.00	0.00				0.00		
Truck & Bus %	15.2%	14.3%				4.8%		
RV %	0.0%	0.0%				0.0%		
E_T	1.5	1.5				1.5		
E_R	1.2	1.2				1.2		
f_{HV}	0.929	0.933				0.977		
f_P	1.00	1.00				1.00		
Off Flow (pcph)	772	571				1,859		
Off Flow (pcphpl)	772	571				1,859		
Calculate Off Ramp Roadway Ope								
Off Ramp Type	Right	Right				Right		
Off Ramp Speed	45	20				45		
Off Ramp Cap (pcph)	2,100	1,900				2,100		
Off Ramp v/c ratio	0.37	0.30				0.89		
Determine Adjacent Ramp for Thr								
Up Type								
Up Distance								
Up Flow (pcph)								
Down Type								
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area O								
Effective v_P (pcph)				3,174				1,969
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)				0.593				0.592
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}				0.283				0.116
v_{12} (pcph)				897				228
v_3 (pcph)								
v_{34} (pcph)				2,277				1,740

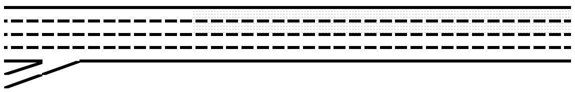


Location	12	13	14	15	16	17	18	19
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
v_{12a} (pcph)				1,269				787
v_{R12a} (pcph)				1,862				1,603
Merge Speed Index				0.30				0.32
Merge Area Speed				58.2				57.7
Outer Lanes Volume				952				591
Outer Lanes Speed				63.4				64.7
Segment Speed				60.7				60.5
Merge v/c ratio				0.40				0.35
Merge Density				16.2				14.5
Merge LOS				B				B
Calculate Diverge Influence Area (								
Effective v_P (pcph)		3,724				3,747		
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)		0.641				0.581		
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}		0.436				0.436		
v_{12} (pcph)		1,946				2,682		
v_3 (pcph)								
v_{34} (pcph)		1,779				1,065		
v_{12a} (pcph)		1,946				2,682		
Diverge Speed Index		0.67				0.47		
Diverge Area Speed		49.5				54.3		
Outer Lanes Volume		889				532		
Outer Lanes Speed		71.3				71.3		
Segment Speed		58.0				58.2		
Diverge v/c ratio		0.44				0.61		
Diverge Density		19.5				22.8		
Diverge LOS		B				C		
Summarize Segment Operations								
Segment v/c ratio	0.38	0.44	0.34	0.40	0.40	0.61	0.20	0.35
Segment Density	13.82	19.5	12.2	16.2	14.4	22.8	7.3	14.5
Segment LOS	B	B	B	B	B	C	A	B
Over Capacity								



Location	20	21	22
Key			
<> Express Lane (HOV)			
No Trucks			
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Define Freeway Segment			
Type	Merge	Basic	Basic
Length (ft)	1,500	3,200	22,312
Accel Length	500		
Decel Length			
Mainline Volume	2,290	2,720	2,720
On Ramp Volume	430		
Off Ramp Volume			
Express Lane Volume			
EL On Ramp Volume			
EL Off Ramp Volume			
Calculate Flow Rate in General Pu			
GP Volume (vph)	2,720	2,720	2,720
PHF	0.93	0.93	0.93
GP Lanes	4	4	4
Terrain	Level	Grade	Grade
Grade %	0.0%	0.0%	6.0%
Grade Length (mi)	0.00	0.00	5.00
Truck & Bus %	26.1%	18.8%	18.8%
RV %	0.0%	0.0%	0.0%
E_T	1.5	1.5	3.5
E_R	1.2	1.2	6.0
f_{HV}	0.885	0.914	0.680
f_P	1.00	1.00	1.00
GP Flow (pcph)	3,306	3,200	4,299
GP Flow (pcphpl)	827	800	1,075
Calculate Speed in General Purpo			
Lane Width (ft)			
Shoulder Width			
TRD			
f_{LW}			
f_{LC}			
Calculated FFS			
Measured FFS			
FFS Curve	65	65	55
Calculate Operations in General P			

Location	20	21	22

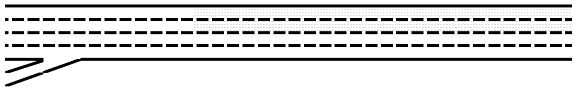


Key
<> Express Lane (HOV)
No Trucks

Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
v/c ratio	0.35	0.34	0.48
Speed (mph)	65.0	65.0	55.0
Density (pcphpl)	12.7	12.3	19.5
LOS	B	B	C
Calculate Operations for Entering			
GP_{IN} Vol (pcph)	2,817		
GP_{IN} Cap (pcph)	9,400		
GP_{IN} v/c ratio	0.30		
Calculate Operations for Exiting G			
GP_{OUT} Vol (pcph)	3,306		
GP_{OUT} Cap (pcph)	9,400		
GP_{OUT} v/c ratio	0.35		
Calculate On Ramp Flow Rate			
On Volume (vph)	430		
PHF	0.92		
Total Lanes	1		
Terrain	Level		
Grade %	0.0%		
Grade Length (mi)	0.00		
Truck & Bus %	9.3%		
RV %	0.0%		
E_T	1.5		
E_R	1.2		
f_{HV}	0.956		
f_P	1.00		
On Flow (pcph)	489		
On Flow (pcphpl)	489		
Calculate On Ramp Roadway Ope			
On Ramp Type	Right		
On Ramp Speed (mph)	45		
On Ramp Cap (pcph)	2,100		
On Ramp v/c ratio	0.23		
Calculate Off Ramp Flow Rate			
Off Volume (vph)			
PHF			

Location	20	21	22
Key			
<> Express Lane (HOV)			
No Trucks			
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Total Lanes			
Terrain			
Grade %			
Grade Length (mi)			
Truck & Bus %			
RV %			
E_T			
E_R			
f_{HV}			
f_P			
Off Flow (pcph)			
Off Flow (pcphpl)			
Calculate Off Ramp Roadway Ope			
Off Ramp Type			
Off Ramp Speed			
Off Ramp Cap (pcph)			
Off Ramp v/c ratio			
Determine Adjacent Ramp for Thr			
Up Type			
Up Distance			
Up Flow (pcph)			
Down Type			
Down Distance			
Down Flow (pcph)			
Calculate Merge Influence Area O			
Effective v_P (pcph)	2,817		
Up Ramp L_{EQ}			
Down Ramp L_{EQ}			
P_{FM} (Eqn 13-3)	0.592		
P_{FM} (Eqn 13-4)			
P_{FM} (Eqn 13-5)			
P_{FM}	0.281		
v_{12} (pcph)	790		
v_3 (pcph)			
v_{34} (pcph)	2,027		

Location	20	21	22



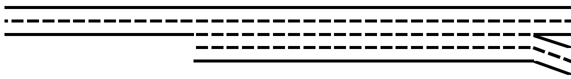
Key

<> Express Lane (HOV)

No Trucks

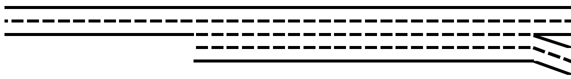
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
v_{12a} (pcph)	1,127		
v_{R12a} (pcph)	1,616		
Merge Speed Index	0.30		
Merge Area Speed	58.2		
Outer Lanes Volume	845		
Outer Lanes Speed	63.8		
Segment Speed	60.9		
Merge v/c ratio	0.35		
Merge Density	14.7		
Merge LOS	B		
Calculate Diverge Influence Area (			
Effective v_P (pcph)			
Up Ramp L_{EQ}			
Down Ramp L_{EQ}			
P_{FD} (Eqn 13-9)			
P_{FD} (Eqn 13-10)			
P_{FD} (Eqn 13-11)			
P_{FD}			
v_{12} (pcph)			
v_3 (pcph)			
v_{34} (pcph)			
v_{12a} (pcph)			
Diverge Speed Index			
Diverge Area Speed			
Outer Lanes Volume			
Outer Lanes Speed			
Segment Speed			
Diverge v/c ratio			
Diverge Density			
Diverge LOS			
Summarize Segment Operations			
Segment v/c ratio	0.35	0.34	0.48
Segment Density	14.7	12.3	19.5
Segment LOS	B	B	C
Over Capacity			

Location	1	2	3	4



Key
<> Express Lane (HOV)
No Trucks

Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Off-ramp to CVEF	I-5 North of SR 99 Auto Only
Define Freeway Segment				
Type	Basic	Basic	Basic	Basic
Length (ft)	2,000	800	1,000	3,800
Accel Length				
Decel Length				
Mainline Volume	1,310	1,310	1,310	1,120
On Ramp Volume				
Off Ramp Volume			190	
Express Lane Volume				
EL On Ramp Volume				
EL Off Ramp Volume				
Calculate Flow Rate in General Purpose Lanes (GP)				
GP Volume (vph)	1,310	1,310	1,310	1,120
PHF	0.92	0.92	0.92	0.92
GP Lanes	2	4	4	2
Terrain	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00
Truck & Bus %	21.4%	21.4%	21.4%	8.3%
RV %	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2
f_{HV}	0.903	0.903	0.903	0.960
f_P	1.00	1.00	1.00	1.00
GP Flow (pcph)	1,576	1,576	1,576	1,268
GP Flow (pcphpl)	788	394	394	634
Calculate Speed in General Purpose Lanes				
Lane Width (ft)				
Shoulder Width				
TRD				
f_{LW}				
f_{LC}				
Calculated FFS				
Measured FFS				
FFS Curve	70	70	70	70
Calculate Operations in General Purpose Lanes				
v/c ratio	0.33	0.16	0.16	0.26
Speed (mph)	70.0	70.0	70.0	70.0
Density (pcphpl)	11.3	5.6	5.6	9.1
LOS	B	A	A	A
Calculate Operations for Entering GP Lanes				
GP_{IN} Vol (pcph)				
GP_{IN} Cap (pcph)				
GP_{IN} v/c ratio				
Calculate Operations for Exiting GP Lanes				
GP_{OUT} Vol (pcph)			1,266	
GP_{OUT} Cap (pcph)			4,800	
GP_{OUT} v/c ratio			0.26	
Calculate Off Ramp Flow Rate				
Off Volume (vph)			190	
PHF			0.92	
Total Lanes			2	
Terrain			Level	
Grade %			0.0%	



Key

<> Express Lane (HOV)

No Trucks

Location	1	2	3	4
Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Off-ramp to CVEF	I-5 North of SR 99 Auto Only
Grade Length (mi)			0.00	
Truck & Bus %			100.0%	
RV %			0.0%	
E_T			1.5	
E_R			1.2	
f_{HV}			0.667	
f_P			1.00	
Off Flow (pcph)			310	
Off Flow (pcphpl)			155	
Calculate Off Ramp Roadway Operations				
Off Ramp Type			Major	
Off Ramp Speed			55	
Off Ramp Cap (pcph)			4,500	
Off Ramp v/c ratio			0.07	
Summarize Segment Operations				
Segment v/c ratio	0.33	0.16	0.16	0.26
Segment Density	11.3	5.6	5.6	9.1
Segment LOS	B	A	A	A
Over Capacity				

INTENTIONALLY LEFT BLANK

Appendix H:

Cumulative Conditions Inputs Memorandum

FEHR & PEERS

MEMORANDUM

Date: November 3, 2014

To: Albert Lee, Paul Marquez, Steve McDonald, & Gail Miller, Caltrans District 6
Paul Candelaria and Warren Maxwell, Kern County Roads Department
Jacqui Kitchen and Todd Taylor, Kern County Planning

CC: Derek Abbott and Diana Hurlbert, Tejon Ranch
Tony Harris, Shannon Smith, & Thomas Szelazek, PointC

From: Rob Hananouchi & Ron Milam, Fehr & Peers

Subject: Cumulative Conditions Inputs for Grapevine Transportation Impact Study

RS13-3088

This memorandum summarizes the proposed land use and roadway inputs for the cumulative conditions scenario for the Grapevine Transportation Impact Study. Fehr & Peers submitted the original draft of this memorandum to Kern County Roads Department staff to review the roadway projects. Since many of the improvements to the major roadway network involve state highways, Kern County Roads Department staff requested that Kern COG and Caltrans staff review the original memorandum.

This updated memorandum includes the suggested edits by Kern COG and Caltrans staff. Also, as a result of our last meeting with Caltrans and County staff, we have included a discussion on the cumulative land development projects. We are submitting this updated memorandum for a second and final review, per the request of Caltrans staff. After Caltrans review, we will ask Kern County staff for final confirmation of these cumulative conditions inputs.

BACKGROUND

Per §21083 of the California Environmental Quality Act (CEQA), analyzing a project's cumulative effects should consider its incremental contribution when viewed in connection with the effects of past projects, current projects, and probable future projects. CEQA case law has defined "probable future projects" as those that are "reasonably foreseeable" to occur based on substantial evidence. This memorandum presents the approach for identifying "reasonably foreseeable" land development projects and roadway projects for inclusion in the cumulative conditions analysis.

CUMULATIVE LAND DEVELOPMENT

The Grapevine Transportation Impact Study is using the Kern Council of Governments (Kern COG) travel demand forecasting (TDF) model to forecast the cumulative traffic volumes. This study will use the 2040 land use inputs for the Kern COG RTP/SCS TDF model to represent cumulative land development projects. This 2040 land use data is consistent with the adopted *2014 Kern COG Regional Transportation Plan & Sustainable Communities Strategy (RTP/SCS)*. The 2040 land use data reflects the adopted SCS scenario and population and employment forecasts for Kern County.

Recognizing that land development is dynamic and details regarding specific projects may change, we will coordinate with the consultant team's planning consultant, Ted James, and the Kern County planning staff to verify that the 2040 RTP/SCS land use data appropriately reflects key projects in the study area for the cumulative conditions analysis. These projects may include, but are not limited to, Tejon Mountain Village, build out of the Tejon Ranch Commerce Center, and San Emidio New Town. We will provide the 2040 TDF model land use data to the County planning department to verify the land use inputs.

CUMULATIVE ROADWAY PROJECTS

The cumulative conditions analysis will also include roadway projects that are reasonably foreseeable to occur as supported by substantial evidence. This includes projects included in the *2014 Kern COG RTP/SCS* financially constrained project list, the Thomas Roads Improvement Program (TRIP), and input received from Kern COG staff. Consistent with the CEQA case law, all projects on the financially constrained program of projects list in the *2014 Kern COG RTP/SCS* are proposed to be included in the cumulative conditions analysis. In addition, we consulted with Kern COG staff regarding several major highway expansion projects reflected in the 2040 Kern COG TDF model that were not specifically listed in the *2014 Kern COG RTP/SCS* constrained program of projects. Kern COG staff confirmed that a few of these projects are funded by impact fees or are already under construction. They also recommended not including a few projects that are either dependent on development or not anticipated to occur until after 2040. These are shown in Table 1 and are not planned to be included in the cumulative conditions scenario.

TABLE 1:
MAJOR HIGHWAY EXPANSION PROJECTS
NOT INCLUDED IN CUMULATIVE CONDITIONS SCENARIO

Roadway Facility	Scope	Project Description	Reason for Not Including
SR 119	I-5 to SR 99	Widened from 2 to 4 lanes in model	Per recommendation from Kern COG staff; project anticipated as part of direct developer mitigation or local transportation impact fee that may not be built prior to Grapevine development.
SR 184	SR 223 to DiGiorgio Rd.	Widened from 2 to 4 lanes in model	Per recommendation from Kern COG staff; project anticipated as part of direct developer mitigation or local transportation impact fee that may not be built prior to Grapevine development.
SR 184	Panama Rd to SR 58	Widened from 2 to 4 lanes in model	Per recommendation from Kern COG staff; project anticipated as part of direct developer mitigation or local transportation impact fee that may not be built prior to Grapevine development.
SR 223	SR 99 to Comanche Dr	Widened from 2 to 4 lanes in model	Per recommendation from Kern COG staff; Kern COG staff noted that this project is not anticipated until 2050.

Source: Kern COG 2040 TDF Model; Kern COG staff, 2014

At the request of Caltrans, we reviewed the Thomas Roads Improvement Program (TRIP) project list and verified that the major roadway projects funded by TRIP are included (see Attachment A).

Table 2 presents the major highway expansion projects from the *2014 Kern COG RTP/SCS*, Kern COG TDF model, and TRIP project list that are proposed to be included in the cumulative conditions scenario based on consultation with Kern COG and Caltrans staff.

TABLE 2:
MAJOR HIGHWAY EXPANSION PROJECTS
PROPOSED TO BE INCLUDED IN CUMULATIVE CONDITIONS SCENARIO

Roadway Facility	Scope	Project Description	Improvement in 2040 Kern COG Model?	RTP Project ID
State Route (SR) 14	Redrock-Inyokern Rd to SR 178	Widen to 4 lanes	Yes	KER08RTP006/ KER08RTP017/ KER08RTP024
Westside Parkway	Stockdale Hwy to Allen Road	Construct new 6-lane freeway	Yes	N/A – TRIP Project; Under Construction

**TABLE 2:
MAJOR HIGHWAY EXPANSION PROJECTS
PROPOSED TO BE INCLUDED IN CUMULATIVE CONDITIONS SCENARIO**

Roadway Facility	Scope	Project Description	Improvement in 2040 Kern COG Model?	RTP Project ID
Centennial Corridor	Westside Parkway (Mohawk St.) to SR 58/ Cottonwood Rd	Construct new freeway	Yes; new six-lane freeway along Centennial Alt B corridor from Mohawk to SR 99 included; SR 58 widened to 8/10 lanes from SR 99 to Cottonwood Road.	KER08RTP020
SR 58	SR 99 to Cottonwood Road	Widen to 6 lanes	Yes; SR 58 Gap Closure Project prior to Centennial Corridor completion	N/A – TRIP Project; Under Construction
SR 58	Operational Improvements	Operational Improvements to SR 58 mainline and ramps between SR 99 and Cottonwood Road	Yes	N/A – TRIP Project
SR 58	Union Ave to Fairfax Rd	Widen to 8 lanes	Yes	KER08RTP093
SR 65	James Rd to Merle Haggard Dr	Widen to 4 lanes	Yes	KER08RTP094
SR 99	Beardsley Canal to 7th Standard Rd	Widen to 8 lanes	Yes	KER08RTP138
SR 99	Snow Rd	Construct new interchange	Yes	KER08RTP115
SR 99	Beardsley Canal to Olive Drive	Widen to 8 lanes	Yes	N/A – Project Under Construction per Kern COG staff
SR 99	Olive Drive to SR 204	Widen to 10 lanes	Yes	N/A – Project Under Construction per Kern COG staff
SR 99	Wilson Rd to SR 119	Widened from 6 to 8 lanes	Yes	N/A – Project Under Construction per Kern COG staff
SR 99	Hosking Ave	Construct Interchange	Yes	KER08RTP009
SR 119	Cherry Ave to Elk Hills Road	Phase 1 Bypass – Widen to 4 lanes	Yes	KER08RTP022
SR 119	Elk Hills – County Rd to Tupman Ave	Widen to 4 lanes (Phase 2)	Yes	KER08RTP086
SR 178	SR 204 to Oswell St	Add HOV Lanes (Widen from 6 to 8 lanes)	Yes	N/A – No Project ID for HOV Projects

TABLE 2:
MAJOR HIGHWAY EXPANSION PROJECTS
PROPOSED TO BE INCLUDED IN CUMULATIVE CONDITIONS SCENARIO

Roadway Facility	Scope	Project Description	Improvement in 2040 Kern COG Model?	RTP Project ID
SR 178	Oswell St to Morning Dr	Widened from 4 to 6 lanes	Yes	N/A – Project Under Construction per Kern COG staff
SR 178	Morning Dr to Vineland Rd	New interchange at Morning Dr; highway widened from 2 to 6 lanes	Yes; Interchange at Morning Drive is a TRIP project currently under construction	N/A – Project Under Construction per Kern COG staff
SR 178	Vineland Rd to Miramonte Dr	Widen existing highway	Yes; widened to 6 lanes as freeway in model (see project below)	KER08RTP011
SR 178	Vineland Rd to Miramonte Dr	Construct new interchange; widen existing freeway	Yes; interchange at Vineland shown with freeway widened to 6 lanes in model	KER08RTP025
SR 178	Miramonte Dr to Rancheria Rd	Widen existing freeway	Yes; widened to 4 lanes in model	KER08RTP084
SR 184	SR 58 to Edison Hwy	Widened from 4 to 6 lanes	Yes	N/A – not shown in RTP; Project verified by Kern COG staff
SR 184	Edison Hwy to Niles St	Widened from 2 to 6 lanes	Yes	N/A – not shown in RTP; Project verified by Kern COG staff
SR 184	Morning Dr to SR 178	Widened from 2 to 4 lanes	Yes	N/A – not shown in RTP; Project verified by Kern COG staff
SR 204	Airport Drive to SR 178	Widen existing highway	Yes; widened to 6 lanes in model	KER08RTP083
Rosedale Highway	Calloway Dr to SR 99	Widen existing highway	Yes; widened to 6 lanes in model	KER08RTP007
Rosedale Highway	Allen Rd to Calloway Dr	Widen existing highway	Yes; widened to 6 lanes in model	N/A – TRIP Project
Rosedale Highway	SR 43 to Allen Rd	Widen existing highway	Yes; widened to 4 lanes from SR 43 to Heath; and widened to 6 lanes from Heath to Allen	KER08RTP092
24th Street	SR 178 (24th/23rd St) from SR 99 to M Street	Widen existing highway	Yes; widened to 6/8 lanes in model	KER08RTP014

**TABLE 2:
MAJOR HIGHWAY EXPANSION PROJECTS
PROPOSED TO BE INCLUDED IN CUMULATIVE CONDITIONS SCENARIO**

Roadway Facility	Scope	Project Description	Improvement in 2040 Kern COG Model?	RTP Project ID
Hageman Flyover	Knudsen Drive to SR 204	Construct extension	Yes; 4 lanes in model	KER08RTP013
7th Standard Road	SR 43 to Santa Fe Way	Widen existing roadway	Yes; widened to 4 lanes in model	KER08RTP113
West Beltway	Rosedale Hwy to 7th Standard Rd	Construct new facility	Yes; 8–lane expressway/freeway in model	KER08RTP102
West Beltway	Rosedale Hwy to Westside Parkway	Construct new facility	Yes; 8-lane expressway/freeway in model	KER08RTP016
West Beltway	Pacheco Rd to Westside Parkway	Construct new facility	Yes; 8-lane expressway/freeway in model	KER08RTP139
West Beltway	Taft Hwy to Pacheco Rd	Construct new facility	Yes; 8-lane expressway/freeway in model	KER08RTP097

Source: *2014 Kern COG RTP/SCS*, 2014; Kern COG 2040 TDF Model; TRIP, 2014; Kern COG staff, 2014

ROADWAY EXPANSION PROJECTS IN STUDY AREA

The constrained program of projects in the *2014 Kern COG RTP/SCS* does not include any funded expansion projects to major highways in the vicinity of the Grapevine project.

Unconstrained Projects

The *Kern COG 2014 RTP/SCS* includes a list of Unconstrained Program of Projects. These are projects that are not anticipated to have funding by 2040, but may be constructed in the future if additional funding becomes available. Within the Grapevine project vicinity, the following two projects are listed on the Unconstrained Program of Projects:

- I-5 – Fort Tejon to SR 99: widen to 10 lanes
- Wheeler Ridge Road – I-5 to SR 223: widen to 4 lanes

Since these projects are not in the financially constrained program of projects, these improvements will not be included in the cumulative conditions analysis, but may be used by the project team as a reference for establishing the ultimate right-of-way.

NEXT STEPS

Kern County Review

To comply with CEQA, this memorandum outlines the proposed inputs for the cumulative conditions scenario, as supported by substantial evidence. After submitting to the project team for final review, the final step is coordinating with Kern County for their final verification of these inputs as the lead agency for the CEQA document.

Traffic Forecasting Methodology

Fehr & Peers has developed a project-specific travel forecasting model for the Grapevine study area based on the 2006 Kern COG model. This project-specific model will be used to forecast project traffic volumes both internal to the project site and long-distance project trips to the regional roadway network (i.e., Interstate 5, SR 99, Wheeler Ridge Road, etc.).

The 2040 Kern COG RTP/SCS TDF model will be used to account for cumulative regional growth on the regional roadway network outside the project. The project traffic from the project-specific model will be added to these regional traffic volumes to develop the cumulative conditions forecasts. We will review the regional RTP/SCS model to verify that the cumulative land use and roadway inputs discussed in this memo are included.

Relationship to Kern COG RTP/SCS

For the Cumulative Conditions analysis, we also want to note that the *2014 Kern COG RTP/SCS* includes development in the study area to reflect development at Grapevine, San Emidio New Town, and Tejon Ranch Commerce Center. San Emidio will be considered in the cumulative analysis, but given its long-term dormancy and need for further CEQA review, it is not assumed to commence construction for near-term purposes. We also want to note that the SCS provides a land use allocation for the study area based on projected development absorption rates through 2040, and that future SCS updates will take into account additional growth expected to occur beyond 2040.

INTENTIONALLY LEFT BLANK

Appendix I:

Cumulative Conditions (2040) – Intersection Operations & Queuing Analysis

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (veh/h)	10	610	10	10	100	280	330	10	10	90	270	20
Number	5	2	12		1	6	16	3	8	18	7	4
Initial Q (Qb), veh	0	0	0		0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	950	1566	1900		1739	1520	1845	1863	1726	1900	1827	1723
Adj Flow Rate, veh/h	11	663	10		109	304	144	11	11	0	316	0
Adj No. of Lanes	1	2	0		2	3	1	1	1	0	2	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	100	20	20		10	25	3	2	2	2	4	2
Cap, veh/h	20	1059	16		362	1839	691	73	71	0	613	304
Arrive On Green	0.02	0.35	0.35		0.11	0.44	0.44	0.04	0.04	0.00	0.18	0.00
Sat Flow, veh/h	905	3001	45		3213	4150	1559	1774	1726	0	3480	1723
Grp Volume(v), veh/h	11	329	344		109	304	144	11	11	0	316	0
Grp Sat Flow(s),veh/h/ln	905	1488	1558		1606	1383	1559	1774	1726	0	1740	1723
Q Serve(g_s), s	0.7	10.9	10.9		1.8	2.6	3.4	0.4	0.4	0.0	4.9	0.0
Cycle Q Clear(g_c), s	0.7	10.9	10.9		1.8	2.6	3.4	0.4	0.4	0.0	4.9	0.0
Prop In Lane	1.00		0.03		1.00		1.00	1.00		0.00	1.00	
Lane Grp Cap(c), veh/h	20	525	550		362	1839	691	73	71	0	613	304
V/C Ratio(X)	0.54	0.63	0.63		0.30	0.17	0.21	0.15	0.16	0.00	0.52	0.00
Avail Cap(c_a), veh/h	246	831	870		439	1839	691	240	233	0	1292	640
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	28.7	15.9	15.9		24.1	9.9	10.1	27.4	27.4	0.0	22.1	0.0
Incr Delay (d2), s/veh	13.1	1.7	1.7		0.3	0.1	0.2	0.6	0.6	0.0	1.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	4.7	4.9		0.8	1.0	1.5	0.2	0.2	0.0	2.4	0.0
LnGrp Delay(d),s/veh	41.8	17.7	17.6		24.4	10.0	10.3	28.0	28.0	0.0	23.4	0.0
LnGrp LOS	D	B	B		C	A	B	C	C		C	
Approach Vol, veh/h		684				557			22			316
Approach Delay, s/veh		18.0				12.9			28.0			23.4
Approach LOS		B				B			C			C

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.6	26.8		14.4	6.2	32.2		6.4
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0
Max Green Setting (Gmax), s	8.1	33.1		22.0	16.1	25.1		8.0
Max Q Clear Time (g_c+I1), s	3.8	12.9		6.9	2.7	5.4		2.4
Green Ext Time (p_c), s	0.1	8.0		2.0	0.0	8.6		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	17.4
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	SBR
Lane Configurations	
Volume (veh/h)	10
Number	14
Initial Q (Qb), veh	0
Ped-Bike Adj(A_pbT)	1.00
Parking Bus, Adj	1.00
Adj Sat Flow, veh/h/ln	1900
Adj Flow Rate, veh/h	0
Adj No. of Lanes	0
Peak Hour Factor	0.92
Percent Heavy Veh, %	2
Cap, veh/h	0
Arrive On Green	0.00
Sat Flow, veh/h	0
Grp Volume(v), veh/h	0
Grp Sat Flow(s),veh/h/ln	0
Q Serve(g_s), s	0.0
Cycle Q Clear(g_c), s	0.0
Prop In Lane	0.00
Lane Grp Cap(c), veh/h	0
V/C Ratio(X)	0.00
Avail Cap(c_a), veh/h	0
HCM Platoon Ratio	1.00
Upstream Filter(I)	0.00
Uniform Delay (d), s/veh	0.0
Incr Delay (d2), s/veh	0.0
Initial Q Delay(d3),s/veh	0.0
%ile BackOfQ(50%),veh/ln	0.0
LnGrp Delay(d),s/veh	0.0
LnGrp LOS	
Approach Vol, veh/h	
Approach Delay, s/veh	
Approach LOS	

Timer

User approved ignoring U-Turning movement.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	570	410	10	270	300	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1743	1624	1863	1652	1545	0
Adj Flow Rate, veh/h	613	0	11	290	323	0
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	9	17	2	15	23	0
Cap, veh/h	743	618	30	1139	807	0
Arrive On Green	0.45	0.00	0.02	0.36	0.28	0.00
Sat Flow, veh/h	1660	1380	1774	3222	3089	0
Grp Volume(v), veh/h	613	0	11	290	323	0
Grp Sat Flow(s),veh/h/ln	1660	1380	1774	1570	1467	0
Q Serve(g_s), s	16.9	0.0	0.3	3.4	4.7	0.0
Cycle Q Clear(g_c), s	16.9	0.0	0.3	3.4	4.7	0.0
Prop In Lane	1.00	1.00	1.00			0.00
Lane Grp Cap(c), veh/h	743	618	30	1139	807	0
V/C Ratio(X)	0.83	0.00	0.37	0.25	0.40	0.00
Avail Cap(c_a), veh/h	1158	963	204	2628	1912	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.6	0.0	25.4	11.7	15.4	0.0
Incr Delay (d2), s/veh	5.1	0.0	7.3	0.2	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	0.0	0.2	1.5	2.0	0.0
LnGrp Delay(d),s/veh	17.7	0.0	32.7	11.9	16.3	0.0
LnGrp LOS	B		C	B	B	
Approach Vol, veh/h	613			301	323	
Approach Delay, s/veh	17.7			12.7	16.3	
Approach LOS	B			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		24.2		28.0	4.6	19.7		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 44		36.4	6.0	34.0		
Max Q Clear Time (g_c+I1), s		5.4		18.9	2.3	6.7		
Green Ext Time (p_c), s		8.5		4.5	0.0	7.7		

Intersection Summary		
HCM 2010 Ctrl Delay		16.1
HCM 2010 LOS		B

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Volume (vph)	20	330	1070	490	390	0	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3142	4673	3085	1352		1442
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3142	4673	3085	1352		1442
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	351	1138	521	415	0	149
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1138	521	415	0	149
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	12%	11%	17%	18%	2%	14%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		10.6	36.4	16.1	36.4		36.4
Effective Green, g (s)		10.6	36.4	16.1	36.4		36.4
Actuated g/C Ratio		0.29	1.00	0.44	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		914	4673	1364	1352		1442
v/s Ratio Prot		0.12	0.24	0.17			
v/s Ratio Perm					c0.31		0.10
v/c Ratio		0.41	0.24	0.38	0.31		0.10
Uniform Delay, d1		10.4	0.0	6.8	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.1	0.1	0.5	0.6		0.1
Delay (s)		10.5	0.1	7.3	0.6		0.1
Level of Service		B	A	A	A		A
Approach Delay (s)			2.7	4.3		0.1	
Approach LOS			A	A		A	

Intersection Summary			
HCM 2000 Control Delay	3.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	36.4	Sum of lost time (s)	9.7
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU
Lane Configurations												
Volume (veh/h)	10	10	30	10	490	10	90	10	40	590	300	10
Number	5	2	12		1	6	16		3	8	18	
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00		1.00		0.99		1.00		1.00	
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Adj Sat Flow, veh/h/ln	1863	950	1863		1863	1584	1900		1863	1583	1863	
Adj Flow Rate, veh/h	11	11	0		533	11	21		43	641	74	
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	
Percent Heavy Veh, %	2	100	2		2	100	100		2	20	2	
Cap, veh/h	30	21	35		681	99	188		90	1774	647	
Arrive On Green	0.02	0.02	0.00		0.20	0.20	0.20		0.05	0.41	0.41	
Sat Flow, veh/h	1774	950	1583		3442	485	927		1774	4323	1578	
Grp Volume(v), veh/h	11	11	0		533	0	32		43	641	74	
Grp Sat Flow(s),veh/h/ln	1774	950	1583		1721	0	1412		1774	1441	1578	
Q Serve(g_s), s	0.4	0.7	0.0		9.1	0.0	1.1		1.5	6.4	1.8	
Cycle Q Clear(g_c), s	0.4	0.7	0.0		9.1	0.0	1.1		1.5	6.4	1.8	
Prop In Lane	1.00		1.00		1.00		0.66		1.00		1.00	
Lane Grp Cap(c), veh/h	30	21	35		681	0	287		90	1774	647	
V/C Ratio(X)	0.37	0.52	0.00		0.78	0.00	0.11		0.48	0.36	0.11	
Avail Cap(c_a), veh/h	209	173	288		1514	0	712		435	4465	1630	
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Upstream Filter(I)	1.00	1.00	0.00		1.00	0.00	1.00		1.00	1.00	1.00	
Uniform Delay (d), s/veh	30.2	30.0	0.0		23.6	0.0	20.1		28.7	12.7	11.3	
Incr Delay (d2), s/veh	4.7	30.0	0.0		1.2	0.0	0.1		2.4	0.2	0.2	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	0.2	0.4	0.0		4.4	0.0	0.5		0.8	2.5	0.8	
LnGrp Delay(d),s/veh	34.8	60.0	0.0		24.9	0.0	20.3		31.1	12.9	11.5	
LnGrp LOS	C	E			C		C		C	B	B	
Approach Vol, veh/h		22				565				758		
Approach Delay, s/veh		47.4				24.6				13.8		
Approach LOS		D				C				B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	17.0	7.1	7.3	30.7	5.7	18.3	7.6	30.4				
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9				
Max Green Setting (Gmax), s	* 27	11.3	* 15	76.7	* 7.3	31.3	28.0	64.1				
Max Q Clear Time (g_c+I1), s	11.1	2.7	3.5	6.2	2.4	3.1	4.1	8.4				
Green Ext Time (p_c), s	1.2	0.1	0.0	17.9	0.0	0.2	0.1	17.1				
Intersection Summary												
HCM 2010 Ctrl Delay			17.8									
HCM 2010 LOS			B									

Notes

User approved ignoring U-Turning movement.

Movement	SBL	SBT	SBR
Lane Configurations			
Volume (veh/h)	50	350	10
Number	7	4	14
Initial Q (Qb), veh	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1625	1339	1900
Adj Flow Rate, veh/h	54	380	11
Adj No. of Lanes	1	3	0
Peak Hour Factor	0.92	0.92	0.92
Percent Heavy Veh, %	20	43	43
Cap, veh/h	91	1516	44
Arrive On Green	0.06	0.42	0.42
Sat Flow, veh/h	1547	3653	105
Grp Volume(v), veh/h	54	253	138
Grp Sat Flow(s),veh/h/ln	1547	1219	1320
Q Serve(g_s), s	2.1	4.2	4.2
Cycle Q Clear(g_c), s	2.1	4.2	4.2
Prop In Lane	1.00		0.08
Lane Grp Cap(c), veh/h	91	1012	548
V/C Ratio(X)	0.60	0.25	0.25
Avail Cap(c_a), veh/h	698	3013	1632
HCM Platoon Ratio	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	11.8	11.9
Incr Delay (d2), s/veh	3.8	0.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	1.4	1.6
LnGrp Delay(d),s/veh	32.3	12.1	12.3
LnGrp LOS	C	B	B
Approach Vol, veh/h		445	
Approach Delay, s/veh		14.6	
Approach LOS		B	

Timer

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection 5 **Street C/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	140	163	116.7%	20.2	3.4	C
	Right Turn	970	993	102.3%	7.1	0.5	A
	Subtotal	1,110	1,156	104.1%	9.0	0.7	A
SB	Left Turn	430	433	100.7%	24.5	3.0	C
	Through	130	150	115.8%	9.3	3.4	A
	Right Turn						
	Subtotal	560	584	104.2%	20.6	2.7	C
EB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
WB	Left Turn	710	694	97.7%	18.8	2.4	B
	Through						
	Right Turn	530	484	91.3%	10.0	1.4	B
	Subtotal	1,240	1,178	95.0%	15.2	1.4	B
Total		2,910	2,917	100.2%	13.8	0.9	B

Intersection 6 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn	400	406	101.5%	18.9	1.6	B
	Through						
	Right Turn	380	380	100.1%	16.0	2.4	B
	Subtotal	780	786	100.8%	17.5	1.2	B
EB	Left Turn						
	Through	1,200	1,199	99.9%	15.5	2.1	B
	Right Turn	200	219	109.4%	5.1	1.5	A
	Subtotal	1,400	1,418	101.3%	13.9	2.0	B
WB	Left Turn						
	Through	860	823	95.8%	13.5	1.0	B
	Right Turn	280	253	90.4%	5.8	0.6	A
	Subtotal	1,140	1,077	94.4%	11.7	0.9	B
Total		3,320	3,281	98.8%	14.0	0.8	B

Intersection 7 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	290	280	96.4%	22.4	3.2	C
	Through						
	Right Turn	390	385	98.8%	10.3	1.7	B
	Subtotal	680	665	97.8%	15.4	1.6	B
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	960	970	101.0%	11.4	1.9	B
	Right Turn	640	640	99.9%	8.9	0.6	A
	Subtotal	1,600	1,609	100.6%	10.4	1.3	B
WB	Left Turn						
	Through	850	795	93.5%	12.5	1.4	B
	Right Turn	940	893	95.0%	12.7	1.0	B
	Subtotal	1,790	1,688	94.3%	12.6	0.8	B
Total		4,070	3,962	97.4%	12.2	0.7	B

Intersection 8 **Street D/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	220	201	91.5%	107.1	42.7	F
	Through	80	82	102.6%	50.0	9.2	D
	Right Turn	20	17	83.6%	16.4	9.4	B
	Subtotal	320	300	93.8%	86.0	27.2	F
SB	Left Turn	210	213	101.5%	45.9	6.1	D
	Through	100	111	111.0%	44.5	8.2	D
	Right Turn	390	393	100.7%	41.0	8.7	D
	Subtotal	700	717	102.4%	42.9	4.2	D
EB	Left Turn	530	525	99.1%	64.6	7.7	E
	Through	610	614	100.7%	15.3	1.9	B
	Right Turn	210	196	93.4%	5.8	0.7	A
	Subtotal	1,350	1,335	98.9%	33.2	3.2	C
WB	Left Turn	30	29	95.0%	71.1	19.7	E
	Through	1,180	1,075	91.1%	64.9	18.0	E
	Right Turn	250	233	93.0%	24.1	11.3	C
	Subtotal	1,460	1,336	91.5%	58.0	16.6	E
Total		3,830	3,689	96.3%	48.3	6.5	D

Intersection 9 **Street C/Street G** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	Total Delay (sec/veh) LOS
NB	Left Turn	200	194	96.9%	51.3	4.8	D
	Through	470	439	93.3%	3.2	1.5	A
	Right Turn						
	Subtotal	670	632	94.4%	17.8	2.3	B
SB	Left Turn						
	Through	400	390	97.6%	8.7	2.5	A
	Right Turn	10	13	133.0%	3.6	3.8	A
	Subtotal	410	404	98.4%	8.5	2.5	A
EB	Left Turn	20	22	110.2%	53.8	21.0	D
	Through						
	Right Turn	160	153	95.5%	4.1	1.0	A
	Subtotal	180	175	97.1%	10.5	4.0	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,260	1,211	96.1%	13.7	1.5	B

Intersection 10 **Street C/Street H** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	Total Delay (sec/veh) LOS
NB	Left Turn	50	50	99.6%	29.9	7.9	C
	Through	910	936	102.8%	10.3	2.3	B
	Right Turn						
	Subtotal	960	985	102.6%	11.3	2.2	B
SB	Left Turn						
	Through	690	681	98.7%	6.4	1.1	A
	Right Turn	150	146	97.5%	3.5	0.6	A
	Subtotal	840	828	98.5%	5.9	1.0	A
EB	Left Turn	200	201	100.7%	24.7	1.8	C
	Through						
	Right Turn	40	49	121.6%	6.5	1.8	A
	Subtotal	240	250	104.2%	21.2	1.7	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,040	2,063	101.1%	10.3	1.3	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (veh/h)	10	10	580	10	10	150	870	290	10	20	150	330
Number		5	2	12		1	6	16	3	8	18	7
Initial Q (Qb), veh		0	0	0		0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00		1.00		1.00		0.99	1.00		0.99	1.00
Parking Bus, Adj		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln		1258	1628	1900		1781	1638	1827	1863	1786	1900	1845
Adj Flow Rate, veh/h		11	630	10		163	946	116	11	22	6	391
Adj No. of Lanes		1	2	0		2	3	1	1	1	0	2
Peak Hour Factor		0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %		100	17	17		7	16	4	2	2	2	3
Cap, veh/h		26	1263	20		349	2189	756	106	81	22	596
Arrive On Green		0.02	0.41	0.41		0.11	0.49	0.49	0.06	0.06	0.06	0.17
Sat Flow, veh/h		1198	3115	49		3291	4472	1545	1774	1347	367	3514
Grp Volume(v), veh/h		11	313	327		163	946	116	11	0	28	391
Grp Sat Flow(s),veh/h/ln		1198	1546	1619		1645	1491	1545	1774	0	1715	1757
Q Serve(g_s), s		0.7	10.9	11.0		3.4	9.9	3.0	0.4	0.0	1.1	7.6
Cycle Q Clear(g_c), s		0.7	10.9	11.0		3.4	9.9	3.0	0.4	0.0	1.1	7.6
Prop In Lane		1.00		0.03		1.00		1.00	1.00		0.21	1.00
Lane Grp Cap(c), veh/h		26	627	656		349	2189	756	106	0	103	596
V/C Ratio(X)		0.42	0.50	0.50		0.47	0.43	0.15	0.10	0.00	0.27	0.66
Avail Cap(c_a), veh/h		168	856	896		367	2345	810	388	0	375	1064
HCM Platoon Ratio		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)		1.00	1.00	1.00		1.00	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh		35.1	16.1	16.1		30.5	12.0	10.2	32.3	0.0	32.6	28.2
Incr Delay (d2), s/veh		6.4	0.9	0.8		0.6	0.2	0.1	0.3	0.0	0.9	2.4
Initial Q Delay(d3),s/veh		0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln		0.3	4.8	5.0		1.6	4.1	1.3	0.2	0.0	0.6	3.8
LnGrp Delay(d),s/veh		41.4	17.0	16.9		31.1	12.2	10.4	32.5	0.0	33.5	30.6
LnGrp LOS		D	B	B		C	B	B	C		C	C
Approach Vol, veh/h			651				1225			39		
Approach Delay, s/veh			17.4				14.5			33.2		
Approach LOS			B				B			C		

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	12.6	35.3		16.3	6.5	41.5		8.4
Change Period (Y+Rc), s	4.9	5.9		4.0	4.9	5.9		4.0
Max Green Setting (Gmax), s	8.1	40.2		22.0	10.2	38.1		15.9
Max Q Clear Time (g_c+I1), s	5.4	13.0		9.6	2.7	11.9		3.1
Green Ext Time (p_c), s	0.1	16.5		2.3	0.0	16.1		0.1

Intersection Summary	
HCM 2010 Ctrl Delay	18.4
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	20	20
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		1.00
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1759	1900
Adj Flow Rate, veh/h	0	0
Adj No. of Lanes	1	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	2	2
Cap, veh/h	299	0
Arrive On Green	0.00	0.00
Sat Flow, veh/h	1759	0
Grp Volume(v), veh/h	0	0
Grp Sat Flow(s),veh/h/ln	1759	0
Q Serve(g_s), s	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0
Prop In Lane		0.00
Lane Grp Cap(c), veh/h	299	0
V/C Ratio(X)	0.00	0.00
Avail Cap(c_a), veh/h	533	0
HCM Platoon Ratio	1.00	1.00
Upstream Filter(I)	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0
LnGrp LOS		
Approach Vol, veh/h	391	
Approach Delay, s/veh	30.6	
Approach LOS	C	

Timer

User approved ignoring U-Turning movement.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	770	300	10	480	350	0
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1712	1681	1863	1652	1667	0
Adj Flow Rate, veh/h	828	0	11	516	376	0
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	11	13	2	15	14	0
Cap, veh/h	926	812	28	1012	841	0
Arrive On Green	0.57	0.00	0.02	0.32	0.27	0.00
Sat Flow, veh/h	1630	1429	1774	3222	3333	0
Grp Volume(v), veh/h	828	0	11	516	376	0
Grp Sat Flow(s),veh/h/ln	1630	1429	1774	1570	1583	0
Q Serve(g_s), s	40.3	0.0	0.6	12.1	9.0	0.0
Cycle Q Clear(g_c), s	40.3	0.0	0.6	12.1	9.0	0.0
Prop In Lane	1.00	1.00	1.00			0.00
Lane Grp Cap(c), veh/h	926	812	28	1012	841	0
V/C Ratio(X)	0.89	0.00	0.39	0.51	0.45	0.00
Avail Cap(c_a), veh/h	1472	1291	118	2026	1704	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.2	0.0	44.1	24.8	27.7	0.0
Incr Delay (d2), s/veh	7.3	0.0	8.4	0.8	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.8	0.0	0.3	5.3	4.0	0.0
LnGrp Delay(d),s/veh	24.4	0.0	52.5	25.7	28.7	0.0
LnGrp LOS	C		D	C	C	
Approach Vol, veh/h	828			527	376	
Approach Delay, s/veh	24.4			26.2	28.7	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		34.5		56.0	5.1	29.3		
Change Period (Y+Rc), s		* 5.3		4.6	3.7	5.3		
Max Green Setting (Gmax), s		* 58		81.7	6.0	48.7		
Max Q Clear Time (g_c+I1), s		14.1		42.3	2.6	11.0		
Green Ext Time (p_c), s		13.8		9.1	0.0	13.1		

Intersection Summary		
HCM 2010 Ctrl Delay		25.9
HCM 2010 LOS		C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Volume (vph)	30	320	1370	810	540	0	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.7	4.0	6.0	4.0		4.0
Lane Util. Factor		0.97	0.91	0.95	1.00		1.00
Frpb, ped/bikes		1.00	1.00	1.00	0.99		1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00
Frt		1.00	1.00	1.00	0.85		0.86
Flt Protected		0.95	1.00	1.00	1.00		1.00
Satd. Flow (prot)		3125	4590	3312	1340		1208
Flt Permitted		0.95	1.00	1.00	1.00		1.00
Satd. Flow (perm)		3125	4590	3312	1340		1208
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	32	340	1457	862	574	0	117
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	372	1457	862	574	0	117
Confl. Peds. (#/hr)					1		
Heavy Vehicles (%)	2%	13%	13%	9%	19%	2%	36%
Turn Type	Prot	Prot	NA	NA	Free		Free
Protected Phases	5	5	Free	6			
Permitted Phases					Free		Free
Actuated Green, G (s)		11.3	45.8	24.8	45.8		45.8
Effective Green, g (s)		11.3	45.8	24.8	45.8		45.8
Actuated g/C Ratio		0.25	1.00	0.54	1.00		1.00
Clearance Time (s)		3.7		6.0			
Vehicle Extension (s)		2.0		6.1			
Lane Grp Cap (vph)		771	4590	1793	1340		1208
v/s Ratio Prot		0.12	0.32	0.26			
v/s Ratio Perm					c0.43		0.10
v/c Ratio		0.48	0.32	0.48	0.43		0.10
Uniform Delay, d1		14.7	0.0	6.5	0.0		0.0
Progression Factor		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2		0.2	0.2	0.6	1.0		0.2
Delay (s)		14.9	0.2	7.1	1.0		0.2
Level of Service		B	A	A	A		A
Approach Delay (s)			3.2	4.7		0.2	
Approach LOS			A	A		A	

Intersection Summary			
HCM 2000 Control Delay	3.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	45.8	Sum of lost time (s)	9.7
Intersection Capacity Utilization	40.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (veh/h)	10	40	60	10	770	40	220	10	70	430	490	260
Number	5	2	12		1	6	16		3	8	18	7
Initial Q (Qb), veh	0	0	0		0	0	0		0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98		1.00		1.00		1.00		0.99	1.00
Parking Bus, Adj	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863		1863	1694	1900		1863	1338	1863	1652
Adj Flow Rate, veh/h	11	43	1		837	43	77		76	467	97	283
Adj No. of Lanes	1	1	1		2	1	0		1	3	1	1
Peak Hour Factor	0.92	0.92	0.92		0.92	0.92	0.92		0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2		2	2	2		2	42	2	15
Cap, veh/h	28	108	91		951	173	310		98	952	410	314
Arrive On Green	0.02	0.06	0.06		0.28	0.32	0.32		0.06	0.26	0.26	0.20
Sat Flow, veh/h	1774	1863	1555		3442	543	973		1774	3653	1574	1573
Grp Volume(v), veh/h	11	43	1		837	0	120		76	467	97	283
Grp Sat Flow(s),veh/h/ln	1774	1863	1555		1721	0	1517		1774	1218	1574	1573
Q Serve(g_s), s	0.6	2.1	0.1		21.8	0.0	5.5		4.0	10.2	4.6	16.5
Cycle Q Clear(g_c), s	0.6	2.1	0.1		21.8	0.0	5.5		4.0	10.2	4.6	16.5
Prop In Lane	1.00		1.00		1.00		0.64		1.00		1.00	1.00
Lane Grp Cap(c), veh/h	28	108	91		951	0	483		98	952	410	314
V/C Ratio(X)	0.39	0.40	0.01		0.88	0.00	0.25		0.78	0.49	0.24	0.90
Avail Cap(c_a), veh/h	151	205	171		2249	0	1028		223	1406	606	386
HCM Platoon Ratio	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00		1.00	0.00	1.00		1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.7	42.6	41.6		32.5	0.0	23.7		43.7	29.4	27.3	36.7
Incr Delay (d2), s/veh	5.2	4.0	0.1		1.8	0.0	0.2		7.8	0.8	0.6	19.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.2	0.0		10.6	0.0	2.3		2.2	3.5	2.0	8.9
LnGrp Delay(d),s/veh	51.0	46.6	41.7		34.2	0.0	23.8		51.6	30.2	27.9	56.4
LnGrp LOS	D	D	D		C		C		D	C	C	E
Approach Vol, veh/h		55				957				640		
Approach Delay, s/veh		47.4				32.9				32.4		
Approach LOS		D				C				C		

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	30.6	11.2	9.4	42.7	6.2	35.6	22.7	29.3
Change Period (Y+Rc), s	* 4.7	5.7	* 4.2	4.9	* 4.7	5.7	4.0	4.9
Max Green Setting (Gmax), s	* 61	10.3	* 12	47.1	* 8	63.6	23.0	36.1
Max Q Clear Time (g_c+I1), s	23.8	4.1	6.0	11.1	2.6	7.5	18.5	12.2
Green Ext Time (p_c), s	2.1	0.4	0.0	15.0	0.0	0.9	0.2	12.2

Intersection Summary	
HCM 2010 Ctrl Delay	32.8
HCM 2010 LOS	C

Notes
User approved ignoring U-Turning movement.

Movement	SBT	SBR
Lane Configurations		
Volume (veh/h)	510	10
Number	4	14
Initial Q (Qb), veh	0	0
Ped-Bike Adj(A_pbT)		0.99
Parking Bus, Adj	1.00	1.00
Adj Sat Flow, veh/h/ln	1435	1900
Adj Flow Rate, veh/h	554	10
Adj No. of Lanes	3	0
Peak Hour Factor	0.92	0.92
Percent Heavy Veh, %	33	33
Cap, veh/h	1595	29
Arrive On Green	0.40	0.40
Sat Flow, veh/h	3962	71
Grp Volume(v), veh/h	365	199
Grp Sat Flow(s),veh/h/ln	1306	1422
Q Serve(g_s), s	9.1	9.1
Cycle Q Clear(g_c), s	9.1	9.1
Prop In Lane		0.05
Lane Grp Cap(c), veh/h	1051	572
V/C Ratio(X)	0.35	0.35
Avail Cap(c_a), veh/h	1311	714
HCM Platoon Ratio	1.00	1.00
Upstream Filter(I)	1.00	1.00
Uniform Delay (d), s/veh	19.5	19.5
Incr Delay (d2), s/veh	0.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	3.7
LnGrp Delay(d),s/veh	19.8	20.2
LnGrp LOS	B	C
Approach Vol, veh/h	847	
Approach Delay, s/veh	32.1	
Approach LOS	C	

Timer

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection 5 **Street C/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	220	250	113.7%	62.6	15.5	E
	Right Turn	930	921	99.0%	15.9	3.7	B
	Subtotal	1,150	1,171	101.8%	26.2	5.0	C
SB	Left Turn	700	692	98.8%	52.5	6.3	D
	Through	260	305	117.4%	17.7	4.9	B
	Right Turn						
	Subtotal	960	997	103.8%	41.8	4.5	D
EB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
WB	Left Turn	1,130	996	88.1%	36.6	4.6	D
	Through						
	Right Turn	710	638	89.9%	17.6	3.8	B
	Subtotal	1,840	1,634	88.8%	29.2	3.8	C
Total		3,950	3,802	96.3%	31.6	3.2	C

Intersection 6 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn	920	944	102.6%	29.6	4.0	C
	Through						
	Right Turn	450	453	100.7%	29.0	4.4	C
	Subtotal	1,370	1,397	102.0%	29.5	3.7	C
EB	Left Turn						
	Through	1,240	1,215	98.0%	30.7	7.5	C
	Right Turn	390	395	101.2%	10.5	4.4	B
	Subtotal	1,630	1,610	98.8%	25.7	6.8	C
WB	Left Turn						
	Through	1,390	1,199	86.3%	30.9	10.2	C
	Right Turn	650	539	83.0%	13.3	3.2	B
	Subtotal	2,040	1,739	85.2%	25.5	8.1	C
Total		5,040	4,746	94.2%	26.9	3.4	C

SimTraffic Post-Processor | **Grapevine Transportation Impact Study**
Average Results from 10 Runs | **Cumulative Plus Project**
Volume and Delay by Movement | **PM Peak Hour**

Intersection 7 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	410	412	100.6%	34.5	6.9	C
	Through						
	Right Turn	660	647	98.0%	26.3	3.8	C
	Subtotal	1,070	1,059	99.0%	29.6	3.4	C
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	1,700	1,697	99.8%	20.9	3.8	C
	Right Turn	460	437	94.9%	10.8	1.4	B
	Subtotal	2,160	2,134	98.8%	18.8	3.3	B
WB	Left Turn						
	Through	1,630	1,343	82.4%	17.2	0.9	B
	Right Turn	510	415	81.4%	7.7	0.6	A
	Subtotal	2,140	1,758	82.1%	14.9	0.8	B
Total		5,370	4,950	92.2%	19.8	1.8	B

Intersection 8 **Street D/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	480	454	94.5%	99.5	30.7	F
	Through	230	226	98.1%	50.9	6.1	D
	Right Turn	70	81	115.6%	49.4	5.1	D
	Subtotal	780	760	97.5%	79.9	18.7	E
SB	Left Turn	660	636	96.4%	98.2	37.0	F
	Through	230	234	101.8%	116.4	36.8	F
	Right Turn	820	630	76.9%	246.6	48.5	F
	Subtotal	1,710	1,501	87.8%	163.8	39.5	F
EB	Left Turn	520	494	94.9%	61.1	5.5	E
	Through	1,370	1,362	99.4%	47.1	5.9	D
	Right Turn	470	455	96.8%	22.4	5.1	C
	Subtotal	2,360	2,310	97.9%	45.3	5.0	D
WB	Left Turn	80	62	77.4%	172.6	33.7	F
	Through	840	669	79.7%	203.2	36.9	F
	Right Turn	510	396	77.6%	156.3	40.6	F
	Subtotal	1,430	1,127	78.8%	185.3	37.3	F
Total		6,280	5,698	90.7%	108.5	9.3	F

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Grapevine Transportation Impact Study
Cumulative Plus Project
PM Peak Hour

Intersection 9 **Street C/Street G** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	280	253	90.4%	46.9	3.7	D
	Through	650	633	97.5%	2.7	0.8	A
	Right Turn						
	Subtotal	930	887	95.3%	15.4	2.5	B
SB	Left Turn						
	Through	670	658	98.2%	18.2	3.2	B
	Right Turn	10	11	110.2%	15.5	12.8	B
	Subtotal	680	669	98.4%	18.2	3.3	B
EB	Left Turn	10	8	83.6%	58.9	45.9	E
	Through						
	Right Turn	290	283	97.6%	18.9	7.0	B
	Subtotal	300	291	97.2%	20.0	6.9	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,910	1,847	96.7%	17.2	2.6	B

Intersection 10 **Street C/Street H** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	60	69	115.3%	34.9	5.3	C
	Through	910	929	102.1%	9.1	2.6	A
	Right Turn						
	Subtotal	970	998	102.9%	10.8	2.6	B
SB	Left Turn						
	Through	1,110	1,006	90.7%	8.4	1.4	A
	Right Turn	280	261	93.2%	5.9	0.9	A
	Subtotal	1,390	1,267	91.2%	7.9	1.3	A
EB	Left Turn	240	233	97.1%	30.5	3.2	C
	Through						
	Right Turn	60	56	93.1%	11.1	2.9	B
	Subtotal	300	289	96.3%	26.7	2.6	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,660	2,554	96.0%	11.2	1.6	B

Intersection 5 **Street C/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
NB	Through	425	100	19	150	23	175	28	0%	0%
	Right Turn	425	125	14	175	24	175	31	0%	0%
SB	Left Turn	475	150	23	225	40	225	40	0%	0%
	Through	475	75	16	100	39	100	46	0%	0%
WB	Left Turn	1,675	175	25	250	26	250	33	0%	0%
	Right Turn	675	125	21	200	52	200	46	0%	0%
0										

Intersection 6 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	675	225	45	350	134	350	134	1%	0%
	Right Turn	325	25	31	75	121	75	135	0%	0%
SB	Left Turn	5,725	125	15	175	32	175	31	0%	0%
	Right Turn	525	125	17	225	37	225	45	0%	0%
WB	Through	975	175	24	250	37	250	42	0%	0%
0										

Intersection 7 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Through	975	150	27	225	57	225	59	0%	0%
NB	Left Turn	525	150	23	250	54	250	64	0%	0%
	Right Turn	3,625	100	15	150	39	150	51	0%	0%
WB	Through	1,100	250	128	675	435	750	512	0%	0%
0										

Intersection 8 **Street D/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Left Turn	425	275	21	400	37	400	45	1%	0%
	Through	1,100	150	22	225	76	250	103	0%	0%
	Right Turn	425	50	7	100	14	100	14	0%	0%
NB	Left Turn	2,900	200	85	300	126	300	129	20%	0%
	Through	2,900	50	11	75	15	75	14	0%	0%
	Through/Right	2,900	50	8	75	16	100	22	0%	0%
SB	Left Turn	2,475	125	11	175	20	175	29	0%	0%
	Through	2,475	100	25	175	40	175	44	0%	0%
	Right Turn	2,475	275	44	425	78	450	80	0%	0%
WB	Left Turn	325	75	21	175	109	200	160	0%	0%
	Through	3,200	575	128	775	205	850	263	34%	0%
	Right Turn	525	300	157	575	293	550	118	0%	0%

Intersection 9 **Street C/Street G** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	275	25	7	50	12	50	12	0%	0%
	Right Turn	1,225	50	7	75	14	75	18	0%	0%
NB	Left Turn	125	125	5	150	10	125	0	35%	0%
	Through	475	150	36	350	72	325	67	0%	0%
SB	Through	2,625	100	16	175	41	175	38	0%	0%
	Through/Right	2,625	50	11	125	33	125	48	0%	0%
0										

Intersection 10 **Street C/Street H** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	1,300	125	26	225	42	225	52	4%	0%
	Right Turn	175	25	10	75	41	75	60	0%	0%
NB	Left Turn	175	50	9	75	11	75	13	0%	0%
	Through	1,525	175	33	300	85	300	91	1%	0%
SB	Through	425	100	16	150	33	150	40	0%	0%
	Right Turn	225	50	10	100	34	100	49	0%	0%
0										

Intersection 5 **Street C/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
NB	Through	425	250	77	375	82	350	63	0%	2%
	Right Turn	425	200	62	350	82	375	65	2%	0%
SB	Left Turn	475	350	55	475	67	475	50	15%	3%
	Through	475	150	36	250	90	250	116	0%	0%
			#VALUE!							
WB	Left Turn	1,675	475	93	675	123	625	89	22%	1%
	Right Turn	675	325	100	600	189	575	165	0%	1%
0										

Intersection 6 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	675	400	110	575	146	550	135	11%	1%
	Right Turn	325	200	68	425	54	350	0	0%	0%
SB	Left Turn	5,725	200	28	275	40	275	38	0%	0%
	Right Turn	525	200	30	300	65	300	103	0%	0%
WB	Through	975	325	114	500	232	500	253	2%	0%
	Right Turn	450	75	83	225	234	225	237	0%	0%
0										

Intersection 7 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Through	975	275	45	400	91	400	106	0%	0%
	Right Turn	450	50	45	150	189	225	235	0%	0%
NB	Left Turn	525	250	42	350	73	350	87	0%	0%
	Right Turn	3,625	175	28	250	50	275	54	0%	0%
WB	Through	1,100	250	39	425	162	450	238	0%	0%
0										

Intersection 8 **Street D/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Left Turn	425	350	60	550	51	475	48	1%	0%
	Through	1,100	575	114	850	267	850	260	19%	1%
	Right Turn	425	325	108	550	88	475	3	0%	0%
NB	Left Turn	2,900	375	108	500	180	500	155	13%	0%
	Through	2,900	150	19	225	73	250	101	1%	0%
	Through/Right	225	150	16	200	33	200	28	2%	0%
SB	Left Turn	2,475	750	488	1,375	935	1,475	831	5%	1%
	Through	2,475	1,425	426	1,950	413	1,950	381	0%	1%
	Right Turn	2,475	2,075	267	2,475	180	2,400	98	0%	5%
WB	Left Turn	325	200	59	425	84	375	0	0%	0%
	Through	3,200	1,500	360	2,200	543	2,250	454	73%	0%
	Right Turn	525	575	27	650	81	600	0	4%	0%

Intersection 9 **Street C/Street G** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	275	25	4	25	15	25	19	0%	0%
	Right Turn	1,225	125	52	225	106	225	110	2%	0%
NB	Left Turn	125	125	4	150	9	125	1	43%	0%
	Through	475	200	44	375	79	350	72	0%	0%
SB	Through	2,625	225	29	350	39	350	61	0%	0%
	Through/Right	2,625	125	20	250	57	275	68	0%	0%
0										

Intersection 10 **Street C/Street H** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	1,300	150	13	225	19	225	24	6%	0%
	Right Turn	175	50	13	75	44	75	59	0%	0%
NB	Left Turn	175	75	11	100	13	100	15	0%	0%
	Through	1,525	175	43	300	71	300	71	0%	0%
SB	Through	425	150	33	250	42	250	50	2%	0%
	Right Turn	225	100	21	175	52	200	68	0%	0%
0										

INTENTIONALLY LEFT BLANK

Appendix J:

Cumulative Conditions (2040) – Freeway Operations

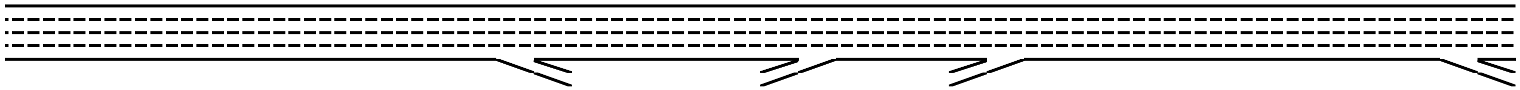
Project: Grapevine
Freeway Corridor: Northbound I-5

Alternative: Cumulative Plus Project Condition
Time Period: AM Peak Hour

Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4	5	6	7	8
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Define Freeway Segment								
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500
Accel Length					500	500		
Decel Length			500					170
Mainline Volume	4,520	4,520	4,520	3,840	3,840	4,480	5,420	5,420
On Ramp Volume					640	940		
Off Ramp Volume			680					580
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	4,520	4,520	4,520	3,840	4,480	5,420	5,420	5,420
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	23.7%	23.7%	23.7%	26.0%	26.0%	26.0%	20.1%	20.1%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.678	0.894	0.894	0.885	0.885	0.885	0.909	0.909
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	7,088	5,378	5,378	4,616	5,386	6,516	6,345	6,345
GP Flow (pcphpl)	1,772	1,345	1,345	1,154	1,346	1,629	1,586	1,586
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS	65.0	65.0	65.0	65.0	65.0			
FFS Curve	65	65	65	65	65	65	70	70
Calculate Operations in General Purpose Lanes								
v/c ratio	0.75	0.57	0.57	0.49	0.57	0.69	0.66	0.66
Speed (mph)	63.0	65.0	65.0	65.0	65.0	64.3	68.3	68.3

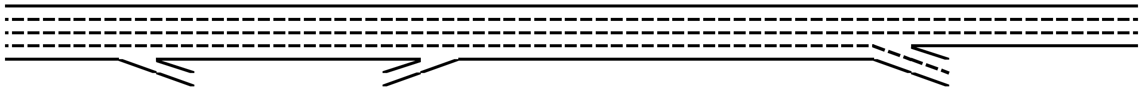
Location	1	2	3	4	5	6	7	8
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Density (pcphpl)	28.1	20.7	20.7	17.8	20.7	25.3	23.2	23.2
LOS	D	C	C	B	C	C	C	C
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)			5,378		4,668	5,467		6,345
GP_{IN} Cap (pcph)			9,400		9,400	9,400		9,600
GP_{IN} v/c ratio			0.57		0.50	0.58		0.66
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)			4,601		5,386	6,516		5,677
GP_{OUT} Cap (pcph)			9,400		9,400	9,400		9,600
GP_{OUT} v/c ratio			0.49		0.57	0.69		0.59
Calculate On Ramp Flow Rate								
On Volume (vph)					640	940		
PHF					0.92	0.92		
Total Lanes					1	1		
Terrain					Level	Level		
Grade %					0.0%	0.0%		
Grade Length (mi)					0.00	0.00		
Truck & Bus %					6.3%	5.3%		
RV %					0.0%	0.0%		
E_T					1.5	1.5		
E_R					1.2	1.2		
f_{HV}					0.969	0.974		
f_P					1.00	1.00		
On Flow (pcph)					718	1,049		
On Flow (pcphpl)					718	1,049		
Calculate On Ramp Roadway Operations								
On Ramp Type					Right	Right		
On Ramp Speed (mph)					25	45		
On Ramp Cap (pcph)					1,900	2,100		
On Ramp v/c ratio					0.38	0.50		
Calculate Off Ramp Flow Rate								
Off Volume (vph)			680					580
PHF			0.92					0.92
Total Lanes			1					1
Terrain			Level					Level



Key
<> Express Lane (HOV)
No Trucks

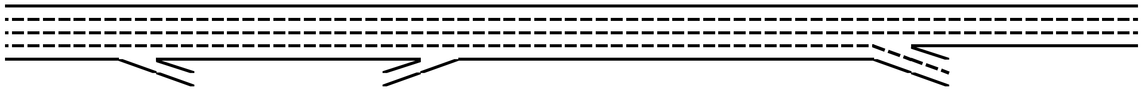
Location	1	2	3	4	5	6	7	8
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Grade %			0.0%					0.0%
Grade Length (mi)			0.00					0.00
Truck & Bus %			10.3%					12.1%
RV %			0.0%					0.0%
E_T			1.5					1.5
E_R			1.2					1.2
f_{HV}			0.951					0.943
f_P			1.00					1.00
Off Flow (pcph)			777					669
Off Flow (pcphpl)			777					669
Calculate Off Ramp Roadway Operations								
Off Ramp Type			Right					Right
Off Ramp Speed			45					45
Off Ramp Cap (pcph)			2,100					2,100
Off Ramp v/c ratio			0.37					0.32
Determine Adjacent Ramp for Three-Lane Mainline Segments								
Up Type								
Up Distance								
Up Flow (pcph)								
Down Type								
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area Operations								
Effective v_P (pcph)					4,668	5,467		
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)					0.592	0.592		
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}					0.128	0.087		
v_{12} (pcph)					598	474		
v_3 (pcph)								
v_{34} (pcph)					4,070	4,993		
v_{12a} (pcph)					1,867	2,187		

Location	1	2	3	4	5	6	7	8
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
v_{R12a} (pcph)					2,585	3,236		
Merge Speed Index					0.35	0.38		
Merge Area Speed					57.0	56.4		
Outer Lanes Volume					1,400	1,640		
Outer Lanes Speed					61.8	60.9		
Segment Speed					59.4	58.6		
Merge v/c ratio					0.56	0.70		
Merge Density					22.2	27.1		
Merge LOS					C	C		
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)			5,378					6,345
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)			0.590					0.571
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}			0.436					0.436
v_{12} (pcph)			2,783					3,144
v_3 (pcph)								
v_{34} (pcph)			2,595					3,202
v_{12a} (pcph)			2,783					3,144
Diverge Speed Index			0.37					0.36
Diverge Area Speed			56.5					60.0
Outer Lanes Volume			1,298					1,601
Outer Lanes Speed			70.1					74.4
Segment Speed			62.4					66.5
Diverge v/c ratio			0.63					0.71
Diverge Density			23.7					29.8
Diverge LOS			C					D
Summarize Segment Operations								
Segment v/c ratio	0.75	0.57	0.63	0.49	0.56	0.70	0.66	0.71
Segment Density	28.1	20.7	23.7	17.8	22.2	27.1	23.2	29.8
Segment LOS	D	C	C	B	C	C	C	D
Over Capacity								



Key
<> Express Lane (HOV)
No Trucks

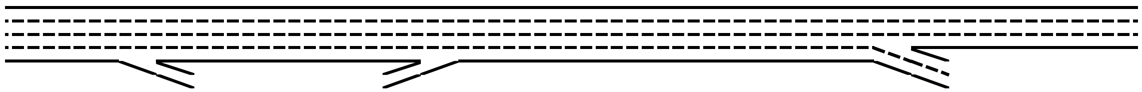
Location	9	10	11	12	13	14
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment						
Type	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	1,240	1,470	1,500	3,336	2,000	2,000
Accel Length			500			
Decel Length	185					
Mainline Volume	4,840	4,700	4,700	5,420	5,420	3,120
On Ramp Volume			720			
Off Ramp Volume	140				2,300	
Express Lane Volume						
EL On Ramp Volume						
EL Off Ramp Volume						
Calculate Flow Rate in General Pu						
GP Volume (vph)	4,840	4,700	5,420	5,420	5,420	3,120
PHF	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	3
Terrain	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	20.1%	21.3%	21.3%	20.3%	20.3%	17.0%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.909	0.904	0.904	0.908	0.908	0.922
f_P	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	5,666	5,533	6,380	6,351	6,351	3,601
GP Flow (pcphpl)	1,417	1,383	1,595	1,588	1,588	1,200
Calculate Speed in General Purpo						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calculated FFS						
Measured FFS						
FFS Curve	70	70	70	70	70	70
Calculate Operations in General P						
v/c ratio	0.59	0.58	0.66	0.66	0.66	0.50
Speed (mph)	69.5	69.6	68.2	68.3	68.3	70.0



Key
<> Express Lane (HOV)
No Trucks

Location	9	10	11	12	13	14
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Density (pcphpl)	20.4	19.9	23.4	23.3	23.3	17.1
LOS	C	C	C	C	C	B
Calculate Operations for Entering						
GP_{IN} Vol (pcph)	5,666		5,543			
GP_{IN} Cap (pcph)	9,600		9,600			
GP_{IN} v/c ratio	0.59		0.58			
Calculate Operations for Exiting G						
GP_{OUT} Vol (pcph)	5,503		6,380		3,541	
GP_{OUT} Cap (pcph)	9,600		9,600		7,200	
GP_{OUT} v/c ratio	0.57		0.66		0.49	
Calculate On Ramp Flow Rate						
On Volume (vph)			720			
PHF			0.92			
Total Lanes			1			
Terrain			Level			
Grade %			0.0%			
Grade Length (mi)			0.00			
Truck & Bus %			13.9%			
RV %			0.0%			
E_T			1.5			
E_R			1.2			
f_{HV}			0.935			
f_P			1.00			
On Flow (pcph)			837			
On Flow (pcphpl)			837			
Calculate On Ramp Roadway Ope						
On Ramp Type			Right			
On Ramp Speed (mph)			45			
On Ramp Cap (pcph)			2,100			
On Ramp v/c ratio			0.40			
Calculate Off Ramp Flow Rate						
Off Volume (vph)	140				2,300	
PHF	0.92				0.92	
Total Lanes	1				2	
Terrain	Level				Level	

Location	9	10	11	12	13	14
Key						
<> Express Lane (HOV)						
No Trucks						
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Grade %	0.0%				0.0%	
Grade Length (mi)	0.00				0.00	
Truck & Bus %	14.3%				24.8%	
RV %	0.0%				0.0%	
E_T	1.5				1.5	
E_R	1.2				1.2	
f_{HV}	0.933				0.890	
f_P	1.00				1.00	
Off Flow (pcph)	163				2,810	
Off Flow (pcphpl)	163				1,405	
Calculate Off Ramp Roadway Ope						
Off Ramp Type	Right				Major	
Off Ramp Speed	25				65	
Off Ramp Cap (pcph)	1,900				4,700	
Off Ramp v/c ratio	0.09				0.60	
Determine Adjacent Ramp for Thr						
Up Type						
Up Distance						
Up Flow (pcph)						
Down Type						
Down Distance						
Down Flow (pcph)						
Calculate Merge Influence Area O						
Effective v_P (pcph)			5,543			
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FM} (Eqn 13-3)			0.592			
P_{FM} (Eqn 13-4)						
P_{FM} (Eqn 13-5)						
P_{FM}			0.113			
v_{12} (pcph)			627			
v_3 (pcph)						
v_{34} (pcph)			4,916			
v_{12a} (pcph)			2,217			



Key
<> Express Lane (HOV)
No Trucks

Location	9	10	11	12	13	14
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
v_{R12a} (pcph)			3,054			
Merge Speed Index			0.36			
Merge Area Speed			60.0			
Outer Lanes Volume			1,663			
Outer Lanes Speed			65.8			
Segment Speed			62.9			
Merge v/c ratio			0.66			
Merge Density			25.8			
Merge LOS			C			
Calculate Diverge Influence Area (						
Effective v_P (pcph)	5,666					
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FD} (Eqn 13-9)	0.611					
P_{FD} (Eqn 13-10)						
P_{FD} (Eqn 13-11)						
P_{FD}	0.436					
v_{12} (pcph)	2,563					
v_3 (pcph)						
v_{34} (pcph)	3,104					
v_{12a} (pcph)	2,563					
Diverge Speed Index	0.57					
Diverge Area Speed	54.0					
Outer Lanes Volume	1,552					
Outer Lanes Speed	74.6					
Segment Speed	63.6					
Diverge v/c ratio	0.58					
Diverge Density	24.6					
Diverge LOS	C					
Summarize Segment Operations						
Segment v/c ratio	0.58	0.58	0.66	0.66	0.66	0.50
Segment Density	24.6	19.9	25.8	23.3	23.3	17.1
Segment LOS	C	C	C	C	C	B
Over Capacity						

Location	1

Key

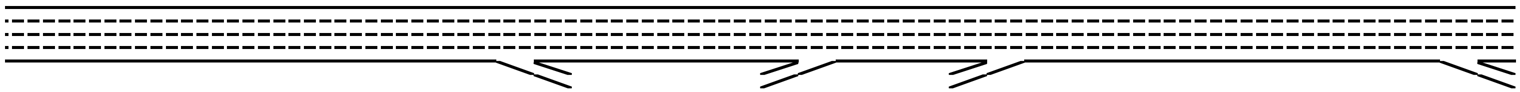
<> Express Lane (HOV)

No Trucks

Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	2,300
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	2,300
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	24.8%
RV %	0.0%
E_T	1.5
E_R	1.2
f_{HV}	0.890
f_P	1.00
GP Flow (pcph)	2,750
GP Flow (pcphpl)	1,375
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f_{LW}	
f_{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.57
Speed (mph)	69.6
Density (pcphpl)	19.7
LOS	C
Calculate Operations for Entering GP Lanes	
GP_{IN} Vol (pcph)	
GP_{IN} Cap (pcph)	
GP_{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP_{OUT} Vol (pcph)	
GP_{OUT} Cap (pcph)	
GP_{OUT} v/c ratio	
Calculate Flow Rate in Express Lanes (EL)	
Calculate Speed in Express Lanes	
Calculate Operations in Express Lanes	
Calculate On Ramp Flow Rate	
Calculate On Ramp Roadway Operations	
Calculate Off Ramp Flow Rate	
Calculate Off Ramp Roadway Operations	

Location	1
Key	
<> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	2,300
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	2,300
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	24.8%
RV %	0.0%
E_T	1.5
E_R	1.2
f_{HV}	0.890
f_P	1.00
GP Flow (pcph)	2,750
GP Flow (pcphpl)	1,375
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f_{LW}	
f_{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.57
Speed (mph)	69.6
Density (pcphpl)	19.7
LOS	C
Calculate Operations for Entering GP Lanes	
GP_{IN} Vol (pcph)	
GP_{IN} Cap (pcph)	
GP_{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP_{OUT} Vol (pcph)	
GP_{OUT} Cap (pcph)	
GP_{OUT} v/c ratio	
Summarize Segment Operations	
Segment v/c ratio	0.57
Segment Density	19.7
Segment LOS	C
Over Capacity	

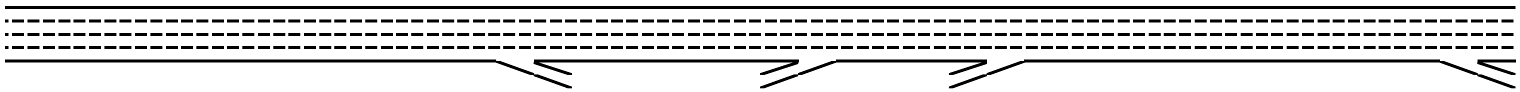
Location	1	2	3	4	5	6	7	8



Key
<> Express Lane (HOV)
No Trucks

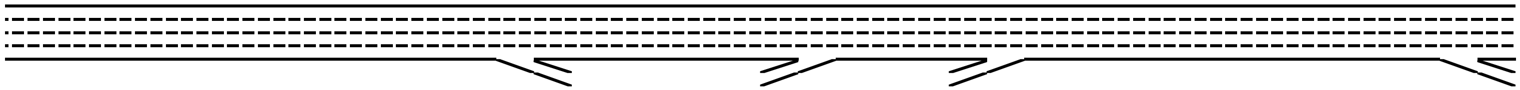
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Define Freeway Segment								
Type	Basic	Basic	Diverge	Basic	Merge	Merge	Basic	Diverge
Length (ft)	22,312	3,200	1,500	1,460	1,500	1,500	11,784	1,500
Accel Length					500	500		
Decel Length			500					170
Mainline Volume	6,550	6,550	6,550	5,480	5,480	5,940	6,450	6,450
On Ramp Volume					460	510		
Off Ramp Volume			1,070					470
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	6,550	6,550	6,550	5,480	5,940	6,450	6,450	6,450
PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	4	4	4
Terrain	Grade	Grade	Level	Level	Level	Level	Level	Level
Grade %	-6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	21.7%	21.7%	21.7%	24.1%	24.1%	24.1%	21.7%	21.7%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	3.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.697	0.902	0.902	0.892	0.892	0.892	0.902	0.902
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	9,992	7,724	7,724	6,532	7,081	7,689	7,606	7,606
GP Flow (pcphpl)	2,498	1,931	1,931	1,633	1,770	1,922	1,902	1,902
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS	65.0	65.0	65.0	65.0	65.0			
FFS Curve	65	65	65	65	65	65	70	70
Calculate Operations in General Purpose Lanes								
v/c ratio	1.06	0.82	0.82	0.69	0.75	0.82	0.79	0.79
Speed (mph)	-	61.0	61.0	64.2	63.1	61.1	64.3	64.3

Location	1	2	3	4	5	6	7	8
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Density (pcphpl)	-	31.7	31.7	25.4	28.1	31.4	29.6	29.6
LOS	F	D	D	C	D	D	D	D
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)			7,724		6,564	7,107		7,606
GP_{IN} Cap (pcph)			9,400		9,400	9,400		9,600
GP_{IN} v/c ratio			0.82		0.70	0.76		0.79
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)			6,507		7,081	7,689		7,052
GP_{OUT} Cap (pcph)			9,400		9,400	9,400		9,600
GP_{OUT} v/c ratio			0.69		0.75	0.82		0.73
Calculate On Ramp Flow Rate								
On Volume (vph)					460	510		
PHF					0.92	0.92		
Total Lanes					1	1		
Terrain					Level	Level		
Grade %					0.0%	0.0%		
Grade Length (mi)					0.00	0.00		
Truck & Bus %					6.5%	9.8%		
RV %					0.0%	0.0%		
E_T					1.5	1.5		
E_R					1.2	1.2		
f_{HV}					0.969	0.953		
f_P					1.00	1.00		
On Flow (pcph)					516	582		
On Flow (pcphpl)					516	582		
Calculate On Ramp Roadway Operations								
On Ramp Type					Right	Right		
On Ramp Speed (mph)					25	45		
On Ramp Cap (pcph)					1,900	2,100		
On Ramp v/c ratio					0.27	0.28		
Calculate Off Ramp Flow Rate								
Off Volume (vph)			1,070					470
PHF			0.92					0.92
Total Lanes			1					1
Terrain			Level					Level

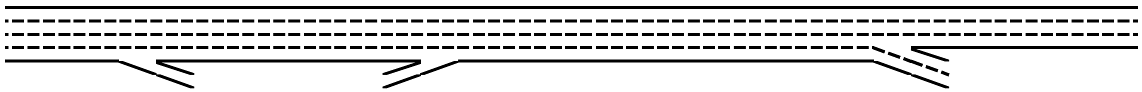


Key
<> Express Lane (HOV)
No Trucks

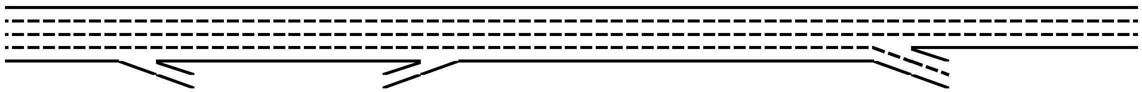
Location	1	2	3	4	5	6	7	8
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
Grade %			0.0%					0.0%
Grade Length (mi)			0.00					0.00
Truck & Bus %			9.3%					17.0%
RV %			0.0%					0.0%
E_T			1.5					1.5
E_R			1.2					1.2
f_{HV}			0.956					0.922
f_P			1.00					1.00
Off Flow (pcph)			1,217					554
Off Flow (pcphpl)			1,217					554
Calculate Off Ramp Roadway Operations								
Off Ramp Type			Right					Right
Off Ramp Speed			45					45
Off Ramp Cap (pcph)			2,100					2,100
Off Ramp v/c ratio			0.58					0.26
Determine Adjacent Ramp for Three-Lane Mainline Segments								
Up Type								
Up Distance								
Up Flow (pcph)								
Down Type								
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area Operations								
Effective v_P (pcph)					6,564	7,107		
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)					0.592	0.592		
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}					0.153	0.145		
v_{12} (pcph)					1,006	1,031		
v_3 (pcph)								
v_{34} (pcph)					5,558	6,076		
v_{12a} (pcph)					2,626	2,843		



Location	1	2	3	4	5	6	7	8
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Grapevine Downgrade	Grapevine Grade to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-Ramp	Grapevine Loop On-ramp	Grapevine Slip On-Ramp	Grapevine to Laval Road	Laval Road East Off-Ramp
v_{R12a} (pcph)					3,142	3,424		
Merge Speed Index					0.39	0.40		
Merge Area Speed					56.1	55.9		
Outer Lanes Volume					1,969	2,132		
Outer Lanes Speed					59.7	59.1		
Segment Speed					58.1	57.6		
Merge v/c ratio					0.68	0.74		
Merge Density					26.6	28.8		
Merge LOS					C	D		
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)			7,724					7,606
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)			0.511					0.544
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}			0.436					0.436
v_{12} (pcph)			4,054					3,629
v_3 (pcph)								
v_{34} (pcph)			3,670					3,977
v_{12a} (pcph)			4,054					3,629
Diverge Speed Index			0.41					0.35
Diverge Area Speed			55.6					60.3
Outer Lanes Volume			1,835					1,989
Outer Lanes Speed			68.0					72.9
Segment Speed			60.9					66.3
Diverge v/c ratio			0.92					0.82
Diverge Density			34.6					33.9
Diverge LOS			D					D
Summarize Segment Operations								
Segment v/c ratio	1.06	0.82	0.92	0.69	0.68	0.74	0.79	0.82
Segment Density	-	31.7	34.6	25.4	26.6	28.8	29.6	33.9
Segment LOS	F	D	D	C	C	D	D	D
Over Capacity	Segment GP Lanes							



Location	9	10	11	12	13	14
Key						
<> Express Lane (HOV)						
No Trucks						
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Define Freeway Segment						
Type	Diverge	Basic	Merge	Basic	Basic	Basic
Length (ft)	1,240	1,470	1,500	3,336	1,500	
Accel Length			500			
Decel Length	185					
Mainline Volume	5,980	5,870	5,870	6,730	6,730	3,690
On Ramp Volume			860			
Off Ramp Volume	110				3,040	
Express Lane Volume						
EL On Ramp Volume						
EL Off Ramp Volume						
Calculate Flow Rate in General Pu						
GP Volume (vph)	5,980	5,870	6,730	6,730	6,730	3,690
PHF	0.94	0.94	0.94	0.94	0.94	0.94
GP Lanes	4	4	4	4	4	3
Terrain	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	21.7%	21.8%	21.8%	21.1%	21.1%	19.0%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.902	0.902	0.902	0.905	0.905	0.913
f_P	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	7,052	6,925	7,940	7,915	7,915	4,298
GP Flow (pcphpl)	1,763	1,731	1,985	1,979	1,979	1,433
Calculate Speed in General Purpo						
Lane Width (ft)						
Shoulder Width						
TRD						
f_{LW}						
f_{LC}						
Calculated FFS						
Measured FFS						
FFS Curve	70	70	70	70	70	70
Calculate Operations in General P						
v/c ratio	0.73	0.72	0.83	0.82	0.82	0.60
Speed (mph)	66.3	66.7	62.9	63.0	63.0	69.4

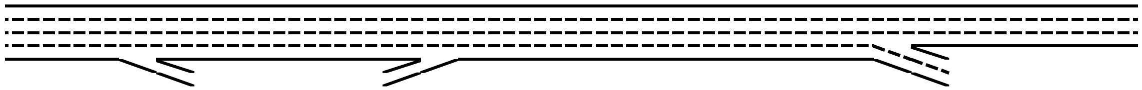


Key

<> Express Lane (HOV)

No Trucks

Location	9	10	11	12	13	14
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Density (pcphpl)	26.6	25.9	31.6	31.4	31.4	20.7
LOS	D	C	D	D	D	C
Calculate Operations for Entering						
GP_{IN} Vol (pcph)	7,052		6,929			
GP_{IN} Cap (pcph)	9,600		9,600			
GP_{IN} v/c ratio	0.73		0.72			
Calculate Operations for Exiting G						
GP_{OUT} Vol (pcph)	6,911		7,940		4,219	
GP_{OUT} Cap (pcph)	9,600		9,600		7,200	
GP_{OUT} v/c ratio	0.72		0.83		0.59	
Calculate On Ramp Flow Rate						
On Volume (vph)			860			
PHF			0.92			
Total Lanes			1			
Terrain			Level			
Grade %			0.0%			
Grade Length (mi)			0.00			
Truck & Bus %			16.3%			
RV %			0.0%			
E_T			1.5			
E_R			1.2			
f_{HV}			0.925			
f_P			1.00			
On Flow (pcph)			1,011			
On Flow (pcphpl)			1,011			
Calculate On Ramp Roadway Ope						
On Ramp Type			Right			
On Ramp Speed (mph)			45			
On Ramp Cap (pcph)			2,100			
On Ramp v/c ratio			0.48			
Calculate Off Ramp Flow Rate						
Off Volume (vph)	110				3,040	
PHF	0.92				0.92	
Total Lanes	1				2	
Terrain	Level				Level	

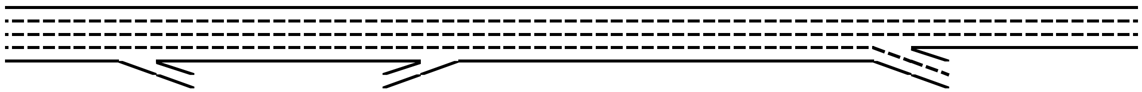


Location	9	10	11	12	13	14
Key						
<> Express Lane (HOV)						
No Trucks						
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
Grade %	0.0%				0.0%	
Grade Length (mi)	0.00				0.00	
Truck & Bus %	36.4%				23.7%	
RV %	0.0%				0.0%	
E_T	1.5				1.5	
E_R	1.2				1.2	
f_{HV}	0.846				0.894	
f_P	1.00				1.00	
Off Flow (pcph)	141				3,696	
Off Flow (pcphpl)	141				1,848	
Calculate Off Ramp Roadway Ope						
Off Ramp Type	Right				Major	
Off Ramp Speed	25				65	
Off Ramp Cap (pcph)	1,900				4,700	
Off Ramp v/c ratio	0.07				0.79	
Determine Adjacent Ramp for Thr						
Up Type						
Up Distance						
Up Flow (pcph)						
Down Type						
Down Distance						
Down Flow (pcph)						
Calculate Merge Influence Area O						
Effective v_P (pcph)			6,929			
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FM} (Eqn 13-3)			0.592			
P_{FM} (Eqn 13-4)						
P_{FM} (Eqn 13-5)						
P_{FM}			0.091			
v_{12} (pcph)			634			
v_3 (pcph)						
v_{34} (pcph)			6,295			
v_{12a} (pcph)			2,772			

Project: Grapevine
Freeway Corridor: Northbound I-5

Alternative: Cumulative Plus Project Condition
Time Period: PM Peak Hour

Location	9	10	11	12	13	14



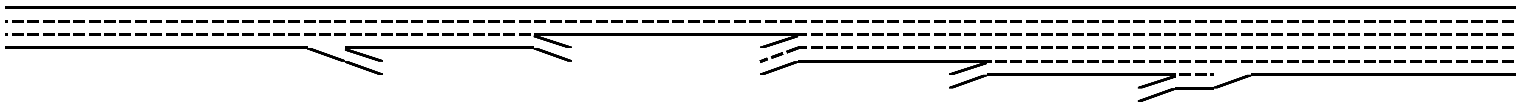
Key						
<> Express Lane (HOV)						
No Trucks						
Name	Laval Road West Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to SR 99	I-5 Northbound Off-Ramp	SR 99 NB North of I-5
v_{R12a} (pcph)			3,783			
Merge Speed Index			0.45			
Merge Area Speed			57.5			
Outer Lanes Volume			2,079			
Outer Lanes Speed			64.3			
Segment Speed			60.9			
Merge v/c ratio			0.82			
Merge Density			31.4			
Merge LOS			D			
Calculate Diverge Influence Area (						
Effective v_P (pcph)	7,052					
Up Ramp L_{EQ}						
Down Ramp L_{EQ}						
P_{FD} (Eqn 13-9)	0.577					
P_{FD} (Eqn 13-10)						
P_{FD} (Eqn 13-11)						
P_{FD}	0.436					
v_{12} (pcph)	3,154					
v_3 (pcph)						
v_{34} (pcph)	3,898					
v_{12a} (pcph)	3,154					
Diverge Speed Index	0.57					
Diverge Area Speed	54.0					
Outer Lanes Volume	1,949					
Outer Lanes Speed	73.1					
Segment Speed	63.1					
Diverge v/c ratio	0.72					
Diverge Density	29.7					
Diverge LOS	D					
Summarize Segment Operations						
Segment v/c ratio	0.72	0.72	0.82	0.82	0.82	0.60
Segment Density	29.7	25.9	31.4	31.4	31.4	20.7
Segment LOS	D	C	D	D	D	C
Over Capacity						

Location	1
Key	
<> Express Lane (HOV)	
No Trucks	
Name	I-5 North of Split Mixed Flow
Define Freeway Segment	
Type	Basic
Length (ft)	2,000
Accel Length	
Decel Length	
Mainline Volume	3,040
On Ramp Volume	
Off Ramp Volume	
Express Lane Volume	
EL On Ramp Volume	
EL Off Ramp Volume	
Calculate Flow Rate in General Purpose Lanes (GP)	
GP Volume (vph)	3,040
PHF	0.94
GP Lanes	2
Terrain	Level
Grade %	0.0%
Grade Length (mi)	0.00
Truck & Bus %	23.7%
RV %	0.0%
E_T	1.5
E_R	1.2
f_{HV}	0.894
f_P	1.00
GP Flow (pcph)	3,617
GP Flow (pcphpl)	1,809
Calculate Speed in General Purpose Lanes	
Lane Width (ft)	
Shoulder Width	
TRD	
f_{LW}	
f_{LC}	
Calculated FFS	
Measured FFS	
FFS Curve	70
Calculate Operations in General Purpose Lanes	
v/c ratio	0.75
Speed (mph)	65.7
Density (pcphpl)	27.5
LOS	D
Calculate Operations for Entering GP Lanes	
GP_{IN} Vol (pcph)	
GP_{IN} Cap (pcph)	
GP_{IN} v/c ratio	
Calculate Operations for Exiting GP Lanes	
GP_{OUT} Vol (pcph)	
GP_{OUT} Cap (pcph)	
GP_{OUT} v/c ratio	
Summarize Segment Operations	
Segment v/c ratio	0.75
Segment Density	27.5
Segment LOS	D
Over Capacity	

Key
<> Express Lane (HOV)
No Trucks

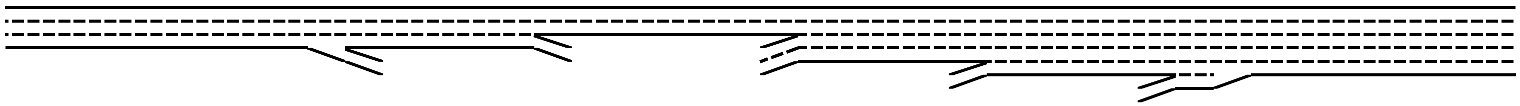
Location	4	5	6	7	8	9	10	11
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Define Freeway Segment								
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310
Accel Length							1,000	
Decel Length		150						
Mainline Volume	2,590	2,590	2,260	2,090	2,090	3,980	4,150	4,810
On Ramp Volume					1,890	170	660	
Off Ramp Volume		330	170					
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	2,590	2,590	2,260	2,090	3,980	4,150	4,810	4,810
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	19.3%	19.3%	7.5%	0.0%	0.0%	4.0%	8.0%	17.0%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.912	0.912	0.964	1.000	1.000	0.980	0.962	0.921
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	2,989	2,989	2,468	2,200	4,189	4,456	5,264	5,495
GP Flow (pcphpl)	996	996	823	1,100	1,047	891	1,053	1,099
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes								
v/c ratio	0.42	0.42	0.35	0.47	0.45	0.38	0.45	0.47

Location	4	5	6	7	8	9	10	11



Key
<> Express Lane (HOV)
No Trucks

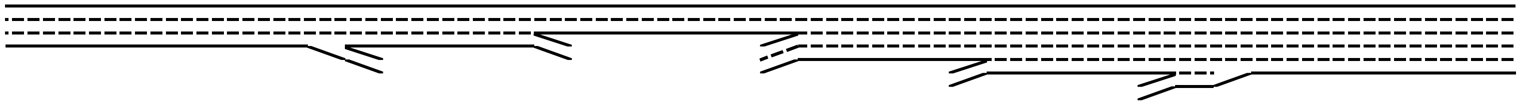
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Density (pcphpl)	15.3	15.3	12.7	16.9	16.1	13.7	16.2	16.9
LOS	B	B	B	B	B	B	B	B
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)		2,989			2,048	4,179	4,188	
GP_{IN} Cap (pcph)		7,050			4,700	9,400	11,750	
GP_{IN} v/c ratio		0.42			0.44	0.44	0.36	
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)		2,451	2,191				5,264	
GP_{OUT} Cap (pcph)		7,050	4,700				11,750	
GP_{OUT} v/c ratio		0.35	0.47				0.45	
Calculate On Ramp Flow Rate								
On Volume (vph)					1,890	170	660	
PHF					0.92	0.92	0.92	
Total Lanes					2	1	1	
Terrain					Level	Level	Level	
Grade %					0.0%	0.0%	0.0%	
Grade Length (mi)					0.00	0.00	0.00	
Truck & Bus %					8.5%	100.0%	100.0%	
RV %					0.0%	0.0%	0.0%	
E_T					1.5	1.5	1.5	
E_R					1.2	1.2	1.2	
f_{HV}					0.959	0.667	0.667	
f_P					1.00	1.00	1.00	
On Flow (pcph)					2,141	277	1,076	
On Flow (pcphpl)					1,071	277	1,076	
Calculate On Ramp Roadway Operations								
On Ramp Type					Major	Right	Right	
On Ramp Speed (mph)					70	55	55	
On Ramp Cap (pcph)					4,800	2,200	2,200	
On Ramp v/c ratio					0.45	0.13	0.49	
Calculate Off Ramp Flow Rate								
Off Volume (vph)		330	170					
PHF		0.92	0.92					
Total Lanes		1	1					



Key
<> Express Lane (HOV)
No Trucks

Location	4	5	6	7	8	9	10	11
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Terrain		Level	Level					
Grade %		0.0%	0.0%					
Grade Length (mi)		0.00	0.00					
Truck & Bus %		100.0%	100.0%					
RV %		0.0%	0.0%					
E_T		1.5	1.5					
E_R		1.2	1.2					
f_{HV}		0.667	0.667					
f_P		1.00	1.00					
Off Flow (pcph)		538	277					
Off Flow (pcphpl)		538	277					
Calculate Off Ramp Roadway Operations								
Off Ramp Type		Right	Right					
Off Ramp Speed		45	45					
Off Ramp Cap (pcph)		2,100	2,100					
Off Ramp v/c ratio		0.26	0.13					
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps								
Up Type		No	Off					
Up Distance			4,500					
Up Flow (pcph)			538					
Down Type		Off	No					
Down Distance		1,000						
Down Flow (pcph)		277						
Calculate Merge Influence Area Operations								
Effective v_P (pcph)							3,267	
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)							0.606	
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}							0.286	
v_{12} (pcph)							934	
v_3 (pcph)								
v_{34} (pcph)							2,333	

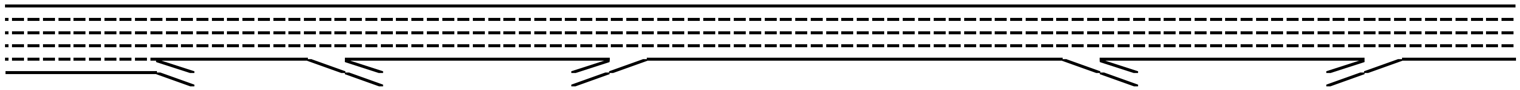
Location	4	5	6	7	8	9	10	11



Key
<> Express Lane (HOV)
No Trucks

Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
v_{12a} (pcph)							1,307	
v_{R12a} (pcph)							2,383	
Merge Speed Index							0.25	
Merge Area Speed							59.2	
Outer Lanes Volume							980	
Outer Lanes Speed							63.3	
Segment Speed							61.0	
Merge v/c ratio							0.52	
Merge Density							17.3	
Merge LOS							B	
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)		2,989						
Up Ramp L_{EQ}								
Down Ramp L_{EQ}		324						
P_{FD} (Eqn 13-9)		0.661						
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)		0.588						
P_{FD}		0.661						
v_{12} (pcph)		2,157						
v_3 (pcph)		832						
v_{34} (pcph)								
v_{12a} (pcph)		2,157						
Diverge Speed Index		0.35						
Diverge Area Speed		57.0						
Outer Lanes Volume		832						
Outer Lanes Speed		71.3						
Segment Speed		60.4						
Diverge v/c ratio		0.49						
Diverge Density		21.5						
Diverge LOS		C						
Summarize Segment Operations								
Segment v/c ratio	0.42	0.49	0.35	0.47	0.45	0.38	0.52	0.47
Segment Density	15.3	21.5	12.7	16.9	16.1	13.7	17.3	16.9
Segment LOS	B	C	B	B	B	B	B	B
Over Capacity								

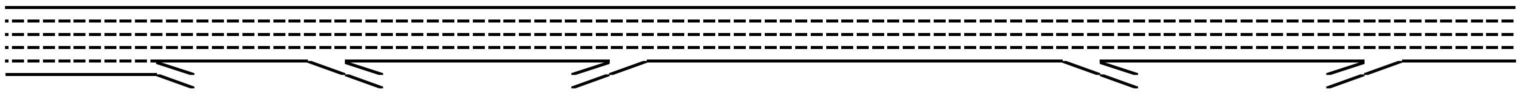
Location	12	13	14	15	16	17	18	19
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Define Freeway Segment								
Type	Basic	Diverge	Basic	Merge	Basic	Diverge	Basic	Merge
Length (ft)	1,500	1,250	1,760	1,500	3,175	1,500	975	1,500
Accel Length				560				500
Decel Length		170				500		
Mainline Volume	4,810	4,450	4,170	4,170	4,880	4,880	4,100	4,100
On Ramp Volume				710				280
Off Ramp Volume	360	280				780		
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Pu								
GP Volume (vph)	4,810	4,450	4,170	4,880	4,880	4,880	4,100	4,380
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	5	4	4	4	4	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	3.3%	20.6%	21.6%	21.6%	21.5%	21.5%	22.9%	22.9%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.984	0.907	0.903	0.903	0.903	0.903	0.897	0.897
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	5,147	5,167	4,864	5,692	5,689	5,689	4,810	5,138
GP Flow (pcphpl)	1,029	1,292	1,216	1,423	1,422	1,422	1,202	1,285
Calculate Speed in General Purpo								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65
Calculate Operations in General P								
v/c ratio	0.44	0.55	0.52	0.61	0.61	0.61	0.51	0.55



Key
<> Express Lane (HOV)
No Trucks

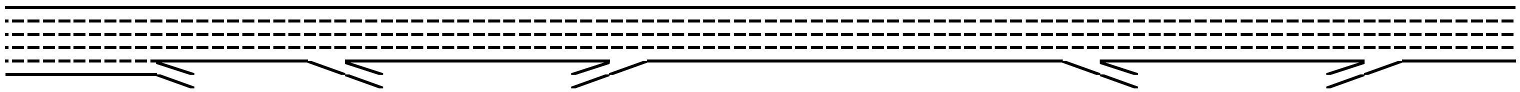
Location	12	13	14	15	16	17	18	19
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Speed (mph)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Density (pcphpl)	15.8	19.9	18.7	21.9	21.9	21.9	18.5	19.8
LOS	B	C	C	C	C	C	C	C
Calculate Operations for Entering								
GP_{IN} Vol (pcph)		5,167		4,838		5,689		4,812
GP_{IN} Cap (pcph)		9,400		9,400		9,400		9,400
GP_{IN} v/c ratio		0.55		0.51		0.61		0.51
Calculate Operations for Exiting G								
GP_{OUT} Vol (pcph)	4,734	4,835		5,692		4,781		5,138
GP_{OUT} Cap (pcph)	9,400	9,400		9,400		9,400		9,400
GP_{OUT} v/c ratio	0.50	0.51		0.61		0.51		0.55
Calculate On Ramp Flow Rate								
On Volume (vph)				710				280
PHF				0.92				0.92
Total Lanes				1				1
Terrain				Level				Level
Grade %				0.0%				0.0%
Grade Length (mi)				0.00				0.00
Truck & Bus %				21.1%				14.3%
RV %				0.0%				0.0%
E_T				1.5				1.5
E_R				1.2				1.2
f_{HV}				0.905				0.933
f_P				1.00				1.00
On Flow (pcph)				853				326
On Flow (pcphpl)				853				326
Calculate On Ramp Roadway Ope								
On Ramp Type				Right				Right
On Ramp Speed (mph)				45				25
On Ramp Cap (pcph)				2,100				1,900
On Ramp v/c ratio				0.41				0.17
Calculate Off Ramp Flow Rate								
Off Volume (vph)	360	280				780		
PHF	0.92	0.92				0.92		
Total Lanes	1	1				1		

Location	12	13	14	15	16	17	18	19



Key
<> Express Lane (HOV)
No Trucks

Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Terrain	Level	Level				Level		
Grade %	0.0%	0.0%				0.0%		
Grade Length (mi)	0.00	0.00				0.00		
Truck & Bus %	11.1%	17.9%				14.1%		
RV %	0.0%	0.0%				0.0%		
E_T	1.5	1.5				1.5		
E_R	1.2	1.2				1.2		
f_{HV}	0.947	0.918				0.934		
f_P	1.00	1.00				1.00		
Off Flow (pcph)	413	332				908		
Off Flow (pcphpl)	413	332				908		
Calculate Off Ramp Roadway Ope								
Off Ramp Type	Right	Right				Right		
Off Ramp Speed	45	20				45		
Off Ramp Cap (pcph)	2,100	1,900				2,100		
Off Ramp v/c ratio	0.20	0.17				0.43		
Determine Adjacent Ramp for Thr								
Up Type								
Up Distance								
Up Flow (pcph)								
Down Type								
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area O								
Effective v_P (pcph)				4,838				4,812
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)				0.593				0.592
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}				0.111				0.177
v_{12} (pcph)				538				852
v_3 (pcph)								
v_{34} (pcph)				4,301				3,960



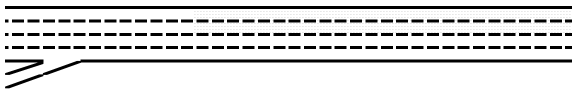
Key
<> Express Lane (HOV)
No Trucks

Location	12	13	14	15	16	17	18	19
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
v_{12a} (pcph)				1,935				1,925
v_{R12a} (pcph)				2,789				2,251
Merge Speed Index				0.33				0.33
Merge Area Speed				57.3				57.3
Outer Lanes Volume				1,452				1,444
Outer Lanes Speed				61.6				61.6
Segment Speed				59.4				59.7
Merge v/c ratio				0.61				0.49
Merge Density				23.3				19.7
Merge LOS				C				B
Calculate Diverge Influence Area (								
Effective v_P (pcph)		5,167				5,689		
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)		0.616				0.576		
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}		0.436				0.436		
v_{12} (pcph)		2,440				2,992		
v_3 (pcph)								
v_{34} (pcph)		2,727				2,697		
v_{12a} (pcph)		2,440				2,992		
Diverge Speed Index		0.65				0.38		
Diverge Area Speed		50.0				56.3		
Outer Lanes Volume		1,363				1,348		
Outer Lanes Speed		69.9				69.9		
Segment Speed		58.8				62.0		
Diverge v/c ratio		0.55				0.68		
Diverge Density		23.7				25.5		
Diverge LOS		C				C		
Summarize Segment Operations								
Segment v/c ratio	0.44	0.55	0.52	0.61	0.61	0.68	0.51	0.49
Segment Density	15.8	23.7	18.7	23.3	21.9	25.5	18.5	19.7
Segment LOS	B	C	C	C	C	C	C	B
Over Capacity								

Key
<> Express Lane (HOV)
No Trucks

Location	20	21	22
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Define Freeway Segment			
Type	Merge	Basic	Basic
Length (ft)	1,500	3,200	22,312
Accel Length	500		
Decel Length			
Mainline Volume	4,380	4,580	4,580
On Ramp Volume	200		
Off Ramp Volume			
Express Lane Volume			
EL On Ramp Volume			
EL Off Ramp Volume			
Calculate Flow Rate in General Pu			
GP Volume (vph)	4,580	4,580	4,580
PHF	0.95	0.95	0.95
GP Lanes	4	4	4
Terrain	Level	Grade	Grade
Grade %	0.0%	0.0%	6.0%
Grade Length (mi)	0.00	0.00	5.00
Truck & Bus %	22.9%	22.1%	22.1%
RV %	0.0%	0.0%	0.0%
E_T	1.5	1.5	3.5
E_R	1.2	1.2	6.0
f_{HV}	0.897	0.900	0.644
f_P	1.00	1.00	1.00
GP Flow (pcph)	5,373	5,354	7,485
GP Flow (pcphpl)	1,343	1,338	1,871
Calculate Speed in General Purpo			
Lane Width (ft)			
Shoulder Width			
TRD			
f_{LW}			
f_{LC}			
Calculated FFS			
Measured FFS			
FFS Curve	65	65	55
Calculate Operations in General P			
v/c ratio	0.57	0.57	0.83

Location	20	21	22



Key
<> Express Lane (HOV)
No Trucks

Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Speed (mph)	65.0	65.0	54.9
Density (pcphpl)	20.7	20.6	34.1
LOS	C	C	D
Calculate Operations for Entering			
GP_{IN} Vol (pcph)	5,139		
GP_{IN} Cap (pcph)	9,400		
GP_{IN} v/c ratio	0.55		
Calculate Operations for Exiting G			
GP_{OUT} Vol (pcph)	5,373		
GP_{OUT} Cap (pcph)	9,400		
GP_{OUT} v/c ratio	0.57		
Calculate On Ramp Flow Rate			
On Volume (vph)	200		
PHF	0.92		
Total Lanes	1		
Terrain	Level		
Grade %	0.0%		
Grade Length (mi)	0.00		
Truck & Bus %	15.0%		
RV %	0.0%		
E_T	1.5		
E_R	1.2		
f_{HV}	0.930		
f_P	1.00		
On Flow (pcph)	234		
On Flow (pcphpl)	234		
Calculate On Ramp Roadway Ope			
On Ramp Type	Right		
On Ramp Speed (mph)	45		
On Ramp Cap (pcph)	2,100		
On Ramp v/c ratio	0.11		
Calculate Off Ramp Flow Rate			
Off Volume (vph)			
PHF			
Total Lanes			

Location	20	21	22
Key			
<> Express Lane (HOV)			
No Trucks			
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Terrain			
Grade %			
Grade Length (mi)			
Truck & Bus %			
RV %			
E_T			
E_R			
f_{HV}			
f_P			
Off Flow (pcph)			
Off Flow (pcphpl)			
Calculate Off Ramp Roadway Ope			
Off Ramp Type			
Off Ramp Speed			
Off Ramp Cap (pcph)			
Off Ramp v/c ratio			
Determine Adjacent Ramp for Thr			
Up Type			
Up Distance			
Up Flow (pcph)			
Down Type			
Down Distance			
Down Flow (pcph)			
Calculate Merge Influence Area O			
Effective v_P (pcph)	5,139		
Up Ramp L_{EQ}			
Down Ramp L_{EQ}			
P_{FM} (Eqn 13-3)	0.592		
P_{FM} (Eqn 13-4)			
P_{FM} (Eqn 13-5)			
P_{FM}	0.189		
v_{12} (pcph)	969		
v_3 (pcph)			
v_{34} (pcph)	4,170		

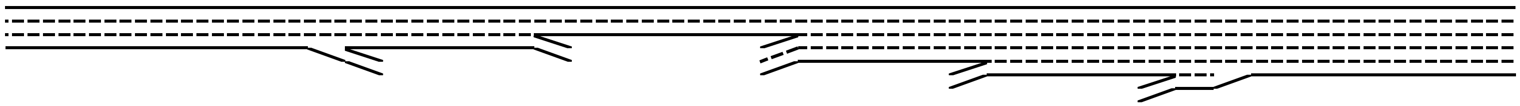
Key
<> Express Lane (HOV)
No Trucks

Location	20	21	22
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
v_{12a} (pcph)	2,056		
v_{R12a} (pcph)	2,289		
Merge Speed Index	0.31		
Merge Area Speed	57.8		
Outer Lanes Volume	1,542		
Outer Lanes Speed	61.2		
Segment Speed	59.7		
Merge v/c ratio	0.50		
Merge Density	20.1		
Merge LOS	C		
Calculate Diverge Influence Area C			
Effective v_P (pcph)			
Up Ramp L_{EQ}			
Down Ramp L_{EQ}			
P_{FD} (Eqn 13-9)			
P_{FD} (Eqn 13-10)			
P_{FD} (Eqn 13-11)			
P_{FD}			
v_{12} (pcph)			
v_3 (pcph)			
v_{34} (pcph)			
v_{12a} (pcph)			
Diverge Speed Index			
Diverge Area Speed			
Outer Lanes Volume			
Outer Lanes Speed			
Segment Speed			
Diverge v/c ratio			
Diverge Density			
Diverge LOS			
Summarize Segment Operations			
Segment v/c ratio	0.50	0.57	0.83
Segment Density	20.1	20.6	34.1
Segment LOS	C	C	D
Over Capacity			

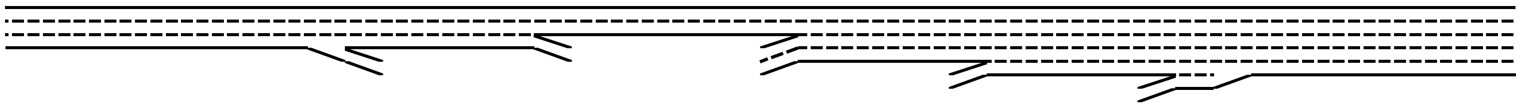
Location	1	2	3	4
Key				
<> Express Lane (HOV)				
No Trucks				
Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Off-ramp to CVEF	I-5 between truck off-ramp and SR99
Define Freeway Segment				
Type	Basic	Basic	Basic	Basic
Length (ft)	2,000	800	1,000	3,800
Accel Length				
Decel Length				
Mainline Volume	2,220	2,220	2,220	1,890
On Ramp Volume				
Off Ramp Volume			330	
Express Lane Volume				
EL On Ramp Volume				
EL Off Ramp Volume				
Calculate Flow Rate in General Purpose Lanes (GP)				
GP Volume (vph)	2,220	2,220	2,220	1,890
PHF	0.95	0.95	0.95	0.95
GP Lanes	2	4	4	2
Terrain	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00
Truck & Bus %	22.1%	22.1%	22.1%	8.6%
RV %	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2
f_{HV}	0.901	0.901	0.901	0.959
f_P	1.00	1.00	1.00	1.00
GP Flow (pcph)	2,595	2,595	2,595	2,075
GP Flow (pcphpl)	1,297	649	649	1,038
Calculate Speed in General Purpose Lanes				
Lane Width (ft)				
Shoulder Width				
TRD				
f_{LW}				
f_{LC}				
Calculated FFS				
Measured FFS				
FFS Curve	70	70	70	70
Calculate Operations in General Purpose Lanes				
v/c ratio	0.54	0.27	0.27	0.43
Speed (mph)	69.9	70.0	70.0	70.0
Density (pcphpl)	18.6	9.3	9.3	14.8
LOS	C	A	A	B
Calculate Operations for Entering GP Lanes				
GP_{IN} Vol (pcph)				
GP_{IN} Cap (pcph)				
GP_{IN} v/c ratio				
Calculate Operations for Exiting GP Lanes				
GP_{OUT} Vol (pcph)			2,074	
GP_{OUT} Cap (pcph)			4,800	
GP_{OUT} v/c ratio			0.43	
Calculate On Ramp Flow Rate				
On Volume (vph)				
PHF				

Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4
Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Off-ramp to CVEF	I-5 between truck off-ramp and SR99
Total Lanes				
Terrain				
Grade %				
Grade Length (mi)				
Truck & Bus %				
RV %				
E_T				
E_R				
f_{HV}				
f_P				
On Flow (pcph)				
On Flow (pcphpl)				
Calculate On Ramp Roadway Operations				
On Ramp Type				
On Ramp Speed (mph)				
On Ramp Cap (pcph)				
On Ramp v/c ratio				
Calculate Off Ramp Flow Rate				
Off Volume (vph)			330	
PHF			0.95	
Total Lanes			2	
Terrain			Level	
Grade %			0.0%	
Grade Length (mi)			0.00	
Truck & Bus %			100.0%	
RV %			0.0%	
E_T			1.5	
E_R			1.2	
f_{HV}			0.667	
f_P			1.00	
Off Flow (pcph)			521	
Off Flow (pcphpl)			261	
Calculate Off Ramp Roadway Operations				
Off Ramp Type			Major	
Off Ramp Speed			55	
Off Ramp Cap (pcph)			4,500	
Off Ramp v/c ratio			0.12	
Summarize Segment Operations				
Segment v/c ratio	0.54	0.27	0.27	0.43
Segment Density	18.6	9.3	9.3	14.8
Segment LOS	C	A	A	B
Over Capacity				



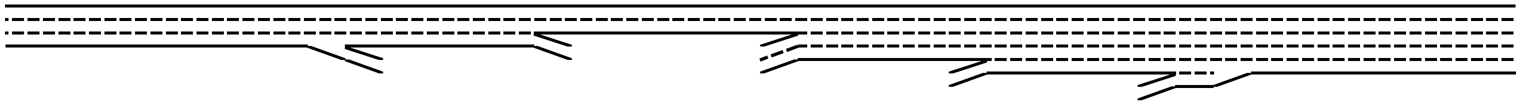
Location	4	5	6	7	8	9	10	11
Key								
<> Express Lane (HOV)								
No Trucks								
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Define Freeway Segment								
Type	Basic	Diverge	Basic	Basic	Basic	Basic	Merge	Basic
Length (ft)	2,000	1,500	1,000	2,900	650	800	1,500	3,310
Accel Length							1,000	
Decel Length		150						
Mainline Volume	3,830	3,830	3,360	3,130	3,130	5,450	5,680	6,690
On Ramp Volume					2,320	230	1,010	
Off Ramp Volume		470	230					
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Purpose Lanes (GP)								
GP Volume (vph)	3,830	3,830	3,360	3,130	5,450	5,680	6,690	6,690
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	3	3	3	2	4	5	5	5
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	18.3%	18.3%	6.8%	0.0%	0.0%	5.0%	8.8%	19.1%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.916	0.916	0.967	1.000	1.000	0.976	0.958	0.913
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	4,400	4,400	3,658	3,295	5,737	6,128	7,352	7,716
GP Flow (pcphpl)	1,467	1,467	1,219	1,647	1,434	1,226	1,470	1,543
Calculate Speed in General Purpose Lanes								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65
Calculate Operations in General Purpose Lanes								
v/c ratio	0.62	0.62	0.52	0.70	0.61	0.52	0.63	0.66



Key
<> Express Lane (HOV)
No Trucks

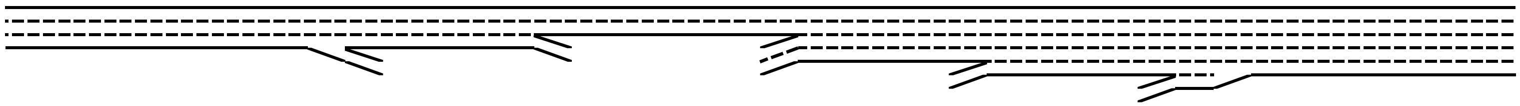
Location	4	5	6	7	8	9	10	11
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Speed (mph)	64.9	64.9	65.0	64.1	65.0	65.0	64.9	64.7
Density (pcphpl)	22.6	22.6	18.8	25.7	22.1	18.9	22.6	23.8
LOS	C	C	C	C	C	C	C	C
Calculate Operations for Entering GP Lanes								
GP_{IN} Vol (pcph)		4,400			3,068	5,753	5,705	
GP_{IN} Cap (pcph)		7,050			4,700	9,400	11,750	
GP_{IN} v/c ratio		0.62			0.65	0.61	0.49	
Calculate Operations for Exiting GP Lanes								
GP_{OUT} Vol (pcph)		3,634	3,283				7,352	
GP_{OUT} Cap (pcph)		7,050	4,700				11,750	
GP_{OUT} v/c ratio		0.52	0.70				0.63	
Calculate On Ramp Flow Rate								
On Volume (vph)					2,320	230	1,010	
PHF					0.92	0.92	0.92	
Total Lanes					2	1	1	
Terrain					Level	Level	Level	
Grade %					0.0%	0.0%	0.0%	
Grade Length (mi)					0.00	0.00	0.00	
Truck & Bus %					11.6%	100.0%	100.0%	
RV %					0.0%	0.0%	0.0%	
E_T					1.5	1.5	1.5	
E_R					1.2	1.2	1.2	
f_{HV}					0.945	0.667	0.667	
f_P					1.00	1.00	1.00	
On Flow (pcph)					2,668	375	1,647	
On Flow (pcphpl)					1,334	375	1,647	
Calculate On Ramp Roadway Operations								
On Ramp Type					Major	Right	Right	
On Ramp Speed (mph)					70	55	55	
On Ramp Cap (pcph)					4,800	2,200	2,200	
On Ramp v/c ratio					0.56	0.17	0.75	
Calculate Off Ramp Flow Rate								
Off Volume (vph)		470	230					
PHF		0.92	0.92					
Total Lanes		1	1					

Location	4	5	6	7	8	9	10	11



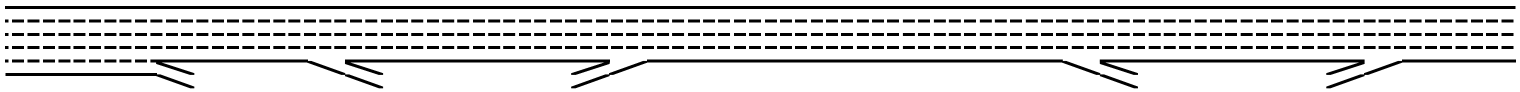
Key
<> Express Lane (HOV)
No Trucks

Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
Terrain		Level	Level					
Grade %		0.0%	0.0%					
Grade Length (mi)		0.00	0.00					
Truck & Bus %		100.0%	100.0%					
RV %		0.0%	0.0%					
E_T		1.5	1.5					
E_R		1.2	1.2					
f_{HV}		0.667	0.667					
f_P		1.00	1.00					
Off Flow (pcph)		766	375					
Off Flow (pcphpl)		766	375					
Calculate Off Ramp Roadway Operations								
Off Ramp Type		Right	Right					
Off Ramp Speed		45	45					
Off Ramp Cap (pcph)		2,100	2,100					
Off Ramp v/c ratio		0.36	0.18					
Determine Adjacent Ramp for Three-Lane Mainline Segments with One-Lane Ramps								
Up Type		No	Off					
Up Distance			4,500					
Up Flow (pcph)			766					
Down Type		Off	No					
Down Distance		1,000						
Down Flow (pcph)		375						
Calculate Merge Influence Area Operations								
Effective v_P (pcph)							4,336	
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)							0.606	
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}							0.012	
v_{12} (pcph)							52	
v_3 (pcph)								
v_{34} (pcph)							4,284	



Key
<> Express Lane (HOV)
No Trucks

Location	4	5	6	7	8	9	10	11
Name	SR 99 North of I-5 Mixed Flow	SR 99 CVEF Off-ramp	SR 99 Bypass Lane Off-ramp	SR 99 North of I-5 Auto Only	I-5 SB On-Ramp	SR 99 Bypass Lane On-Ramp	SR 99/I-5 SB CVEF On-Ramp	SR 99 to Laval Road
v_{12a} (pcph)							1,734	
v_{R12a} (pcph)							3,381	
Merge Speed Index							0.33	
Merge Area Speed							57.5	
Outer Lanes Volume							1,301	
Outer Lanes Speed							62.1	
Segment Speed							59.4	
Merge v/c ratio							0.74	
Merge Density							24.8	
Merge LOS							C	
Calculate Diverge Influence Area Operations								
Effective v_P (pcph)		4,400						
Up Ramp L_{EQ}								
Down Ramp L_{EQ}		516						
P_{FD} (Eqn 13-9)		0.615						
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)		0.570						
P_{FD}		0.615						
v_{12} (pcph)		3,000						
v_3 (pcph)		1,400						
v_{34} (pcph)								
v_{12a} (pcph)		3,000						
Diverge Speed Index		0.37						
Diverge Area Speed		56.6						
Outer Lanes Volume		1,400						
Outer Lanes Speed		69.7						
Segment Speed		60.2						
Diverge v/c ratio		0.68						
Diverge Density		28.7						
Diverge LOS		D						
Summarize Segment Operations								
Segment v/c ratio	0.62	0.68	0.52	0.70	0.61	0.52	0.74	0.66
Segment Density	22.6	28.7	18.8	25.7	22.1	18.9	24.8	23.8
Segment LOS	C	D	C	C	C	C	C	C
Over Capacity								



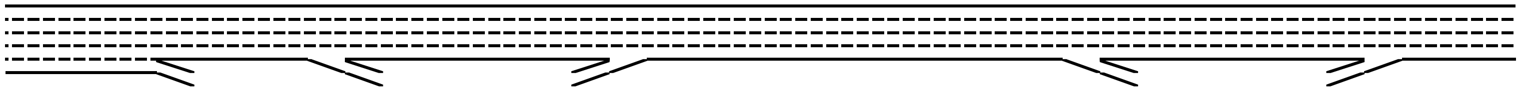
Key
<> Express Lane (HOV)
No Trucks

Location	12	13	14	15	16	17	18	19
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Define Freeway Segment								
Type	Basic	Diverge	Basic	Merge	Basic	Diverge	Basic	Merge
Length (ft)	1,500	1,250	1,760	1,500	3,175	1,500	975	1,500
Accel Length				560				500
Decel Length		170				500		
Mainline Volume	6,690	5,980	5,490	5,490	6,140	6,140	4,770	4,770
On Ramp Volume				650				650
Off Ramp Volume	710	490				1,370		
Express Lane Volume								
EL On Ramp Volume								
EL Off Ramp Volume								
Calculate Flow Rate in General Pu								
GP Volume (vph)	6,690	5,980	5,490	6,140	6,140	6,140	4,770	5,420
PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
GP Lanes	5	4	4	4	4	4	4	4
Terrain	Level	Level	Level	Level	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Truck & Bus %	4.0%	22.6%	24.6%	24.6%	23.3%	23.3%	28.9%	28.9%
RV %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
f_{HV}	0.980	0.898	0.890	0.890	0.896	0.896	0.874	0.874
f_P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GP Flow (pcph)	7,184	7,006	6,490	7,258	7,216	7,216	5,747	6,530
GP Flow (pcphpl)	1,437	1,752	1,622	1,815	1,804	1,804	1,437	1,632
Calculate Speed in General Purpo								
Lane Width (ft)								
Shoulder Width								
TRD								
f_{LW}								
f_{LC}								
Calculated FFS								
Measured FFS								
FFS Curve	65	65	65	65	65	65	65	65
Calculate Operations in General P								
v/c ratio	0.61	0.75	0.69	0.77	0.77	0.77	0.61	0.69

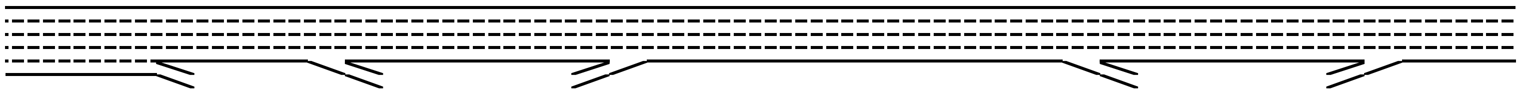
Key
<> Express Lane (HOV)
No Trucks

Location	12	13	14	15	16	17	18	19
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Speed (mph)	65.0	63.2	64.3	62.6	62.7	62.7	65.0	64.2
Density (pcphpl)	22.1	27.7	25.2	29.0	28.8	28.8	22.1	25.4
LOS	C	D	C	D	D	D	C	C
Calculate Operations for Entering								
GP_{IN} Vol (pcph)		7,006		6,508		7,216		5,791
GP_{IN} Cap (pcph)		9,400		9,400		9,400		9,400
GP_{IN} v/c ratio		0.75		0.69		0.77		0.62
Calculate Operations for Exiting G								
GP_{OUT} Vol (pcph)	6,363	6,435		7,258		5,700		6,530
GP_{OUT} Cap (pcph)	9,400	9,400		9,400		9,400		9,400
GP_{OUT} v/c ratio	0.68	0.68		0.77		0.61		0.69
Calculate On Ramp Flow Rate								
On Volume (vph)				650				650
PHF				0.92				0.92
Total Lanes				1				1
Terrain				Level				Level
Grade %				0.0%				0.0%
Grade Length (mi)				0.00				0.00
Truck & Bus %				12.3%				9.2%
RV %				0.0%				0.0%
E_T				1.5				1.5
E_R				1.2				1.2
f_{HV}				0.942				0.956
f_P				1.00				1.00
On Flow (pcph)				750				739
On Flow (pcphpl)				750				739
Calculate On Ramp Roadway Ope								
On Ramp Type				Right				Right
On Ramp Speed (mph)				45				25
On Ramp Cap (pcph)				2,100				1,900
On Ramp v/c ratio				0.36				0.39
Calculate Off Ramp Flow Rate								
Off Volume (vph)	710	490				1,370		
PHF	0.92	0.92				0.92		
Total Lanes	1	1				1		

Location	12	13	14	15	16	17	18	19



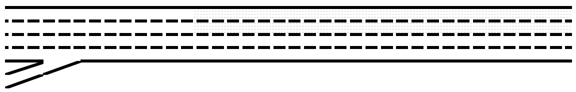
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
Terrain	Level	Level				Level		
Grade %	0.0%	0.0%				0.0%		
Grade Length (mi)	0.00	0.00				0.00		
Truck & Bus %	12.7%	14.3%				3.6%		
RV %	0.0%	0.0%				0.0%		
E_T	1.5	1.5				1.5		
E_R	1.2	1.2				1.2		
f_{HV}	0.940	0.933				0.982		
f_P	1.00	1.00				1.00		
Off Flow (pcph)	821	571				1,516		
Off Flow (pcphpl)	821	571				1,516		
Calculate Off Ramp Roadway Ope								
Off Ramp Type	Right	Right				Right		
Off Ramp Speed	45	20				45		
Off Ramp Cap (pcph)	2,100	1,900				2,100		
Off Ramp v/c ratio	0.39	0.30				0.72		
Determine Adjacent Ramp for Thr								
Up Type								
Up Distance								
Up Flow (pcph)								
Down Type								
Down Distance								
Down Flow (pcph)								
Calculate Merge Influence Area O								
Effective v_P (pcph)				6,508				5,791
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FM} (Eqn 13-3)				0.593				0.592
P_{FM} (Eqn 13-4)								
P_{FM} (Eqn 13-5)								
P_{FM}				0.124				0.125
v_{12} (pcph)				807				726
v_3 (pcph)								
v_{34} (pcph)				5,701				5,064



Location	12	13	14	15	16	17	18	19
Key								
<> Express Lane (HOV)								
No Trucks								
Name	Laval Road West Off-Ramp	Laval Road East Off-Ramp	Laval Road Off to On-Ramp	Laval Road On-Ramp	Laval Road to Grapevine	Grapevine Off-Ramp	Grapevine Off to On-ramp	Grapevine Loop On-Ramp
v_{12a} (pcph)				2,603				2,316
v_{R12a} (pcph)				3,353				3,055
Merge Speed Index				0.38				0.38
Merge Area Speed				56.2				56.3
Outer Lanes Volume				1,952				1,737
Outer Lanes Speed				59.8				60.5
Segment Speed				58.1				58.5
Merge v/c ratio				0.73				0.66
Merge Density				27.8				25.8
Merge LOS				C				C
Calculate Diverge Influence Area (								
Effective v_P (pcph)		7,006				7,216		
Up Ramp L_{EQ}								
Down Ramp L_{EQ}								
P_{FD} (Eqn 13-9)		0.559				0.510		
P_{FD} (Eqn 13-10)								
P_{FD} (Eqn 13-11)								
P_{FD}		0.436				0.436		
v_{12} (pcph)		3,377				4,001		
v_3 (pcph)								
v_{34} (pcph)		3,630				3,215		
v_{12a} (pcph)		3,377				4,001		
Diverge Speed Index		0.67				0.43		
Diverge Area Speed		49.5				55.0		
Outer Lanes Volume		1,815				1,607		
Outer Lanes Speed		68.1				68.9		
Segment Speed		57.7				60.4		
Diverge v/c ratio		0.77				0.91		
Diverge Density		31.8				34.2		
Diverge LOS		D				D		
Summarize Segment Operations								
Segment v/c ratio	0.61	0.77	0.69	0.73	0.77	0.91	0.61	0.66
Segment Density	22.1	31.8	25.2	27.8	28.8	34.2	22.1	25.8
Segment LOS	C	D	C	C	D	D	C	C
Over Capacity								

Location	20	21	22
Key			
<> Express Lane (HOV)			
No Trucks			
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Define Freeway Segment			
Type	Merge	Basic	Basic
Length (ft)	1,500	3,200	22,312
Accel Length	500		
Decel Length			
Mainline Volume	5,420	5,810	5,810
On Ramp Volume	390		
Off Ramp Volume			
Express Lane Volume			
EL On Ramp Volume			
EL Off Ramp Volume			
Calculate Flow Rate in General Pu			
GP Volume (vph)	5,810	5,810	5,810
PHF	0.95	0.95	0.95
GP Lanes	4	4	4
Terrain	Level	Grade	Grade
Grade %	0.0%	0.0%	6.0%
Grade Length (mi)	0.00	0.00	5.00
Truck & Bus %	28.9%	25.5%	25.5%
RV %	0.0%	0.0%	0.0%
E_T	1.5	1.5	3.5
E_R	1.2	1.2	6.0
f_{HV}	0.874	0.887	0.611
f_P	1.00	1.00	1.00
GP Flow (pcph)	7,000	6,896	10,015
GP Flow (pcphpl)	1,750	1,724	2,504
Calculate Speed in General Purpo			
Lane Width (ft)			
Shoulder Width			
TRD			
f_{LW}			
f_{LC}			
Calculated FFS			
Measured FFS			
FFS Curve	65	65	55
Calculate Operations in General P			
v/c ratio	0.74	0.73	1.11

Location	20	21	22



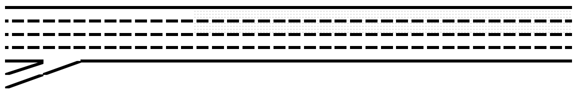
Key

<> Express Lane (HOV)

No Trucks

Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Speed (mph)	63.3	63.5	-
Density (pcphpl)	27.7	27.1	-
LOS	D	D	F
Calculate Operations for Entering			
GP_{IN} Vol (pcph)	6,554		
GP_{IN} Cap (pcph)	9,400		
GP_{IN} v/c ratio	0.70		
Calculate Operations for Exiting G			
GP_{OUT} Vol (pcph)	7,000		
GP_{OUT} Cap (pcph)	9,400		
GP_{OUT} v/c ratio	0.74		
Calculate On Ramp Flow Rate			
On Volume (vph)	390		
PHF	0.92		
Total Lanes	1		
Terrain	Level		
Grade %	0.0%		
Grade Length (mi)	0.00		
Truck & Bus %	10.3%		
RV %	0.0%		
E_T	1.5		
E_R	1.2		
f_{HV}	0.951		
f_P	1.00		
On Flow (pcph)	446		
On Flow (pcphpl)	446		
Calculate On Ramp Roadway Ope			
On Ramp Type	Right		
On Ramp Speed (mph)	45		
On Ramp Cap (pcph)	2,100		
On Ramp v/c ratio	0.21		
Calculate Off Ramp Flow Rate			
Off Volume (vph)			
PHF			
Total Lanes			

Location	20	21	22
Key			
<> Express Lane (HOV)			
No Trucks			
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
Terrain			
Grade %			
Grade Length (mi)			
Truck & Bus %			
RV %			
E_T			
E_R			
f_{HV}			
f_P			
Off Flow (pcph)			
Off Flow (pcphpl)			
Calculate Off Ramp Roadway Ope			
Off Ramp Type			
Off Ramp Speed			
Off Ramp Cap (pcph)			
Off Ramp v/c ratio			
Determine Adjacent Ramp for Thr			
Up Type			
Up Distance			
Up Flow (pcph)			
Down Type			
Down Distance			
Down Flow (pcph)			
Calculate Merge Influence Area O			
Effective v_P (pcph)	6,554		
Up Ramp L_{EQ}			
Down Ramp L_{EQ}			
P_{FM} (Eqn 13-3)	0.592		
P_{FM} (Eqn 13-4)			
P_{FM} (Eqn 13-5)			
P_{FM}	0.162		
v_{12} (pcph)	1,062		
v_3 (pcph)			
v_{34} (pcph)	5,492		



Key
<> Express Lane (HOV)
No Trucks

Location	20	21	22
Name	Grapevine Slip On-Ramp	Grapevine to Grapevine Grade	Grapevine Upgrade
v_{12a} (pcph)	2,622		
v_{R12a} (pcph)	3,067		
Merge Speed Index	0.36		
Merge Area Speed	56.7		
Outer Lanes Volume	1,966		
Outer Lanes Speed	59.7		
Segment Speed	58.4		
Merge v/c ratio	0.67		
Merge Density	26.1		
Merge LOS	C		
Calculate Diverge Influence Area (			
Effective v_P (pcph)			
Up Ramp L_{EQ}			
Down Ramp L_{EQ}			
P_{FD} (Eqn 13-9)			
P_{FD} (Eqn 13-10)			
P_{FD} (Eqn 13-11)			
P_{FD}			
v_{12} (pcph)			
v_3 (pcph)			
v_{34} (pcph)			
v_{12a} (pcph)			
Diverge Speed Index			
Diverge Area Speed			
Outer Lanes Volume			
Outer Lanes Speed			
Segment Speed			
Diverge v/c ratio			
Diverge Density			
Diverge LOS			
Summarize Segment Operations			
Segment v/c ratio	0.67	0.73	1.11
Segment Density	26.1	27.1	-
Segment LOS	C	D	F
Over Capacity			Segment GP Lanes

Location	1	2	3	4
Key				
<> Express Lane (HOV)				
No Trucks				
Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Off-ramp to CVEF	I-5 North of SR 99 Auto Only
Define Freeway Segment				
Type	Basic	Basic	Basic	Basic
Length (ft)	2,000	800	1,000	3,800
Accel Length				
Decel Length				
Mainline Volume	2,860	2,860	2,860	2,320
On Ramp Volume				
Off Ramp Volume			540	
Express Lane Volume				
EL On Ramp Volume				
EL Off Ramp Volume				
Calculate Flow Rate in General Purpose Lanes (GP)				
GP Volume (vph)	2,860	2,860	2,860	2,320
PHF	0.95	0.95	0.95	0.95
GP Lanes	2	4	4	2
Terrain	Level	Level	Level	Level
Grade %	0.0%	0.0%	0.0%	0.0%
Grade Length (mi)	0.00	0.00	0.00	0.00
Truck & Bus %	28.3%	28.3%	28.3%	11.6%
RV %	0.0%	0.0%	0.0%	0.0%
E_T	1.5	1.5	1.5	1.5
E_R	1.2	1.2	1.2	1.2
f_{HV}	0.876	0.876	0.876	0.945
f_P	1.00	1.00	1.00	1.00
GP Flow (pcph)	3,437	3,437	3,437	2,584
GP Flow (pcphpl)	1,718	859	859	1,292
Calculate Speed in General Purpose Lanes				
Lane Width (ft)				
Shoulder Width				
TRD				
f_{LW}				
f_{LC}				
Calculated FFS				
Measured FFS				
FFS Curve	70	70	70	70
Calculate Operations in General Purpose Lanes				
v/c ratio	0.72	0.36	0.36	0.54
Speed (mph)	66.9	70.0	70.0	69.9
Density (pcphpl)	25.7	12.3	12.3	18.5
LOS	C	B	B	C
Calculate Operations for Entering GP Lanes				
GP_{IN} Vol (pcph)				
GP_{IN} Cap (pcph)				
GP_{IN} v/c ratio				
Calculate Operations for Exiting GP Lanes				
GP_{OUT} Vol (pcph)			2,584	
GP_{OUT} Cap (pcph)			4,800	
GP_{OUT} v/c ratio			0.54	
Calculate Flow Rate in Express Lanes (EL)				
Calculate Speed in Express Lanes				
Calculate Operations in Express Lanes				

Key
<> Express Lane (HOV)
No Trucks

Location	1	2	3	4
Name	I-5 North of SR 99 Mixed Flow	I-5 North of SR 99 Mixed Flow	Off-ramp to CVEF	I-5 North of SR 99 Auto Only
Calculate On Ramp Flow Rate				
On Volume (vph)				
PHF				
Total Lanes				
Terrain				
Grade %				
Grade Length (mi)				
Truck & Bus %				
RV %				
E_T				
E_R				
f_{HV}				
f_P				
On Flow (pcph)				
On Flow (pcphpl)				
Calculate On Ramp Roadway Operations				
On Ramp Type				
On Ramp Speed (mph)				
On Ramp Cap (pcph)				
On Ramp v/c ratio				
Calculate Off Ramp Flow Rate				
Off Volume (vph)			540	
PHF			0.95	
Total Lanes			2	
Terrain			Level	
Grade %			0.0%	
Grade Length (mi)			0.00	
Truck & Bus %			100.0%	
RV %			0.0%	
E_T			1.5	
E_R			1.2	
f_{HV}			0.667	
f_P			1.00	
Off Flow (pcph)			853	
Off Flow (pcphpl)			426	
Calculate Off Ramp Roadway Operations				
Off Ramp Type			Major	
Off Ramp Speed			55	
Off Ramp Cap (pcph)			4,500	
Off Ramp v/c ratio			0.19	
Summarize Segment Operations				
Segment v/c ratio	0.72	0.36	0.36	0.54
Segment Density	25.7	12.3	12.3	18.5
Segment LOS	C	B	B	C
Over Capacity				

INTENTIONALLY LEFT BLANK

Appendix K:

Cumulative Conditions (2040) – Grapevine Grade Freeway Operations

SB I-5 on Grapvine Grade - CPP PM			
	4 Lanes		
	Auto	Truck	Total Vehs
Volume	4330	1480	5810

	Lane 4	Lane 3	Lane 2	Lane 1
Veh Type	Auto	Auto	Auto & Truck	Trucks
PCE Factor	1	1	-	3.5
auto	1865	1865	600	0
trucks	0	0	493	987
Volume	1865	1865	1093	987
PCE Volume	1865	1865	2327	3453

	Volume	Truck%
Left 3 Lanes	4823	10%
Left 2 Lanes	3730	0
Right 2 Lanes	2080	71%

SB I-5 on Grapvine Grade - CNP PM			
	4 Lanes		
	Auto	Truck	Total Vehs
Volume	3490	1400	4890

	Lane 4	Lane 3	Lane 2	Lane 1
Veh Type	Auto	Auto	Auto & Truck	Trucks
PCE Factor	1	1	-	3.5
auto	1495	1495	500	0
trucks	0	0	467	933
Volume	1495	1495	967	933
PCE Volume	1495	1495	2133	3267

	Volume	Truck%
Left 3 Lanes	3957	12%
Left 2 Lanes	2990	0
Right 2 Lanes	1900	74%

NB I-5 on Grapvine Grade - CPP PM			
	4 Lanes		
	Auto	Truck	Total Vehs
Volume	5130	1420	6550

	Lane 4	Lane 3	Lane 2	Lane 1
Veh Type	Auto	Auto	Auto & Truck	Trucks
PCE Factor	1	1	-	3
auto	2215	2215	700	0
trucks	0	0	473	947
Volume	2215	2215	1173	947
PCE Volume	2215	2215	2120	2840

	Volume	Truck%
Left 3 Lanes	5603	8%
Left 2 Lanes	4430	0
Right 2 Lanes	2120	67%

NB I-5 on Grapvine Grade - CNP PM			
	4 Lanes		
	Auto	Truck	Total Vehs
Volume	4230	1340	5570

	Lane 4	Lane 3	Lane 2	Lane 1
Veh Type	Auto	Auto	Auto & Truck	Trucks
PCE Factor	1	1	-	3
auto	1815	1815	600	0
trucks	0	0	447	893
Volume	1815	1815	1047	893
PCE Volume	1815	1815	1940	2680

	Volume	Truck%
Left 3 Lanes	4677	10%
Left 2 Lanes	3630	0
Right 2 Lanes	1940	69%

HCS 2010: Basic Freeway Segments Release 6.60

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	
Date Performed:	4/10/2015
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-5 NB
From/To:	Grapevine to Fort Tejon
Jurisdiction:	
Analysis Year:	CNP

Description: Left Two Lanes

Flow Inputs and Adjustments

Volume, V	3630	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	955	v
Trucks and buses	0	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-6.00	%
Segment length	5.00	mi
Trucks and buses PCE, ET	3.0*	
Recreational vehicle PCE, ER	4.0*	
Heavy vehicle adjustment, fHV	1.000	
Driver population factor, fp	1.00	
Flow rate, vp	1911	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1911	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	61.3	mi/h
Number of lanes, N	2	
Density, D	31.2	pc/mi/ln
Level of service, LOS	D	

HCS 2010: Basic Freeway Segments Release 6.60

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	
Date Performed:	4/10/2015
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-5 NB
From/To:	Grapevine to Fort Tejon
Jurisdiction:	
Analysis Year:	CPP
Description: Left Two Lanes	

Flow Inputs and Adjustments

Volume, V	4430	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1166	v
Trucks and buses	0	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-6.00	%
Segment length	5.00	mi
Trucks and buses PCE, ET	3.0*	
Recreational vehicle PCE, ER	4.0*	
Heavy vehicle adjustment, fHV	1.000	
Driver population factor, fp	1.00	
Flow rate, vp	2332	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2332	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	52.7	mi/h
Number of lanes, N	2	
Density, D	44.3	pc/mi/ln
Level of service, LOS	E	

HCS 2010: Basic Freeway Segments Release 6.60

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	
Date Performed:	4/10/2015
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-5 NB
From/To:	Grapevine to Fort Tejon
Jurisdiction:	
Analysis Year:	CNP
Description: Right Two Lanes	

Flow Inputs and Adjustments

Volume, V	1940	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	511	v
Trucks and buses	69	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-6.00	%
Segment length	5.00	mi
Trucks and buses PCE, ET	3.0*	
Recreational vehicle PCE, ER	4.0*	
Heavy vehicle adjustment, fHV	0.420	
Driver population factor, fp	1.00	
Flow rate, vp	2430	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2430	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	50.0	mi/h
Number of lanes, N	2	
Density, D	48.6	pc/mi/ln
Level of service, LOS	F	

HCS 2010: Basic Freeway Segments Release 6.60

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	
Date Performed:	4/10/2015
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-5 NB
From/To:	Grapevine to Fort Tejon
Jurisdiction:	
Analysis Year:	CPP

Description: Right Two Lanes

Flow Inputs and Adjustments

Volume, V	2120	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	558	v
Trucks and buses	67	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	-6.00	%
Segment length	5.00	mi
Trucks and buses PCE, ET	3.0*	
Recreational vehicle PCE, ER	4.0*	
Heavy vehicle adjustment, fHV	0.427	
Driver population factor, fp	1.00	
Flow rate, vp	2611	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2611	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	44.2	mi/h
Number of lanes, N	2	
Density, D	59.1	pc/mi/ln
Level of service, LOS	F	

HCS 2010: Basic Freeway Segments Release 6.60

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	
Date Performed:	4/10/2015
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-5 SB
From/To:	Grapevine to Fort Tejon
Jurisdiction:	
Analysis Year:	CNP

Description: Left Two Lanes

Flow Inputs and Adjustments

Volume, V	2990	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	787	v
Trucks and buses	0	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	6.00	%
Segment length	5.00	mi
Trucks and buses PCE, ET	3.5*	
Recreational vehicle PCE, ER	4.0*	
Heavy vehicle adjustment, fHV	1.000	
Driver population factor, fp	1.00	
Flow rate, vp	1574	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1574	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	2	
Density, D	24.4	pc/mi/ln
Level of service, LOS	C	

HCS 2010: Basic Freeway Segments Release 6.60

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	
Date Performed:	4/10/2015
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-5 SB
From/To:	Grapevine to Fort Tejon
Jurisdiction:	
Analysis Year:	CPP

Description: Left Two Lanes

Flow Inputs and Adjustments

Volume, V	3730	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	982	v
Trucks and buses	0	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	6.00	%
Segment length	5.00	mi
Trucks and buses PCE, ET	3.5*	
Recreational vehicle PCE, ER	4.0*	
Heavy vehicle adjustment, fHV	1.000	
Driver population factor, fp	1.00	
Flow rate, vp	1963	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1963	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.5	mi/h
Number of lanes, N	2	
Density, D	32.4	pc/mi/ln
Level of service, LOS	D	

HCS 2010: Basic Freeway Segments Release 6.60

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	
Date Performed:	4/10/2015
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-5 SB
From/To:	Grapevine to Fort Tejon
Jurisdiction:	
Analysis Year:	CNP
Description:	Right Two Lanes

Flow Inputs and Adjustments

Volume, V	1900	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	500	v
Trucks and buses	74	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	6.00	%
Segment length	5.00	mi
Trucks and buses PCE, ET	3.5*	
Recreational vehicle PCE, ER	4.0*	
Heavy vehicle adjustment, fHV	0.351	
Driver population factor, fp	1.00	
Flow rate, vp	2850	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2850	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	35.2	mi/h
Number of lanes, N	2	
Density, D	81.0	pc/mi/ln
Level of service, LOS	F	

HCS 2010: Basic Freeway Segments Release 6.60

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Fehr & Peers
Agency or Company:	
Date Performed:	4/10/2015
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-5 SB
From/To:	Grapevine to Fort Tejon
Jurisdiction:	
Analysis Year:	CPP
Description: Right Two Lanes	

Flow Inputs and Adjustments

Volume, V	2080	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	547	v
Trucks and buses	71	%
Recreational vehicles	0	%
Terrain type:	Grade	
Grade	6.00	%
Segment length	5.00	mi
Trucks and buses PCE, ET	3.5*	
Recreational vehicle PCE, ER	4.0*	
Heavy vehicle adjustment, fHV	0.360	
Driver population factor, fp	1.00	
Flow rate, vp	3038	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	3038	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	27.0	mi/h
Number of lanes, N	2	
Density, D	112.7	pc/mi/ln
Level of service, LOS	F	

INTENTIONALLY LEFT BLANK

Appendix L:

Existing Plus Project Conditions (2015) – Intersection Operations with Capacity Enhancements

Intersection 14 **Street C/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	120	135	112.1%	22.2	3.2	C
	Right Turn	990	965	97.5%	6.5	0.6	A
	Subtotal	1,110	1,099	99.0%	8.4	0.6	A
SB	Left Turn	430	427	99.3%	22.2	4.4	C
	Through	120	120	99.8%	10.9	3.8	B
	Right Turn						
	Subtotal	550	547	99.4%	19.8	4.0	B
EB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
WB	Left Turn	730	732	100.2%	18.2	1.5	B
	Through						
	Right Turn	520	504	97.0%	10.4	2.0	B
	Subtotal	1,250	1,236	98.9%	15.1	1.3	B
Total		2,910	2,882	99.0%	13.4	1.1	B

Intersection 15 **Street D/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	220	218	99.1%	57.0	9.7	E
	Through	80	85	106.4%	53.2	7.3	D
	Right Turn	20	22	108.3%	20.3	13.7	C
	Subtotal	320	325	101.5%	53.8	7.9	D
SB	Left Turn	190	184	96.6%	50.7	5.1	D
	Through	90	84	93.3%	47.0	10.6	D
	Right Turn	430	435	101.2%	5.1	0.9	A
	Subtotal	710	703	99.0%	21.9	2.2	C
EB	Left Turn	550	506	92.0%	43.4	5.5	D
	Through	640	600	93.8%	13.7	2.6	B
	Right Turn	220	213	96.7%	3.4	0.7	A
	Subtotal	1,410	1,319	93.5%	23.3	1.9	C
WB	Left Turn	30	31	102.6%	65.4	12.4	E
	Through	1,200	1,221	101.8%	41.8	9.1	D
	Right Turn	240	242	101.0%	13.9	2.3	B
	Subtotal	1,470	1,495	101.7%	37.9	8.2	D
Total		3,910	3,841	98.2%	31.3	4.1	C

Intersection 20 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn	440	431	97.9%	20.0	2.1	C
	Through						
	Right Turn	400	412	102.9%	18.8	3.3	B
	Subtotal	840	842	100.3%	19.5	1.6	B
EB	Left Turn						
	Through	1,200	1,203	100.2%	16.4	2.2	B
	Right Turn	220	214	97.4%	4.9	0.4	A
	Subtotal	1,420	1,417	99.8%	14.7	2.1	B
WB	Left Turn						
	Through	850	843	99.2%	14.6	1.9	B
	Right Turn	350	338	96.5%	8.0	0.7	A
	Subtotal	1,200	1,181	98.4%	12.7	1.5	B
Total		3,460	3,440	99.4%	15.2	1.4	B

Intersection 21 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph)		Total Delay (sec/veh)		
			Average	Percent	Average	Std. Dev.	LOS
NB	Left Turn	310	312	100.6%	23.3	3.0	C
	Through						
	Right Turn	450	425	94.5%	11.0	2.0	B
	Subtotal	760	737	97.0%	16.3	2.1	B
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	960	938	97.7%	12.1	1.6	B
	Right Turn	680	670	98.5%	9.1	0.4	A
	Subtotal	1,640	1,608	98.1%	10.9	1.1	B
WB	Left Turn						
	Through	890	855	96.0%	11.5	0.8	B
	Right Turn	960	903	94.1%	7.5	0.7	A
	Subtotal	1,850	1,758	95.0%	9.5	0.5	A
Total		4,250	4,103	96.5%	11.2	0.7	B

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Grapevine Transportation Impact Study
Existing Plus Project Mitigated Condition
AM Peak Hour

Intersection 31 **Street C/Street G** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	200	195	97.7%	48.2	8.6	D
	Through	440	420	95.3%	2.8	1.0	A
	Right Turn						
	Subtotal	640	615	96.1%	17.2	3.0	B
SB	Left Turn						
	Through	390	398	102.1%	8.2	2.6	A
	Right Turn	10	5	53.2%	1.8	2.6	A
	Subtotal	400	404	100.9%	8.1	2.5	A
EB	Left Turn	10	11	106.4%	79.7	16.2	E
	Through						
	Right Turn	160	152	94.8%	3.9	0.8	A
	Subtotal	170	162	95.4%	8.4	3.0	A
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,210	1,181	97.6%	12.8	2.2	B

Intersection 32 **Street C/Street H** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	50	51	101.8%	30.6	6.0	C
	Through	910	898	98.6%	8.1	1.4	A
	Right Turn						
	Subtotal	960	948	98.8%	9.4	1.3	A
SB	Left Turn						
	Through	700	701	100.2%	5.6	0.9	A
	Right Turn	150	146	97.3%	3.6	0.4	A
	Subtotal	850	847	99.6%	5.3	0.7	A
EB	Left Turn	200	192	96.1%	26.7	2.4	C
	Through						
	Right Turn	40	33	81.7%	6.2	1.6	A
	Subtotal	240	225	93.7%	23.7	2.1	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,050	2,020	98.6%	9.3	0.8	A

Intersection 14 **Street C/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	200	230	115.0%	57.8	10.0	E
	Right Turn	970	896	92.3%	16.3	2.2	B
	Subtotal	1,170	1,126	96.2%	24.8	2.8	C
SB	Left Turn	730	724	99.2%	60.3	11.9	E
	Through	210	206	98.3%	21.0	3.9	C
	Right Turn						
	Subtotal	940	931	99.0%	51.7	9.7	D
EB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
WB	Left Turn	1,170	941	80.4%	43.6	5.0	D
	Through						
	Right Turn	680	589	86.7%	19.4	3.2	B
	Subtotal	1,850	1,530	82.7%	34.3	3.7	C
Total		3,960	3,586	90.6%	35.9	3.1	D

Intersection 15 **Street D/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	520	458	88.1%	102.7	39.0	F
	Through	180	179	99.2%	52.3	4.8	D
	Right Turn	70	73	104.2%	40.1	9.0	D
	Subtotal	770	709	92.1%	84.3	27.2	F
SB	Left Turn	520	538	103.4%	56.3	6.4	E
	Through	180	204	113.2%	54.0	5.0	D
	Right Turn	770	752	97.7%	10.4	1.3	B
	Subtotal	1,470	1,494	101.6%	32.9	2.9	C
EB	Left Turn	440	380	86.4%	48.2	4.1	D
	Through	1,510	1,374	91.0%	36.6	3.3	D
	Right Turn	510	436	85.5%	11.2	3.2	B
	Subtotal	2,460	2,190	89.0%	33.5	3.3	C
WB	Left Turn	80	68	85.5%	88.4	55.9	F
	Through	990	928	93.7%	66.5	8.6	E
	Right Turn	370	368	99.4%	19.7	4.0	B
	Subtotal	1,440	1,364	94.7%	55.5	7.9	E
Total		6,140	5,757	93.8%	44.8	3.4	D

Intersection 20 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn	1,060	957	90.3%	32.6	3.2	C
	Through						
	Right Turn	610	527	86.3%	49.9	20.1	D
	Subtotal	1,670	1,484	88.9%	38.9	8.6	D
EB	Left Turn						
	Through	1,270	1,178	92.7%	28.0	6.5	C
	Right Turn	430	387	90.1%	10.2	3.0	B
	Subtotal	1,700	1,565	92.0%	23.6	5.8	C
WB	Left Turn						
	Through	1,240	1,133	91.4%	30.9	12.5	C
	Right Turn	720	655	90.9%	14.0	6.1	B
	Subtotal	1,960	1,788	91.2%	24.7	10.2	C
Total		5,330	4,837	90.7%	28.7	6.0	C

Intersection 21 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	450	441	98.0%	44.3	18.0	D
	Through						
	Right Turn	680	668	98.2%	23.8	1.9	C
	Subtotal	1,130	1,108	98.1%	32.2	7.3	C
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	1,780	1,590	89.3%	16.7	4.9	B
	Right Turn	550	500	90.9%	10.4	1.6	B
	Subtotal	2,330	2,089	89.7%	15.2	4.1	B
WB	Left Turn						
	Through	1,510	1,403	92.9%	19.1	4.1	B
	Right Turn	770	720	93.5%	5.4	0.6	A
	Subtotal	2,280	2,123	93.1%	14.5	2.8	B
Total		5,740	5,320	92.7%	18.5	2.0	B

Intersection 31 **Street C/Street G** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	280	236	84.4%	47.6	6.5	D
	Through	600	563	93.8%	3.5	1.2	A
	Right Turn						
	Subtotal	880	799	90.8%	16.5	1.6	B
SB	Left Turn						
	Through	650	624	95.9%	24.5	6.1	C
	Right Turn	10	10	95.0%	9.5	15.9	A
	Subtotal	660	633	95.9%	24.2	6.1	C
EB	Left Turn	10	8	83.6%	75.1	49.4	E
	Through						
	Right Turn	290	270	93.0%	29.0	28.0	C
	Subtotal	300	278	92.7%	30.7	27.3	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,840	1,710	93.0%	21.5	5.7	C

Intersection 32 **Street C/Street H** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	60	54	89.3%	35.7	5.4	D
	Through	930	922	99.2%	9.4	2.7	A
	Right Turn						
	Subtotal	990	976	98.6%	10.8	2.8	B
SB	Left Turn						
	Through	1,100	940	85.5%	8.7	0.9	A
	Right Turn	280	221	79.0%	5.4	0.7	A
	Subtotal	1,380	1,161	84.2%	8.1	0.8	A
EB	Left Turn	240	228	94.8%	31.3	5.5	C
	Through						
	Right Turn	60	63	105.8%	9.4	3.2	A
	Subtotal	300	291	97.0%	26.5	4.8	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,670	2,428	90.9%	11.4	1.9	B

Intersection 14 **Street C/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
NB	Through	425	100	10	150	30	150	37	0%	0%
	Right Turn	425	125	14	175	27	175	33	0%	0%
SB	Left Turn	475	125	24	200	42	200	39	0%	0%
	Through	475	75	16	125	37	125	34	0%	0%
WB	Left Turn	675	150	22	225	30	200	27	0%	0%
	Right Turn	675	150	24	225	57	250	58	0%	0%
0										

Intersection 15 **Street D/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
			Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Left Turn	425	225	30	350	65	350	70	0%	0%
	Through	525	150	20	225	49	225	66	0%	0%
	Right Turn	425	50	8	100	18	100	20	0%	0%
NB	Left Turn	2,900	125	42	200	78	200	70	1%	0%
	Through	2,900	50	10	100	25	100	23	0%	0%
	Through/Right	2,900	50	8	75	14	100	18	0%	0%
SB	Left Turn	2,450	100	25	150	38	175	39	0%	0%
	Through	2,450	75	28	125	40	150	37	0%	0%
WB	Left Turn	325	75	44	150	130	150	139	0%	0%
	Through	3,200	325	54	475	110	450	98	8%	0%
	Right Turn	525	100	20	200	97	225	134	0%	0%

SimTraffic Post-Processor
Average Results from 10 Runs
Queue Length

Grapevine Transportation Impact Study
Existing Plus Project Mitigated Condition
AM Peak Hour

Intersection 20 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	675	225	32	325	58	325	63	1%	0%
	Right Turn	325	25	22	75	113	100	157	0%	0%
SB	Left Turn	5,725	125	22	175	38	175	46	0%	0%
	Right Turn	525	150	28	275	72	275	82	0%	0%
WB	Through	975	175	22	250	39	225	29	0%	0%
0										

Intersection 21 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	975	150	33	275	65	325	239	0%	0%
	Right Turn	450	25	1	25	6	25	8	0%	0%
NB	Left Turn	525	175	19	250	41	275	47	0%	0%
	Right Turn	3,625	75	20	125	34	125	39	0%	0%
WB	Through	550	175	21	275	41	275	47	0%	0%
	Right Turn	550	25	40	125	201	175	279	0%	0%
0										

Intersection 31 **Street C/Street G** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	275	25	7	25	12	25	9	0%	0%
	Right Turn	1,225	25	6	75	15	75	18	0%	0%
NB	Left Turn	125	125	4	150	7	125	1	38%	0%
	Through	475	150	36	350	61	300	60	0%	0%
SB	Through	2,625	100	30	175	47	175	43	0%	0%
	Through/Right	2,625	50	11	100	43	125	65	0%	0%
0										

Intersection 32 **Street C/Street H** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	1,300	125	17	200	26	200	32	4%	0%
	Right Turn	175	25	2	50	8	50	15	0%	0%
NB	Left Turn	175	50	9	75	15	100	20	0%	0%
	Through	1,525	150	24	225	75	250	103	0%	0%
SB	Through	425	75	13	125	27	125	35	0%	0%
	Right Turn	225	50	10	100	20	75	19	0%	0%
0										

Intersection 14 **Street C/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
NB	Through	425	250	60	375	77	375	56	0%	1%
	Right Turn	425	225	34	350	68	350	77	1%	0%
SB	Left Turn	475	375	64	500	63	500	41	24%	9%
	Through	475	125	18	225	48	250	70	0%	0%
WB	Left Turn	675	525	86	750	104	700	27	26%	4%
	Right Turn	675	425	128	775	188	725	6	0%	5%
0										

Intersection 15 **Street D/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	425	250	52	425	126	425	109	0%	0%
	Through	500	450	45	550	44	525	33	16%	6%
	Right Turn	425	250	110	500	181	425	115	0%	0%
NB	Left Turn	2,900	400	200	575	372	600	377	14%	0%
	Through	2,900	125	50	250	250	300	354	1%	0%
	Through/Right	225	125	25	175	43	175	49	1%	0%
SB	Left Turn	2,450	250	29	350	38	350	44	0%	0%
	Through	2,450	200	34	300	49	300	53	0%	0%
WB	Left Turn	325	150	60	250	90	275	115	0%	0%
	Through	3,200	375	46	475	64	500	68	13%	0%
	Right Turn	525	175	33	250	68	275	97	0%	0%

Intersection 20 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	675	350	82	575	161	550	140	9%	1%
	Right Turn	325	150	74	375	138	300	103	0%	0%
SB	Left Turn	5,725	225	56	350	249	450	415	0%	0%
	Right Turn	525	300	110	475	203	500	213	8%	0%
WB	Through	975	300	119	450	279	450	212	2%	0%
	Right Turn	450	50	62	100	194	150	216	0%	0%
0										

Intersection 21 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	975	225	44	300	81	350	181	0%	0%
	Right Turn	450	25	20	50	101	100	188	0%	0%
NB	Left Turn	525	300	94	425	148	450	136	2%	0%
	Right Turn	3,625	175	21	250	73	250	103	0%	0%
WB	Through	550	375	61	575	104	550	80	0%	1%
	Right Turn	550	75	61	275	241	350	288	0%	0%
0										

Intersection 31 **Street C/Street G** **Signal**

		Storage	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
Direction	Lane Group	(ft)	Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Left Turn	275	25	4	25	11	25	12	0%	0%
	Right Turn	1,225	150	92	300	193	300	162	6%	0%
NB	Left Turn	125	125	5	150	5	125	1	42%	0%
	Through	475	225	45	375	52	350	68	0%	0%
SB	Through	2,625	275	39	475	74	450	93	0%	0%
	Through/Right	2,625	100	30	200	79	225	116	0%	0%
0										

Intersection 32 **Street C/Street H** **Signal**

		Storage	Average Queue (ft)		95th Queue (ft)		Maximum Queue (ft)		Block Time	
Direction	Lane Group	(ft)	Average	Std. Dev.	Average	Std. Dev.	Average	Std. Dev.	Pocket	Upstream
EB	Left Turn	1,300	175	24	250	45	275	57	9%	0%
	Right Turn	175	50	16	100	59	125	85	0%	0%
NB	Left Turn	175	50	9	100	18	100	23	0%	0%
	Through	1,525	150	38	275	92	300	101	0%	0%
SB	Through	425	175	25	300	40	300	39	3%	0%
	Right Turn	225	100	14	200	42	225	46	0%	0%
0										

INTENTIONALLY LEFT BLANK

Appendix M:

Cumulative Conditions (2040) – Intersection Operations with Capacity Enhancements

Intersection 5 **Street C/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	140	148	105.6%	48.6	6.5	D
	Right Turn	970	972	100.2%	10.5	2.0	B
	Subtotal	1,110	1,120	100.9%	15.5	1.3	B
SB	Left Turn	430	406	94.4%	44.8	4.4	D
	Through	130	124	95.3%	22.7	4.2	C
	Right Turn						
	Subtotal	560	530	94.6%	39.6	3.8	D
EB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
WB	Left Turn	710	729	102.7%	17.2	2.6	B
	Through						
	Right Turn	530	524	98.8%	7.4	1.4	A
	Subtotal	1,240	1,253	101.0%	13.2	1.8	B
Total		2,910	2,903	99.8%	18.9	0.7	B

Intersection 6 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn	400	397	99.2%	22.8	1.1	C
	Through						
	Right Turn	380	388	102.2%	18.1	2.2	B
	Subtotal	780	785	100.7%	20.5	1.1	C
EB	Left Turn						
	Through	1,200	1,184	98.7%	12.6	2.1	B
	Right Turn	200	192	96.1%	4.6	0.8	A
	Subtotal	1,400	1,377	98.3%	11.5	2.0	B
WB	Left Turn						
	Through	860	853	99.2%	9.5	1.6	A
	Right Turn	280	266	94.9%	4.5	0.6	A
	Subtotal	1,140	1,118	98.1%	8.3	1.3	A
Total		3,320	3,280	98.8%	12.6	1.3	B

Intersection 7 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	290	284	97.9%	48.4	4.9	D
	Through						
	Right Turn	390	385	98.7%	15.4	1.6	B
	Subtotal	680	669	98.4%	29.4	3.0	C
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	960	983	102.4%	12.1	1.9	B
	Right Turn	640	605	94.5%	7.5	0.4	A
	Subtotal	1,600	1,588	99.3%	10.4	1.2	B
WB	Left Turn						
	Through	850	852	100.2%	11.8	1.2	B
	Right Turn	940	945	100.5%	16.7	1.5	B
	Subtotal	1,790	1,796	100.3%	14.4	1.3	B
Total		4,070	4,053	99.6%	15.3	0.6	B

Intersection 8 **Street D/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	220	227	103.1%	49.6	7.1	D
	Through	80	83	103.6%	45.3	8.8	D
	Right Turn	20	21	106.4%	15.6	10.3	B
	Subtotal	320	331	103.4%	46.3	6.0	D
SB	Left Turn	210	224	106.6%	50.0	3.9	D
	Through	100	114	114.0%	46.4	7.3	D
	Right Turn	390	400	102.6%	4.9	0.5	A
	Subtotal	700	738	105.4%	25.0	1.5	C
EB	Left Turn	530	494	93.2%	43.8	4.8	D
	Through	610	580	95.1%	20.4	3.3	C
	Right Turn	210	196	93.4%	7.0	1.2	A
	Subtotal	1,350	1,270	94.1%	27.4	3.5	C
WB	Left Turn	30	27	88.7%	57.2	12.3	E
	Through	1,180	1,112	94.2%	37.5	5.1	D
	Right Turn	250	236	94.5%	12.2	1.9	B
	Subtotal	1,460	1,374	94.1%	33.5	4.0	C
Total		3,830	3,714	97.0%	30.9	2.4	C

Intersection 9 **Street C/Street G** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	200	215	107.7%	44.6	5.0	D
	Through	470	461	98.1%	2.7	1.1	A
	Right Turn						
	Subtotal	670	676	101.0%	16.0	2.3	B
SB	Left Turn						
	Through	400	373	93.3%	12.7	3.7	B
	Right Turn	10	10	102.6%	8.6	6.9	A
	Subtotal	410	383	93.5%	12.6	3.8	B
EB	Left Turn	20	19	96.9%	61.9	21.3	E
	Through						
	Right Turn	160	169	105.5%	5.4	1.5	A
	Subtotal	180	188	104.5%	11.4	4.0	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,260	1,248	99.0%	14.2	1.5	B

Intersection 10 **Street C/Street H** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	50	49	98.8%	30.4	4.3	C
	Through	910	905	99.4%	7.9	1.2	A
	Right Turn						
	Subtotal	960	954	99.4%	9.1	1.3	A
SB	Left Turn						
	Through	690	689	99.8%	6.0	0.9	A
	Right Turn	150	141	94.2%	3.7	0.9	A
	Subtotal	840	830	98.8%	5.6	0.8	A
EB	Left Turn	200	184	92.2%	26.7	2.5	C
	Through						
	Right Turn	40	38	95.0%	6.9	1.7	A
	Subtotal	240	222	92.6%	23.3	2.5	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,040	2,006	98.4%	9.2	1.0	A

SimTraffic Post-Processor
Average Results from 10 Runs
Volume and Delay by Movement

Grapevine Transportation Impact Study
Cumulative Plus Project Mitigated Condition
PM Peak Hour

Intersection 5 **Street C/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	220	220	100.2%	49.8	6.2	D
	Right Turn	930	970	104.3%	15.4	2.5	B
	Subtotal	1,150	1,191	103.5%	21.8	2.4	C
SB	Left Turn	700	699	99.8%	47.1	6.1	D
	Through	260	304	117.1%	16.5	4.3	B
	Right Turn						
	Subtotal	960	1,003	104.5%	37.8	4.7	D
EB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
WB	Left Turn	1,130	1,121	99.2%	43.6	3.5	D
	Through						
	Right Turn	710	706	99.5%	26.7	4.1	C
	Subtotal	1,840	1,827	99.3%	37.1	2.2	D
Total		3,950	4,021	101.8%	32.8	2.3	C

Intersection 6 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn	920	901	97.9%	32.9	4.7	C
	Through						
	Right Turn	450	448	99.5%	51.6	17.0	D
	Subtotal	1,370	1,349	98.4%	39.1	6.5	D
EB	Left Turn						
	Through	1,240	1,232	99.4%	22.7	6.3	C
	Right Turn	390	403	103.4%	8.4	3.0	A
	Subtotal	1,630	1,636	100.3%	19.2	5.6	B
WB	Left Turn						
	Through	1,390	1,338	96.2%	47.9	13.8	D
	Right Turn	650	606	93.2%	21.6	6.0	C
	Subtotal	2,040	1,944	95.3%	39.7	11.5	D
Total		5,040	4,928	97.8%	32.6	4.5	C

Intersection 7 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	410	419	102.1%	31.5	5.0	C
	Through						
	Right Turn	660	643	97.4%	24.8	5.4	C
	Subtotal	1,070	1,061	99.2%	27.6	3.7	C
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	1,700	1,642	96.6%	32.9	16.7	C
	Right Turn	460	438	95.2%	15.3	8.5	B
	Subtotal	2,160	2,080	96.3%	29.3	15.2	C
WB	Left Turn						
	Through	1,630	1,647	101.0%	35.6	5.4	D
	Right Turn	510	543	106.5%	14.0	1.7	B
	Subtotal	2,140	2,190	102.3%	30.3	4.6	C
Total		5,370	5,331	99.3%	29.4	5.3	C

Intersection 8 **Street D/Street A** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	480	453	94.4%	56.5	5.7	E
	Through	230	219	95.2%	52.0	5.8	D
	Right Turn	70	57	81.4%	43.8	7.1	D
	Subtotal	780	729	93.5%	54.2	4.8	D
SB	Left Turn	660	702	106.3%	53.3	11.4	D
	Through	230	263	114.3%	42.5	2.8	D
	Right Turn	820	842	102.7%	12.9	2.1	B
	Subtotal	1,710	1,807	105.7%	32.9	4.9	C
EB	Left Turn	520	513	98.7%	86.2	10.0	F
	Through	1,370	1,280	93.4%	65.6	11.3	E
	Right Turn	470	468	99.5%	33.1	7.4	C
	Subtotal	2,360	2,261	95.8%	63.7	10.1	E
WB	Left Turn	80	67	83.6%	141.7	61.4	F
	Through	840	814	96.9%	49.2	3.8	D
	Right Turn	510	480	94.2%	30.4	8.2	C
	Subtotal	1,430	1,362	95.2%	47.4	3.5	D
Total		6,280	6,159	98.1%	50.0	3.9	D

SimTraffic Post-Processor | **Grapevine Transportation Impact Study**
Average Results from 10 Runs | **Cumulative Plus Project Mitigated Condition**
Volume and Delay by Movement | **PM Peak Hour**

Intersection 9 **Street C/Street G** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	280	308	109.9%	45.2	6.0	D
	Through	650	639	98.3%	2.5	0.8	A
	Right Turn						
	Subtotal	930	947	101.8%	16.4	2.2	B
SB	Left Turn						
	Through	670	633	94.4%	18.2	4.9	B
	Right Turn	10	9	87.4%	11.4	8.9	B
	Subtotal	680	641	94.3%	18.2	4.8	B
EB	Left Turn	10	10	98.8%	59.7	38.9	E
	Through						
	Right Turn	290	315	108.5%	17.1	5.4	B
	Subtotal	300	325	108.2%	18.4	5.1	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,910	1,913	100.2%	17.4	1.7	B

Intersection 10 **Street C/Street H** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	60	73	121.0%	30.5	4.7	C
	Through	910	952	104.6%	8.7	1.0	A
	Right Turn						
	Subtotal	970	1,025	105.7%	10.2	1.2	B
SB	Left Turn						
	Through	1,110	1,065	96.0%	9.2	1.6	A
	Right Turn	280	278	99.3%	6.6	0.5	A
	Subtotal	1,390	1,343	96.6%	8.7	1.4	A
EB	Left Turn	240	219	91.4%	27.2	2.7	C
	Through						
	Right Turn	60	63	104.5%	9.3	2.7	A
	Subtotal	300	282	94.0%	23.3	1.8	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		2,660	2,650	99.6%	10.8	1.0	B

Intersection 5 **Street C/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
NB	Through	425	150	33	250	57	250	66	0%	0%
	Right Turn	425	175	25	275	37	250	53	0%	0%
SB	Left Turn	475	200	24	325	61	325	65	1%	0%
	Through	475	75	13	125	22	150	28	0%	0%
			#VALUE!							
WB	Left Turn	1,675	200	26	300	55	350	121	2%	0%
	Right Turn	675	100	20	150	33	200	90	0%	0%
0										

Intersection 6 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	675	200	45	300	88	350	113	1%	0%
	Right Turn	325	25	0	25	0	75	137	0%	0%
SB	Left Turn	5,725	125	17	200	35	200	28	0%	0%
	Right Turn	525	150	22	225	47	250	51	0%	0%
WB	Through	975	150	32	225	50	225	50	0%	0%
0										

Intersection 7 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	975	175	24	275	43	300	52	0%	0%
NB	Left Turn	525	275	42	375	48	375	59	0%	0%
	Right Turn	3,625	125	27	225	78	225	92	0%	0%
WB	Through	575	50	11	100	30	100	45	0%	0%
	Right Turn	575	25	28	50	138	75	192	0%	0%
0										

Intersection 8 **Street D/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	425	225	28	325	36	325	37	0%	0%
	Through	500	200	24	300	38	300	38	0%	0%
	Right Turn	425	75	11	100	20	100	23	0%	0%
NB	Left Turn	2,900	125	15	175	28	175	26	0%	0%
	Through	2,900	50	11	100	29	100	39	0%	0%
	Through/Right	225	50	7	100	28	100	38	0%	0%
SB	Left Turn	2,450	125	18	175	23	200	38	0%	0%
	Through	2,450	100	21	175	35	175	50	0%	0%
WB	Left Turn	325	50	18	100	71	100	102	0%	0%
	Through	3,200	300	25	400	51	400	65	3%	0%
	Right Turn	525	100	18	175	38	175	40	0%	0%

Intersection 9 **Street C/Street G** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	275	25	11	50	25	50	23	0%	0%
	Right Turn	1,225	50	7	75	16	75	19	0%	0%
NB	Left Turn	125	125	6	150	7	125	1	37%	0%
	Through	475	150	48	300	60	275	58	0%	0%
SB	Through	2,625	125	30	200	52	225	38	0%	0%
	Through/Right	2,625	50	9	100	24	100	18	0%	0%
0										

Intersection 10 **Street C/Street H** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	1,300	125	17	200	24	200	39	3%	0%
	Right Turn	175	25	11	75	45	75	61	0%	0%
NB	Left Turn	175	50	12	100	17	100	20	0%	0%
	Through	1,525	150	24	250	34	250	32	0%	0%
SB	Through	425	100	19	175	44	200	54	0%	0%
	Right Turn	225	50	28	100	63	125	84	0%	0%
0										

SimTraffic Post-Processor
Average Results from 10 Runs
Queue Length

Grapevine Transportation Impact Study
Cumulative Plus Project Mitigated Condition
PM Peak Hour

Intersection 5 **Street C/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
NB	Through	425	250	77	375	82	350	63	0%	2%
	Right Turn	425	200	62	350	82	375	65	2%	0%
SB	Left Turn	475	350	55	475	67	475	50	15%	3%
	Through	475	150	36	250	90	250	116	0%	0%
			#VALUE!							
WB	Left Turn	1,675	475	93	675	123	625	89	22%	1%
	Right Turn	675	325	100	600	189	575	165	0%	1%
0										

Intersection 6 **I-5 Southbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	675	400	110	575	146	550	135	11%	1%
	Right Turn	325	200	68	425	54	350	0	0%	0%
SB	Left Turn	5,725	200	28	275	40	275	38	0%	0%
	Right Turn	525	200	30	300	65	300	103	0%	0%
WB	Through	975	325	114	500	232	500	253	2%	0%
	Right Turn	450	75	83	225	234	225	237	0%	0%
0										

Intersection 7 **I-5 Northbound Ramps/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Through	975	275	45	400	91	400	106	0%	0%
	Right Turn	450	50	45	150	189	225	235	0%	0%
NB	Left Turn	525	250	42	350	73	350	87	0%	0%
	Right Turn	3,625	175	28	250	50	275	54	0%	0%
WB	Through	1,100	250	39	425	162	450	238	0%	0%
0										

Intersection 8 **Street D/Street A** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	425	350	60	550	51	475	48	1%	0%
	Through	1,100	575	114	850	267	850	260	19%	1%
	Right Turn	425	325	108	550	88	475	3	0%	0%
NB	Left Turn	2,900	375	108	500	180	500	155	13%	0%
	Through	2,900	150	19	225	73	250	101	1%	0%
	Through/Right	225	150	16	200	33	200	28	2%	0%
SB	Left Turn	2,475	750	488	1,375	935	1,475	831	5%	1%
	Through	2,475	1,425	426	1,950	413	1,950	381	0%	1%
	Right Turn	2,475	2,075	267	2,475	180	2,400	98	0%	5%
WB	Left Turn	325	200	59	425	84	375	0	0%	0%
	Through	3,200	1,500	360	2,200	543	2,250	454	73%	0%
	Right Turn	525	575	27	650	81	600	0	4%	0%

Intersection 9 **Street C/Street G** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	275	25	4	25	15	25	19	0%	0%
	Right Turn	1,225	125	52	225	106	225	110	2%	0%
NB	Left Turn	125	125	4	150	9	125	1	43%	0%
	Through	475	200	44	375	79	350	72	0%	0%
SB	Through	2,625	225	29	350	39	350	61	0%	0%
	Through/Right	2,625	125	20	250	57	275	68	0%	0%
0										

Intersection 10 **Street C/Street H** **Signal**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Left Turn	1,300	150	13	225	19	225	24	6%	0%
	Right Turn	175	50	13	75	44	75	59	0%	0%
NB	Left Turn	175	75	11	100	13	100	15	0%	0%
	Through	1,525	175	43	300	71	300	71	0%	0%
SB	Through	425	150	33	250	42	250	50	2%	0%
	Right Turn	225	100	21	175	52	200	68	0%	0%
0										

INTENTIONALLY LEFT BLANK

Appendix N:

Trip Internalization Sensitivity Analysis Memorandum

INTENTIONALLY LEFT BLANK

FEHR PEERS
Improving Communities Since 1985

MEMORANDUM

Date: January 26, 2016

To: Harpreet Binning, Caltrans

CC: Kevin Lum & Beverly Boucher, Caltrans

From: Rob Hananouchi & Fred Choa, Fehr & Peers

Subject: Grapevine Transportation Impact Study – Trip Internalization

RS13-3088

This memorandum presents the trip internalization analysis for the proposed Grapevine Specific and Community Plan development. This memorandum begins by presenting the characteristics of the proposed project that contribute to the internalization of project trips, and then follows with a summary of the methodology used to develop the proposed project's trip internalization estimate. Attachment A to this memorandum provides additional background information related to the trip internalization analysis, including specific data references and calculations used to estimate the project's trip internalization.

The trip internalization analysis is based on a wide range of transportation and demographic data sources, including the Institute of Transportation Engineers (ITE), the National Cooperative Highway Research Program (NCHRP), and the U.S. Census Bureau.

The trip internalization analysis is intended to validate the travel forecasting outputs from the Kern Council of Governments (Kern COG) travel demand forecasting (TDF) model. The Grapevine Transportation Impact Study (TIS) ultimately uses the Kern COG TDF model to forecast the proposed project's trip generation and trip distribution, including forecasting the internalization of project trips. The results of this trip internalization analysis are intended to verify that the Kern COG TDF model internalization forecasts are reasonable.

PROJECT DESCRIPTION & LOCAL CONTEXT

The 8,010-acre Grapevine project site is located in the west-central portion of Tejon Ranch within unincorporated Kern County, just south of the junction of I-5 and SR 99. The project would leverage and build upon the economic expansion and job growth that has occurred at the Tejon Ranch Commerce

Center (TRCC), which is located immediately north of the project adjacent to the I-5 / Laval Road interchange.

Overall, Grapevine is one part of an area identified for development in the Kern COG Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). The Kern COG RTP/SCS includes future development at TRCC, some development at San Emidio New Town, as well as Grapevine in this area. Table 1 below presents the land uses for these three developments.

TABLE 1
LAND USE INPUTS

Development	Land Use Category	Land Use Type	Amount
Grapevine[1]	Residential[3]	Residential	8,410 Dwelling Units
		Village Center Residential	3,590 Dwelling Units
		Total	12,000 Dwelling Units
	Non-Residential[3]	Village Center Commercial - Retail[5]	450,000 square feet
		Village Center Commercial - Office[5]	350,000 square feet
		Highway/Regional Commercial	750,000 square feet
		Office / Research & Development	2,100,000 square feet
		Light Industrial / Warehouse	1,450,000 square feet
		Total	5,100,000 square feet
	Schools[4]	K-5 Students	3,520 Students
		6-8 Students	1,760 Students
		High School	2,454 Students
		Total	7,734 Students
Tejon Ranch Commerce Center (TRCC)[1]	Non-Residential	Highway/Regional Commercial	936,000 square feet
		Industrial/Warehouse	17,236,000 square feet
		Total	18,172,000 square feet

TABLE 1
LAND USE INPUTS

Development	Land Use Category	Land Use Type	Amount
San Emidio New Town[2]	Residential	Single-Family Residential	1,025 Dwelling Units
		Multi-Family Residential	325 Dwelling Units
		Total	1,350 Dwelling Units
	Non-Residential	Commercial Retail	16,000 square feet
		Office	30,000 square feet
		Industrial	24,000 square feet
		Total	70,000 square feet

Notes: [1]Grapevine and TRCC land use data provided by Ken Kay Associates and Tejon Ranch, respectively.
[2]San Emidio New Town land use data presented above was obtained from the Kern COG RTP/SCS TDF model.
[3]Grapevine residential and non-residential land use data provided by Ken Kay Associates
[4]School enrollment data based on student generation rates from General Shafter Elementary School District for elementary and middle schools and Kern County High School District for high schools.
[5]Village Center Commercial is a mix of 450,000 sq. ft. of Village Center Retail and 350,000 sq. ft. of Village Center Office, per data provided by Tejon Ranch and Ken Kay Associates
Source: Ken Kay Associates, 2015; Kern COG RTP/SCS, 2014.

As shown in Table 1 above, Grapevine is part of a larger planned development area within Kern County that will ultimately be a complete, full-service community. The proposed Grapevine project consists of a mix of complementary land uses to provide both jobs and services for future residents and workers in Grapevine. As shown in Table 1, this includes:

- Neighborhood-serving retail and services such as grocery stores, pharmacies, restaurants, and local serving retail (Village Center Retail)
- Retail and commercial outlets such as larger-scale retail stores, fast-food restaurants, and gas stations that will serve both the community and existing regional traffic on I-5 (Highway/Regional Commercial)
- Local services such as health care facilities, and banking and real estate services (Village Center Office)
- A wide range of employment opportunities for future residents (Office/Research & Development and Light Industrial/Warehouse)
- Educational facilities, including K-12 schools
- Parks and a comprehensive trail system to support local recreation and bicycle and pedestrian connectivity within the project

Additional key characteristics of the proposed project include:

- Consists of a series of compact neighborhoods with conveniently located village centers, each composed of a mix of housing, neighborhood-serving retail and office uses, schools, parks, and community services.
- Adjacent to a major employment center at TRCC, which already provides over 3,000 jobs with approximately 4.4 million square feet of existing commercial and industrial development. TRCC is entitled to include over 18 million square feet of industrial and commercial space providing additional employment and service opportunities for future Grapevine residents.
- Isolated location 30 miles south of Downtown Bakersfield and 45 miles north of Santa Clarita

JOBS-HOUSING BALANCE

The proposed Grapevine development, in concert with development at TRCC and the small amount of development at San Emidio New Town included in the Kern COG RTP/SCS, will create a development with a balance of housing and employment opportunities. Tables 2 and 3 present the anticipated workforce generation and employment generation for this area.

TABLE 2
ESTIMATED WORKFORCE GENERATION

Development	Residential Dwelling Units	Workforce per Dwelling Unit[1]	Total Workforce
Grapevine	12,000 Dwelling Units	1.50	18,000
Tejon Ranch Commerce Center	0	1.50	0
San Emidio New Town	1,350 Dwelling Units	1.50	2,025
Total	13,350 Dwelling Units	-	20,025

Notes: [1]Workforce per Dwelling Unit value comes from U.S. Census data for similarly sized communities.
Source: Ken Kay Associates, 2015; Kern COG RTP/SCS, 2014; 2008-2012 ACS – Report DP03 & DP04, U.S. Census Bureau, 2012.

TABLE 3
ESTIMATED EMPLOYMENT GENERATION

Development	Land Use Type	Amount	Employment Factor	Number of Jobs
Grapevine	Village Center Commercial - Retail	450,000 SF	2 jobs per 1,000 SF	900
	Village Center Commercial - Office	350,000 SF	3 jobs per 1,000 SF	1,050
	Highway/Regional Commercial	750,000 SF	2 jobs per 1,000 SF	1,500
	Office / Research & Development	2,100,000 SF	3 jobs per 1,000 SF	6,300
	Light Industrial / Warehouse	1,450,000 SF	0.75 jobs per 1,000 SF	1,088
	Elementary School[3]	3,520 Students	1 job per 10.7 students	329
	Middle School[3]	1,760 Students	1 job per 10.7 students	164
	High School[3]	2,454 Students	1 job per 10.7 students	229
			Total	11,560
Tejon Ranch Commerce Center (TRCC)[1]	Highway/Regional Commercial	936,000 SF	2 jobs per 1,000 SF	1,872
	Industrial/Warehouse	17,236,000 SF	0.30 jobs per 1,000 SF	5,143
			Total	7,015
San Emidio New Town[2]	Commercial Retail	16,000 SF	2 jobs per 1,000 SF	32
	Office	30,000 SF	3 jobs per 1,000 SF	90
	Industrial	24,000 SF	1 job per 1,000 SF	24
			Total	146
			Total Employment	18,721

Notes: [1]TRCC employment factors based on existing employment yields
[2]San Emidio New Town land use data presented above was obtained from the Kern COG RTP/SCS TDF model.
[3]School employment yields based on the average student to teacher ratio for California and national teacher to school staff data (see Attachment A).
Source: Tejon Ranch, 2015.

As shown in Tables 2 and 3, the amount of workforce generated by the proposed residential development in the area will closely match the total number of jobs generated by the non-residential development, demonstrating a well-balanced jobs-housing ratio.

It should be noted that the Industrial/Warehouse employment yield factors are different for each development since Grapevine is expected to provide more local distribution, warehousing, and manufacturing, while TRCC is expected to include more high-cube, regional distribution centers and logistics centers, which typically have lower employment yields.

TRIP GENERATION

While the Grapevine TIS uses the Kern COG TDF model to estimate the proposed project's trip generation, this study also calculated the estimated trip generation for the project using trip rates in the Institute of Transportation Engineers' *Trip Generation 9th Edition* (ITE, 2012) to validate and calibrate the trip generation outputs from the Kern COG TDF model. Table 4 presents these daily, a.m. peak hour, and p.m. peak hour trip generation estimates based on these ITE trip rates.

TABLE 4
ITE TRIP GENERATION ESTIMATE

Land Use	Quantity	ITE Code	A.M. Peak Hour			P.M. Peak Hour			Daily Total
			Total	*In*	*Out*	*Total*	*In*	*Out*	
Residential									
Residential	8,410 DUs	210	6,308	1,577	4,731	8,410	5,298	3,112	80,063
Village Center Residential	3,590 DUs	220	1,831	366	1,465	2,226	1,446	779	23,874
Non-Residential									
Village Center Comm. - Retail[1]	450 ksf	820[1]	432	268	164	1,670	802	868	19,215
Village Center Comm. - Office[1]	350 ksf	710[1]	546	480	66	522	89	433	3,861
Highway/Regional Commercial	750 ksf	820	720	446	274	2,783	1,336	1,447	32,025
Office/Research & Development	2,100 ksf	710	3,276	2,883	393	3,129	532	2,597	23,163
Light Industrial/Warehouse[2]	1,450 ksf	130/ 150[2]	813	660	153	848	187	661	7,533
Schools & Parks									
Elementary Schools	3,520 students	520	1,584	871	713	528	259	269	4,541
Middle Schools	1,760 students	522	950	523	428	282	138	144	2,851
High Schools	2,454 students	530	1,055	717	338	319	150	169	4,196
Parks[3]	132 acres	411	-	-	-	-	-	-	249
Total			17,515	8,791	8,725	20,717	10,238	10,479	201,571

Notes: DUs = dwelling units; ksf = thousand square feet
Trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition*
[1]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[2]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
[3]City Park land use (ITE Code 411) in ITE's *Trip Generation Manual* only includes daily trip information.
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

As shown in Table 4, the proposed project has an overall balance of "in" and "out" trips during the a.m. and p.m. peak hours, further demonstrating its jobs-housing balance.

TRIP INTERNALIZATION ANALYSIS

As noted in the project description, the proposed Grapevine development is a complete, full-service community that provides a mix of complementary land uses to provide both jobs and services for future residents and workers in Grapevine. This complete community approach will allow future residents and workers to fulfill most of their daily needs within the proposed project at build out.

Furthermore, the project's isolated location approximately 30 miles south of Downtown Bakersfield and 45 miles north of Santa Clarita make it more likely that people will primarily stay within the project and the immediate vicinity (i.e., TRCC) particularly for non-work trips such as shopping, school, restaurant, and basic services, such as medical, banking, and real estate.

These aspects of the project description and location result in an increased likelihood for project trips to remain within the community at build out. While this full-service community approach along with the project's isolated location means that residents and workers will likely make most of their trips within the project and the immediate vicinity, this study acknowledges that some project residents will work and travel outside the area, and some workers and visitors to Grapevine will travel to the project from outside the area.

KERN COG MODEL

As stated in the introduction of the memorandum, the Grapevine TIS ultimately uses the Kern COG TDF model to forecast the proposed project's trip generation and trip distribution, including forecasting the internalization of project trips. The Kern COG TDF model predicts that the proposed Grapevine project will have an internal capture rate of 73% during the a.m. peak hour and 72% during the p.m. peak hour.

TRIP INTERNALIZATION ANALYSIS METHODOLOGY

The following trip internalization analysis is intended to verify that the Kern COG TDF model internalization forecasts are reasonable.

Given the project's size, unique location, and complete community approach, this analysis uses the following three-step process to estimate the project's trip internalization, or the number of trips that are expected to remain within the project.

Step 1. Estimate the trip purpose for project trips

Step 2. Estimate the internalization by trip purpose

Step 3. Estimate the total trip internalization

This study uses trip purpose information from the Transportation Research Board along with data from the U.S. Census Bureau for similarly sized and isolated communities in California and the MXD+ tool to support this analysis process.

STEP 1: DETERMINING PEAK HOUR TRIP PURPOSE SPLIT

This study uses information from the National Cooperative Highway Research Program (NCHRP) Report 365 (Transportation Research Board, 1998) to estimate the peak hour trip purpose breakdown. Developing the peak hour trip purpose breakdown is a two-step process that includes the following:

Step 1A. Identify trip purpose split for daily trip productions based on NCHRP 365

Step 1B. Use Time of Day Factors from NCHRP 365 to estimate the peak hour trip purpose split

Through this process, this study estimates that the peak hour trip purpose split is as shown in Table 5.

TABLE 5
PEAK HOUR TRIP PURPOSE

A.M. Peak Hour			P.M. Peak Hour		
HBW	*HBO*	*NHB*	*HBW*	*HBO*	*NHB*
47.8%	46.5%	5.7%	28.1%	47.5%	24.4%

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
Source: *National Cooperative Highway Research Program Report 365* (Transportation Research Board, 1998); Fehr & Peers, 2015.

The detailed calculations for each of these steps to develop this breakdown are provided in Attachment A.

STEP 2: INTERNALIZATION BY TRIP PURPOSE

This study recognizes that the internal trip capture rate will be different for different trip purposes. For example, people generally travel further for their commute trips and may not live where they work. However, most people tend to shop and attend schools within their community, when feasible. Therefore, this study evaluates the trip internalization for home-based work and home-based other/non-home-based trips separately, as described below.

Step 2A: Home-Based Work Trips

Internalization for home-based work trips is estimated using U.S. Census Journey to Work data for California communities that have similar characteristics to Grapevine. This includes similar size, in terms of dwelling units and population, employment opportunities, and proximity to other developed areas (i.e., similar isolation). This analysis included the following six communities:

- El Centro, CA
- Madera, CA
- Paso Robles, CA
- Porterville, CA
- Santa Maria, CA
- Watsonville, CA

Additional data for each of these communities is provided in Attachment A.

This study uses the Journey to Work data from the U.S. Census Bureau's American Community Survey (ACS) for these six communities to estimate how many Grapevine residents will work within Grapevine and the immediate area (i.e., TRCC). Specifically, the study uses the percentage of the population who worked in their place of residence from the Journey to Work data, as presented in Table 6 below.

TABLE 6
JOURNEY TO WORK DATA FOR SIMILAR COMMUNITIES

City	Percent of Population that Work in Place of Residence
El Centro, CA	57.6%
Madera, CA	51.2%
Paso Robles, CA	48.5%
Porterville, CA	58.0%
Santa Maria, CA	62.0%
Watsonville, CA	49.4%
Average	54.5%

Source: 2008-2012 ACS – Report S0801, U.S. Census Bureau, 2012.

Based on this U.S. Census data, this study anticipates that approximately 54.5% of Grapevine residents will work in Grapevine/TRCC. Therefore, this study assumes that **54.5%** of home-based work trips will be internal.

Step 2B: Home-Based Other and Non-Home-Based Trips

Internalization for home-based other and non-home-based trips are based on travel data from NCHRP 365, specific land use characteristics, cell phone data, and the MXD+ trip generation model.

Since the non-residential land uses attract a combination of home-based work, home-based other, and non-home-based trips, this study estimates the proportion of home-based work trips versus home-based other and non-home-based trips to isolate the home-based other and non-home-based trips.

Table 7 presents a summary of the anticipated break down of home-based other/non-home-based trips versus home-based work trips by land use. This breakdown is based on data from NCHRP 365. Calculations used to develop the percentages presented in Table 7 are included in Attachment A.

TABLE 7
TRIP PURPOSE FOR NON-RESIDENTIAL LAND USES

Land Use	A.M. Peak Hour				P.M. Peak Hour			
	HBW	*HBO*	*NHB*	*HBO+NHB*	*HBW*	*HBO*	*NHB*	*HBO+NHB*
Village Center Comm. - Retail	28%	63%	9%	72%	14%	55%	31%	86%
Village Center Comm. - Office	66%	28%	6%	34%	42%	31%	27%	58%
Highway/Regional Commercial	28%	63%	9%	72%	14%	55%	31%	86%
Office/Research & Development	66%	28%	6%	34%	42%	31%	27%	58%
Light Industrial/Warehouse	86%	11%	3%	14%	67%	15%	18%	33%

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
Source: *National Cooperative Highway Research Program Report 365* – Table 8 (Transportation Research Board, 1998).

NCHRP 365 does not present specific trip purpose data for school trips. Therefore, this study uses a combination of the data presented in NCHRP 365 and school employment yield data from the California School Boards Association and the National Center for Education Statistics to estimate home-based work trips associated with schools. Table 8 presents the estimated home-based work trips for the schools in the proposed projects. Detailed calculations associated with this data are included in Attachment A.

TABLE 8
ESTIMATED EDUCATION HOME-BASED WORK TRIPS

School Type	Amount	Number of Jobs[1]	A.M. Peak Hour		P.M. Peak Hour	
			HBW Trip Rate[2]	*# of HBW Trips*	*HBW Trip Rate*[2]	*# of HBW Trips*
Elementary School	3,520 Students	329	0.21	69	0.17	56
Middle School	1,760 Students	164	0.21	35	0.17	28
High School	2,454 Students	229	0.21	48	0.17	39
Total				152		123

Notes: [1]School employment yields based on the average student to teacher ratio for California and national teacher to school staff data.
[2]Home-based work trip rate for schools based on data in Table 8 and Table 41 of NCHRP 365 (Transportation Research Board, 1998).
Source: Fehr & Peers, 2015.

Using the information in Table 8 along with the estimated ITE trip generation for schools within the proposed project (see Table 4), this study is able to deduce that the remaining trip generation at schools would be home-based other or non-home-based trips, as shown in Table 8.

Using the data in Tables 4, 7, and 8, Table 9 estimates the number of home-based other and non-home-based trips by non-residential land use type.

TABLE 9
HBO/NHB TRIP ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour		P.M. Peak Hour	
		Total Trip Generation[1]	*HBO+NHB*[2]	*Total Trip Generation*[1]	*HBO+NHB*[2]
Non-Residential					
Village Center Comm. - Retail[3]	450 ksf	432	311	1,670	1,436
Village Center Comm. - Office[3]	350 ksf	546	186	522	303
Highway/Regional Commercial	750 ksf	720	518	2,783	2,393
Office/Research & Development	2,100 ksf	3,276	1,114	3,129	1,815
Light Industrial/Warehouse[4]	1,450 ksf	813	114	848	280
Non-Residential Sub-Total		*5,787*	*2,243*	*8,952*	*6,227*

TABLE 9
HBO/NHB TRIP ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour		P.M. Peak Hour	
		Total Trip Generation[1]	*HBO+NHB[2]*	*Total Trip Generation[1]*	*HBO+NHB[2]*
Schools					
Elementary Schools	3,520 students	1,584	1,515	528	472
Middle Schools	1,760 students	950	915	282	254
High Schools	2,454 students	1,055	1,007	319	280
Schools Sub-Total		*3,589*	*3,437*	*1,129*	*1,006*
Total		9,376	5,680	10,081	7,233

Notes: ksf = thousand square feet
[1]A.M. and P.M. peak hour trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition* from Table 4.
[2]Home-based other and non-home-based trip estimate based on percentages presented in Table 7 for non-residential uses; and the remaining trips after home-based work trips calculated in Table 8 are subtracted from total school trips.
[3]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[4]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

For the home-based other and non-home-based trip estimates presented in Table 9, this study applies a different internalization percentage for each land use type based on its function. Further details regarding the determination of the internalization percentage for home-based other/non-home-based trips for each land use type is described in Attachment A.

Table 10 presents the estimated internal home-based other/non-home-based trips by land use type. These are based on the total home-based other/non-home-based trip numbers from Table 9 and the internalization percentage of for each land use type.

TABLE 10
HBO/NHB TRIP INTERNALIZATION ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour			P.M. Peak Hour		
		HBO/NHB[1]	*Internal %[2]*	*Internal HBO/NHB*	*HBO/NHB[1]*	*Internal %[2]*	*Internal HBO/NHB*
Non-Residential							
Village Center Comm. - Retail[3]	450 ksf	311	95%	295	1,436	95%	1,364
Village Center Comm. - Office[3]	350 ksf	186	95%	177	303	95%	288
Highway/Regional Commercial	750 ksf	518	60%	311	2,393	60%	1,436
Office/Research & Development	2,100 ksf	1,114	85%	947	1,815	85%	1,543
Light Industrial/Warehouse[4]	1,450 ksf	114	20%	23	280	20%	56
Non-Residential Sub-Total		*2,243*	*77.0%*	*1,753*	*6,227*	*75.3%*	*4,687*
Schools							
Elementary Schools	3,520 students	1,515	95%	1,439	472	95%	448
Middle Schools	1,760 students	915	95%	869	254	95%	241
High Schools	2,454 students	1,007	95%	957	280	95%	266
Schools Sub-Total		*3,437*	*95.0%*	*3,265*	*1,006*	*95.0%*	*955*
Total		5,680	88.3%	5,018	7,233	78.0%	5,642

Notes: ksf = thousand square feet
[1]Home-based other and non-home-based trip estimate based on data presented in Table 9.
[2]Internalization percentage based on discussion provided in Attachment A.
[3]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[4]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

Step 2 Summary: Internalization by Trip Purpose

As presented above, the estimated internalization for home-based work trips is 54.5% during both the a.m. and p.m. peak hours (see Table 6). For home-based other and non-home-based trips, the project's internalization is estimated to be 88.3% during the a.m. peak hour and 78.0% during the p.m. peak hour (see Table 10).

STEP 3: TOTAL PROJECT TRIP INTERNALIZATION BY PEAK HOUR

The final step in the trip internalization analysis is to combine the data from Steps 1 and 2 into an aggregate trip internalization estimate for each peak hour. This study calculates this aggregate total project trip internalization by peak hour using the peak hour trip purpose split presented in Table 5 along with the internalization by trip purpose presented in Tables 6 and 10.

Table 11 below calculates the total project trip internalization by peak hour.

TABLE 11
ESTIMATED PROJECT TRIP INTERNALIZATION BY PEAK HOUR

Trip Purpose	A.M. Peak Hour			P.M. Peak Hour		
	% of Trips[1]	*% Internal*[2]	*Total Internalization %*[3]	*% of Trips*[1]	*% Internal*[2]	*Total Internalization %*[3]
Home-Based Work	47.8%	54.5%	26.1%	28.1%	54.5%	15.3%
Home-Based Other/ Non-Home-Based	52.2%	88.3%	46.1%	71.9%	78.0%	56.1%
Total			72.2%			71.4%

Notes: [1]Percent of peak hour trips by trip purpose. Based on data from NCHRP 365, as shown in Tables A-1 through A-3 of Attachment A.
[2]Internalization percentage by trip purpose. Home-based work trip internalization shown in Table 5. Home-based other/non-home-based trip internalization shown in Table 9.
[3]Overall internalization estimate calculation.
Source: Fehr & Peers, 2015.

As shown in Table 11, the proposed Grapevine project is estimated to have a total internalization of 72.2% during the a.m. peak hour and 71.4% during the p.m. peak hour.

These analysis results validate the trip internalization outputs from the Kern COG RTP/SCS TDF model, which estimated an approximately 73% internalization during the a.m. peak hour and 72% internalization during the p.m. peak hour.

FEHR & PEERS
Improving Communities Since 1985

ATTACHMENT A:
CALCULATIONS

STEP 1: PEAK HOUR TRIP PURPOSE SPLIT CALCULATIONS

Developing the peak hour trip purpose breakdown is a two-step process that includes the following:

Step 1A: Identify trip purpose split for the daily productions based on NCHRP 365

Step 1B: Use Time of Day Factors from NCHRP 365 to estimate the peak hour trip purpose split

The data and calculations for these steps are provided below.

STEP 1A: DAILY TRIP PURPOSE

Table A-1 presents the daily trip purpose percentages for home-based work (HBW), home-based other (HBO), and non-home-based trips (NHB) based on data presented in NCHRP 365.

TABLE A-1
DAILY TRIP PURPOSE

Data Set	Productions per Household	Percentage			Daily Productions per HH[1]		
		HBW	*HBO*	*NHB*	*HBW*	*HBO*	*NHB*
All Area Types	8.55	21%	56.25%	22.75%	1.86	4.98	2.01

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
[1]NCHRP 365 provides Productions per Household and trip purpose percentages. The Daily Productions per Household are calculated by multiplying the Productions Per Household by the daily trip purpose percentages.
Source: *National Cooperative Highway Research Program Report 365* – Table 9 (Transportation Research Board, 1998).

STEP 1B: PEAK HOUR TRIP PURPOSE

Table A-2 presents the time of day factors by trip purpose for the a.m. and p.m. peak hours from NCHRP 365.

TABLE A-2
TIME OF DAY FACTORS BY TRIP PURPOSE

Data	A.M. Peak Hour[1]			P.M. Peak Hour[2]		
	HBW	*HBO*	*NHB*	*HBW*	*HBO*	*NHB*
Percent of Daily Trips that Occur During Time Period	14.33%	5.21%	1.57%	11.53%	7.28%	9.24%

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
[1]A.M. Peak Hour data uses data for 7-8 a.m., consistent with the typical a.m. peak hour shown in Table 41 of NCHRP 365.
[2]P.M. Peak Hour data uses data for 5-6 p.m., consistent with the typical p.m. peak hour shown in Table 41 of NCHRP 365.
Source: *National Cooperative Highway Research Program Report 365* – Table 41 (Transportation Research Board, 1998).

This study uses the data presented in Tables A-1 and A-2 to estimate the trip purpose split during the a.m. and p.m. peak hour, as shown in Table A-3.

The number of peak hour productions by trip purpose is calculated by multiplying the daily productions per household in Table A-1 by the time of day factors in Table A-2. These calculations for Table A-3 are presented below. For example, the number of home-based work productions during the a.m. peak hour is calculated by multiplying the daily home-based work productions by the time of day factor (i.e., 1.86 x 14.33% = 0.27).

TABLE A-3
PEAK HOUR TRIP PURPOSE – PRODUCTIONS PER HOUSEHOLD CALCULATIONS

Trip Purpose	Daily[1]	A.M. Peak Hour			P.M. Peak Hour		
	Productions per HH	*% of Daily Trips that Occur During Time Period[3]*	*Productions per HH[2]*		*% of Daily Trips that Occur During Time Period[3]*	*Productions per HH[2]*	
			Amount	*%*		*Amount*	*%*
Home-Based Work (HBW)	1.86	14.33%	0.27	47.8%	11.53%	0.21	28.1%
Home-Based Other (HBO)	4.98	5.21%	0.26	46.5%	7.28%	0.36	47.5%
Non-Home-Based (NHB)	2.04	1.57%	0.03	5.7%	9.24%	0.19	24.4%

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based; HH = household
[1]Daily productions per household from Table A-1.
[2]A.M. and P.M. Peak Hour productions calculated by multiplying the daily productions per household by the Time of Day factors in Table A-2.
Source: *National Cooperative Highway Research Program Report 365* (Transportation Research Board, 1998); Fehr & Peers, 2015.

The key conclusions from Table A-3 are as follows:

- A.M. Peak Hour trip purpose breakdown is:
  - 47.8% home-based work trips
  - 46.5% home-based other trips
  - 5.7% non-home-based trips
- P.M. Peak Hour trip purpose breakdown is:
  - 28.1% home-based work trips
  - 47.5% home-based other trips
  - 24.4% non-home-based trips

STEP 2: INTERNALIZATION BY TRIP PURPOSE

STEP 2A: HOME-BASED WORK TRIPS

Internalization for home-based work trips is estimated using U.S. Census Journey to Work data for California communities that have similar characteristics to Grapevine. This includes similar size, in terms of dwelling units and population, employment opportunities, and proximity to other developed areas (i.e., similar isolation). This analysis included the six communities presented in Table A-4 below.

TABLE A-4
U.S. CENSUS DATA FOR SIMILAR COMMUNITIES

City	Dwelling Units	Population	% Worked in Place of Residence	Nearest Major Cities
El Centro, CA	14,475	42,514	57.6%	Adjacent to Imperial; 10 miles to Brawley; 100 miles to San Diego
Madera, CA	17,687	61,151	51.2%	20 miles to Fresno; 120 miles to San Jose
Paso Robles, CA	11,686	29,770	48.5%	30 miles to San Luis Obispo; 150 miles to San Jose
Porterville, CA	17,331	54,038	58.0%	30 miles to Tulare & Visalia; 50 miles to Bakersfield
Santa Maria, CA	28,673	98,715	62.0%	30 miles to San Luis Obispo; 60 miles to Santa Barbara; 130+ miles to Los Angeles
Watsonville, CA	14,521	50,945	49.4%	20 miles to Salinas, Santa Cruz, Monterey; 50 miles to San Jose
Average	17,396	50,972	54.5%	
Grapevine	12,000	[redacted]	[redacted]	30 miles to Bakersfield; 45 miles to Santa Clarita

Source: 2008-2012 ACS, U.S. Census Bureau, 2012.

The communities presented in Table A-4 are all roughly similar in size to Grapevine at build out and are located in generally isolated locations. Although none of these communities exactly match every aspect of Grapevine's unique context and location, they each have a few aspects in common with Grapevine to serve as comparable communities for this analysis.

This study uses the Journey to Work data from the U.S. Census Bureau's American Community Survey (ACS) for these six communities to estimate how many Grapevine residents will work within Grapevine and the immediate area (i.e., TRCC). Specifically, the study uses the percentage of the population who worked in their place of residence from the Journey to Work data, as presented in Table A-4 above.

Based on this U.S. Census data, this study anticipates that approximately 54.5% of Grapevine residents will work in Grapevine/TRCC. Therefore, this study assumes that 54.5% of home-based work trips will be internal.

STEP 2B: HOME-BASED OTHER/NON-HOME BASED TRIPS

Non-residential land uses attract a combination of home-based work, home-based other, and non-home-based trips. Since this study uses U.S. Census Journey to Work data to estimate the internalization of home-based work trips, the next step in the trip internalization analysis is to identify the internalization of home-based other and non-home-based trips.

This study uses data from NCHRP 365 to estimate the trip purpose split for trip attractions to non-residential land uses. Table A-5 presents the estimated number of daily trip attractions generated by non-residential land uses by trip purpose based on data presented in Table 8 of NCHRP 365.

TABLE A-5
DAILY TRIP ATTRACTIONS BY LAND USE

Land Use	Unit	Daily Productions per Employee		
		HBW	*HBO*	*NHB*
Commercial/Retail	Per Retail Employee	1.45	9.00	4.10
Office	Per Office Employee	1.45	1.70	1.20
Industrial/Other	Per Industrial Employee	1.45	0.50	0.50

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
Data presented for non-CBD (Central Business District) condition.
Source: *National Cooperative Highway Research Program Report 365* – Table 8 (Transportation Research Board, 1998).

This study then uses daily trip attraction data presented in Table A-5 along with the Time of Day data presented in Table A-2 to estimate the trip attraction by trip purpose during the a.m. and p.m. peak hours. This calculation is presented in Table A-6 below.

TABLE A-6
PEAK HOUR TRIP ATTRACTIONS BY LAND USE

Data	A.M. Peak Hour[1]						P.M. Peak Hour[2]					
	HBW		*HBO*		*NHB*		*HBW*		*HBO*		*NHB*	
	Amount	*%*	*Amount*	*%*	*Amount*	*%*	*Amount*	*%*	*Amount*	*%*	*Amount*	*%*
Percent of Daily Trips that Occur During Time Period[3]	*14.33%*		*5.21%*		*1.57%*		*11.53%*		*7.28%*		*9.24%*	
Commercial/Retail	0.21	28%	0.47	63%	0.06	9%	0.17	14%	0.66	55%	0.38	31%
Office	0.21	66%	0.09	28%	0.02	6%	0.17	42%	0.12	31%	0.11	27%
Industrial/Other	0.21	86%	0.03	11%	0.01	3%	0.17	67%	0.04	15%	0.05	18%

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
[1]A.M. Peak Hour data uses data for 7-8 a.m., consistent with the typical a.m. peak hour shown in Table 41 of NCHRP 365.
[2]P.M. Peak Hour data uses data for 5-6 p.m., consistent with the typical p.m. peak hour shown in Table 41 of NCHRP 365.
[3]Data from Table A-2; originally from Table 41 of NCHRP 365.
Source: *National Cooperative Highway Research Program Report 365* – Table 41 (Transportation Research Board, 1998).

Table A-7 takes the peak hour trip purpose splits presented in Table A-6 and identifies the combined share for home-based other and non-home-based trips by land use type.

TABLE A-7
TRIP PURPOSE FOR NON-RESIDENTIAL LAND USES

Land Use	A.M. Peak Hour				P.M. Peak Hour			
	HBW	*HBO*	*NHB*	*HBO+NHB*	*HBW*	*HBO*	*NHB*	*HBO+NHB*
Village Center Comm. - Retail	28%	63%	9%	72%	14%	55%	31%	86%
Village Center Comm. - Office	66%	28%	6%	34%	42%	31%	27%	58%
Highway/Regional Commercial	28%	63%	9%	72%	14%	55%	31%	86%
Office/Research & Development	66%	28%	6%	34%	42%	31%	27%	58%
Light Industrial/Warehouse	86%	11%	3%	14%	67%	15%	18%	33%

Notes: HBW = home-based work; HBO = home-based other; NHB = non-home-based
Source: *National Cooperative Highway Research Program Report 365* – Table 8 (Transportation Research Board, 1998).

Using the trip purpose information presented in Table A-7 and the total project trip generation estimate in Table 4 of the memorandum, this study estimates the total home-based other and non-home-based trips generated by the proposed project, as shown in Table A-8 below.

TABLE A-8
HBO/NHB TRIP ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour		P.M. Peak Hour	
		Total Trip Generation[1]	*HBO+NHB*[2]	*Total Trip Generation*[1]	*HBO+NHB*[2]
Non-Residential					
Village Center Comm. - Retail[3]	450 ksf	432	311	1,670	1,436
Village Center Comm. - Office[3]	350 ksf	546	186	522	303
Highway/Regional Commercial	750 ksf	720	518	2,783	2,393
Office/Research & Development	2,100 ksf	3,276	1,114	3,129	1,815
Light Industrial/Warehouse[4]	1,450 ksf	813	114	848	280
Total		5,787	2,243	8,952	6,227

Notes: ksf = thousand square feet
[1]A.M. and P.M. peak hour trip generation estimates calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition* from Table 4.
[2]Home-based other and non-home-based trip estimate based on percentages presented in Table A-7.
[3]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[4]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

School Trips

NCHRP 365 does not present specific trip attractions by purpose for school trips. Therefore, this study uses a combination of the data presented in NCHRP 365, school employment yield data, and the ITE trip generation estimate for schools in the project presented in Table 4 of the memorandum.

According to the California School Boards Association, the average student-teacher ratio for California is 20.9 students per teacher. The national average for teacher to total school staff ratio is 51% (i.e., about half of school staff are teachers), according to the National Center for Education Statistics. Based on this data, the average student to school staff ratio is 10.7 students per school staff.

Using this employment yield data along with the student generation data for the proposed project shown in Table 1, Table A-9 presents the estimated number of education employees expected at build out of the proposed project.

TABLE A-9
ESTIMATED EDUCATION EMPLOYMENT GENERATION

School Type	Amount	Employment Factor[1]	Number of Jobs
Elementary School	3,520 Students	1 job per 10.7 students	329
Middle School	1,760 Students	1 job per 10.7 students	164
High School	2,454 Students	1 job per 10.7 students	229
		Total	722

Notes: [1]School employment yields based on the average student to teacher ratio for California and national teacher to school staff data.
Source: California School Boards Association, 2015; National Center for Education Statistics, 2015.

Table 8 in NCHRP 365 shows that home-based work attractions can be estimated by multiplying the total employment by a factor by 1.45 (see Table A-4, for example). Similarly, the Time of Day data in NCHRP 365 for home-based work trips (see Table A-2) results in a consistent 0.21 trips per employee during the a.m. peak hour and 0.17 trips per employee during the p.m. peak hour.

This study uses this information to estimate the home-based work trips associated with schools during the a.m. and p.m. peak hour, as shown in Table A-10 below.

TABLE A-10
ESTIMATED EDUCATION HOME-BASED WORK TRIPS

School Type	Amount	Number of Jobs[1]	A.M. Peak Hour		P.M. Peak Hour	
			HBW Trip Rate[2]	*# of HBW Trips*	*HBW Trip Rate[2]*	*# of HBW Trips*
Elementary School	3,520 Students	329	0.21	69	0.17	56
Middle School	1,760 Students	164	0.21	35	0.17	28
High School	2,454 Students	229	0.21	48	0.17	39
		Total		152		123

Notes: [1]School employment yields based on the average student to teacher ratio for California and national teacher to school staff data.
[2]Home-based work trip rate for schools based on data in Table 8 and Table 41 of NCHRP 365 (Transportation Research Board, 1998).
Source: Fehr & Peers, 2015.

Using the information in Table A-10 along with the estimated ITE trip generation for schools within the proposed project (see Table 4 in the memorandum), this study is able to deduce that the remaining trip generation at schools would be home-based other or non-home-based trips. Table A-11 presents this calculation.

TABLE A-11
ESTIMATED EDUCATION HOME-BASED OTHER/NON-HOME-BASED TRIPS

School Type	Amount	A.M. Peak Hour			P.M. Peak Hour		
		Total Trip Generation[1]	*HBW[2]*	*HBO/NHB*	*Total Trip Generation[1]*	*HBW[2]*	*HBO/NHB*
Elementary School	3,520 Students	1,584	69	1,515	528	56	472
Middle School	1,760 Students	950	35	915	282	28	254
High School	2,454 Students	1,055	48	1,007	319	39	280
	Total	3,589	152	3,437	1,129	123	1,006

Notes: [1]Total A.M. and P.M. peak hour trip generation calculated using the trip rates in ITE's *Trip Generation Manual, 9th Edition*
[2]Home-based work trip data from Table A-9.
Source: Fehr & Peers, 2015.

Home-Based Other & Non-Home-Based Trip Internalization Discussion

Village Center Commercial

The Village Center Commercial uses include retail and office uses that are primarily local-serving, such as grocery stores, pharmacies, banks, small eateries, real estate offices, small medical offices, and other local serving uses. Therefore, this study assumes that 95% of the home-based other and non-home-based trips traveling to these uses will be internal trips generated by Grapevine residents and workers.

Highway/Regional Commercial

Highway/Regional Commercial uses will include larger-scale retail stores, fast-food restaurants, and gas stations that will serve both the community and regional traffic on I-5. These highway/regional commercial uses will partially draw from trips that already exist or will exist in the future on I-5 without the project. These trips, called diverted link trips, will not be new trips generated by the project, but trips that are "diverted" off the freeway to visit highway/regional commercial uses (e.g., gas stations, restaurants, etc.) as an intermediate stop in their trip.

This study estimates that 26% of the trips generated by highway/regional commercial uses will be diverted link trips based on data in ITE's *Trip Generation Handbook, 3rd Edition* (Institute of Transportation Engineers, 2012) for shopping centers (ITE Code 820). The highway/regional commercial uses are likely to include gas stations, fast-food restaurants, and other services with higher diverted link percentages than shopping centers according to the ITE *Trip Generation Handbook*. However, the exact breakdown of these specific highway commercial uses is not identified in the Specific Plan. Therefore, this study uses the lower "diverted link" percentage of shopping center to present a more conservative analysis and be consistent with the trip generation inputs identified in Table 4.

With 26% of highway/regional commercial trips expected to be "diverted link" trips, and the regional commercial uses having a broader draw with potential for attracting trips from smaller communities in the area, this study estimates that 60% of the home-based other and non-home-based trips will be internal.

Office/Research & Development

The office/research & development land uses in the project are expected to predominantly be services and research uses that have a lower proportion of home-based other and non-home-based trips when compared to commercial retail and school uses (see Table A-6). However, these offices may also include medical, financial, and other services that will be frequented by Grapevine residents and workers. Therefore, they will still generate some home-based other and non-home-based trips that will primarily serve the local community.

As a result, this study assumes that 85% of the home-based other and non-home-based trips associated with office/research & development land uses in the project are expected to be internal.

Light Industrial/Warehouse

The light industrial/warehouse land uses in the project are expected to predominantly be employment and small-scale warehouse distribution industrial uses that have the lowest proportion of home-based other and non-home-based trips (see Table A-7). While some of these trips may be generated by

Grapevine residents and workers needing to access storage units or accessing more industrial type services, such as home improvement suppliers, this study assumes that many of these trips will be external trips. These external trips may include shipping vehicles traveling to and from these industrial uses.

Therefore, this study assumes that 20% of the home-based other and non-home-based trips for industrial uses will be internal.

School Trips

Since the schools within Grapevine will predominantly serve the proposed project, this study assumes that the vast majority of school trips will remain internal at project build out. For purposes of this analysis, 95% of school trips are anticipated to be internal.

Overall Home-Based Other & Non-Home-Based Trip Internalization

Table A-12 presents the overall home-based other/non-home-based trip internalization calculation estimate based on the assumptions identified above and the data presented in Tables A-8 and A-11.

TABLE A-12
HBO/NHB TRIP INTERNALIZATION ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour			P.M. Peak Hour		
		HBO/NHB[1]	*Internal %*[2]	*Internal HBO/NHB*	*HBO/NHB*[1]	*Internal %*[2]	*Internal HBO/NHB*
Non-Residential							
Village Center Comm. - Retail[3]	450 ksf	311	95%	295	1,436	95%	1,364
Village Center Comm. - Office[3]	350 ksf	186	95%	177	303	95%	288
Highway/Regional Commercial	750 ksf	518	60%	311	2,393	60%	1,436
Office/Research & Development	2,100 ksf	1,114	85%	947	1,815	85%	1,543
Light Industrial/Warehouse[4]	1,450 ksf	114	20%	23	280	20%	56
Non-Residential Sub-Total		*2,243*	*77.0%*	*1,753*	*6,227*	*73.3%*	*4,687*

TABLE A-12
HBO/NHB TRIP INTERNALIZATION ESTIMATE – NON-RESIDENTIAL LAND USES

Land Use	Quantity	A.M. Peak Hour			P.M. Peak Hour		
		HBO/NHB[1]	*Internal %[2]*	*Internal HBO/NHB*	*HBO/NHB[1]*	*Internal %[2]*	*Internal HBO/NHB*
Schools							
Elementary Schools	3,520 students	1,515	95%	1,439	472	95%	448
Middle Schools	1,760 students	915	95%	869	254	95%	241
High Schools	2,454 students	1,007	95%	957	280	95%	266
Schools Sub-Total		*3,437*	*95.0%*	*3,265*	*1,006*	*95.0%*	*955*
Total		5,680	88.3%	5,018	7,233	78.0%	5,642

Notes: ksf = thousand square feet
[1]Home-based other and non-home-based trip estimate based on data presented in Table 8.
[2]Internalization percentage based on discussion provided in Attachment A.
[3]Village Center Commercial consists of 450,000 sq. ft. of retail (ITE Code 820) and 350,000 sq. ft. of office (ITE Code 710)
[4]Light Industrial/Warehouse assumes 50% industrial park (ITE Code 130) and 50% warehousing (ITE Code 150)
Source: *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012).

VALIDATION OF HOME-BASED OTHER & NON-HOME-BASED INTERNALIZATION

This study uses cell phone travel pattern data for southern Bakersfield to verify that the internalization projected for Grapevine home-based other and non-home-based trips are appropriate. Based on this cell phone data, approximately 93.4% of trips to and from Bakersfield remain within Bakersfield and Kern County.

Using this as a benchmark, the projected 88.3% and 78.0% internalization estimate during the a.m. and p.m. peak hours, respectively, for Grapevine home-based other and non-home-based trips seems appropriate.

Appendix O:

Grapevine Specific Plan Land Use Exchange

INTENTIONALLY LEFT BLANK

Appendix O – Grapevine Specific Plan Land Use Exchange

The overall development cap for the entire Grapevine Specific Plan is a maximum of 12,000 dwelling units and a maximum of 5,100,000 square feet of commercial and industrial floor area. However, based on the built and permitted commercial/industrial uses at the adjacent TRCC, Grapevine may ultimately support up to 2,000 additional dwelling units. The additional 2,000 units would be authorized only with a corresponding reduction of commercial/industrial square footage based on vehicle trip equivalency ratios (as shown in Table 1), and only to the extent that the additional units would not cause any significant new adverse impacts, or increase the severity of previously identified adverse impacts. At the time a land use exchange may be proposed during the tract map stage, the most current Institute of Transportation Engineers (ITE) Trip Generation Manual will be used to calculate the vehicle trip generation for each use involved in the land use exchange, as shown in Table 1.

This mechanism to provide for a future increase in the number of residential units and correlated reduction in commercial and/or industrial uses is necessary to allow flexibility to ensure a jobs-housing balance over time, and would be monitored by County staff.

Table 1
Grapevine Land Use Exchange Table

	Conversion Information[1,2]			Conversion Rate	
Grapevine Land Use Type	*ITE Code*	*Units*	*Daily Trip Rate*[2]	*SFR - Detached*	*SFR/MFR-Attached*
SFR-Detached	210	1 DU	9.52	1	1.43
SFR/MFR-Attached	220	1 DU	6.665	0.7	1
Retail	820	1,000 SF gross leasable area	42.7	225 SF = 1 DU	155 SF = 1 DU
Office/R&D	710	1,000 SF gross floor area	11.03	865 SF = 1 DU	600 SF = 1 DU
Industrial/Warehouse	150	1,000 SF gross floor area	3.56	2,675 SF = 1 DU	1,865 SF = 1 DU

Source: Trip Generation Manual, 9th Edition (ITE 2012).

1 At time of land use exchange, the most current ITE information shall be used and reflected in all calculations

2 Average trip rate for weekday (ITE 2012)

Appendix U

Dry Utilities – Technical Memorandum

Tejon Ranch Corp proposes to construct the Grapevine project, an approximately 8,010 acres area of which 4,771 acres are planned for development as a residential community and employment center, while approximately 3,197 acres are planned for agricultural use, such as grazing, and open space. The project is approximately 22 miles south of Bakersfield city limits, east and west of Interstate 5 at the Grapevine interchange. There are a number of existing dry utility systems owned and operated by Pacific Gas & Electric (electric), Southern California Edison (electric), Southern California Gas (natural gas), Pacific Pipeline (petroleum products pipelines) AT&T Communications, Verizon Communications and MCI Communications on the site. The following technical report is a broad global dry utility planning summary identifying the issues to be dealt with as part of the project development.

<u>Existing Electric Service Facilities</u>

Electricity – Pacific Gas & Electric (PG&E)

1. A 70kV transmission pole line along Interstate 5
2. Local 12kV distribution facilities are present serving existing residential and commercial development along Interstate 5.

Electricity – Southern California Edison (SCE)

1. A 66kV transmission pole line running diagonally across the project from the northwest corner near Laval Rd. down to the Grapevine interchange where it continues south along interstate 5.
2. A 220kV transmission pole line that runs north and south across the eastern tip of the project boundary.

<u>New Electric Distribution Voltage Services for Grapevine</u>

Pacific Gas & Electric (PG&E) is the electric service provider for the project. New electric distribution voltage infrastructure will be underground, engineered and designed by either PG&E or approved applicant design firms. Construction of new underground electric infrastructure is the joint responsibility of the developer and PG&E. The Developer provides conduit, equipment pads, sub-grade enclosures, protective equipment and retaining walls. PG&E is typically responsible for installation of all distribution electric cable, connections, and related electrical equipment.

<u>New Electric Transmission Voltage Services for Grapevine</u>

It is expected that during the development of Grapevine additional electric distribution capacity will be necessary. This additional distribution capacity will come from the construction of a new PG&E electric transmission circuit utilizing the existing transmission pole-line along Interstate 5. Additional capacity will also require a new distribution voltage substation within the Grapevine project boundaries.

A specific site for the new distribution substation within the Grapevine project has not yet been identified. The preferred location is within a light industrial/ warehouse planning area adjacent to PG&E transmission lines along Interstate 5. A typical PG&E substation and related switchyard will require approximately 5 acres. PG&E is required to secure California Public Utilities Commission permission (Certificate of Public Necessity and Convenience) and related environmental permits for transmission line extensions and switchyard facilities. Any new electric transmission construction of consisting of 2000 feet or more of overhead pole line construction must comply with CPUC General Order 131D. (Copy attached) Extensions of underground transmission lines do not need to go through the identified GO 131D process.

Estimated Project Electric Demand

In order to determine a typical electric profile for the types of uses that are expected within the project area, we confirmed typical residential and commercial load assumptions provided by PG&E and applied those to the current land use program summary.

The Grapevine project is proposed to support 12,000 residential units and 10,748,400 sf of commercial use. The peak electrical demand for the project would be approximately 200 MW. The breakdown is as follows:

Planning Area	Land Use	Units	Non-Res SF	Residential kW Demand/unit	Commercial Volt-Amps/Sq. Ft.	kVA	Assumptions
1	Residential	1110		5.5		6783.3	2400 Sq/Ft Home
	Village Center Residential	230		4.5		1150.0	2000 Sq/Ft Home
	Village Center Commercial		50,000		12.3	615.0	Typical Office Buildings
	Office / R&D		770,000		14.5	11165.0	Typical Office Buildings
	Lt. Industrial / Warehouse		520,000		24.3/9.6	9402.0	College Campus @ 300,000 Sq/Ft and Non-Refrigerated with A/C Warehouse@ 220,000 Sq/Ft
2	Residential	1850		5.5		11305.6	2400 Sq/Ft Home
	Village Center Residential	980		4.5		4900.0	2000 Sq/Ft Home
	Village Center Commercial		200,000		14.5	2900.0	Typical Office Buildings
	Freeway Oriented Commercial		170,000		9.6	1632.0	Non-Refrigerated with A/C Warehouse
	Office / R&D		600,000		14.5	8700.0	Medical Center
	Lt. Industrial / Warehouse		1,220,000		24.3/9.6	21618.0	College Campus @ 690,000 Sq/Ft Non-Refrigerated with A/C Warehouse@ 230,000 Sq/Ft
3	Residential	1180		5.5		7211.1	2400 Sq/Ft Home
	Village Center Residential	730		4.5		3650.0	2000 Sq/Ft Home
	Village Center Commercial		130,000		12.3	1599.0	Typical Retail
	Freeway Oriented Commercial		830,000		9.6	7968.0	Non-Refrigerated with A/C Warehouse
	Office / R&D		790,000		14.5	11455.0	Typical Office Buildings
	Lt. Industrial / Warehouse		760,000		9.6	7296.0	Non-Refrigerated with A/C Warehouse
4	Residential	1900		5.5		11611.1	2400 Sq/Ft Home
	Village Center Residential	570		4.5		2850.0	2000 Sq/Ft Home
	Village Center Commercial		100,000		14.5	1450.0	Typical Office Buildings

Planning Area	Land Use	Units	Non-Res SF	Residential kW Demand/unit	Commercial Volt-Amps/Sq. Ft	kVA	Assumptions
5a	Residential	1750		5.5		10694.4	2400 Sq/Ft Home
	Village Center Residential	330		4.5		1650.0	2000 Sq/Ft Home
	Village Center Commercial		40,000		12.3	492.0	Typical Retail
5b	Residential	35		5.5		213.9	Used kW for 2400 Sq/Ft Home
6a	Residential	585		5.5		3575.0	2400 Sq/Ft Home
	Village Center Residential	750		4.5		3750.0	2000 Sq/Ft Home
	Village Center Commercial		130,000		12.3	1599.0	Typical Retail
	Office / R&D		270,000		14.5	3915.0	Typical Office Buildings
	Lt. Industrial / Warehouse		3,160,000		9.6	30336.0	Non-Refrigerated with A/C Warehouse
6b	Lt. Industrial / Warehouse		708,400		9.6	6800.6	Non-Refrigerated with A/C Warehouse
6c	Lt. Industrial / Warehouse		100,000		9.6	960.0	Non-Refrigerated with A/C Warehouse
6d	Lt. Industrial / Warehouse		100,000		9.6	960.0	Non-Refrigerated with A/C Warehouse
6e	Lt. Industrial / Warehouse		100,000		9.6	960.0	Non-Refrigerated with A/C Warehouse
Total		**12,000**	**10,748,400**			**201,167.1**	

Electric Service Capacity

Utility companies use diversification factors to help them determine what portion of the total connected load in a particular circumstance will be switched on at the peak load moment to their system. These diversified peak demands are what they use for their long range system planning requirements. In this specific case it is anticipated that PG&E will need to plan infrastructure, including a new substation, new transmission lines, and new distribution lines to serve a 90 MW demand load. . Siting new transmission corridors and substations generally involve consideration of the following items: environmental constraints, zoning, access to street infrastructure, land values and availability, sensitive land uses such as schools, and other related issues. PG&E has expressed a desire to locate the new substation along the highway near their existing right-of-way, but such a location will have to be weighed against all other factors. This will be a negotiation between the Developer and PG&E to determine the most viable location from a development planning and operational perspective.

Initial discussions with PG&E indicate that the existing transmission lines along the east side of Hwy 99 are old and capacity is limited in this area. This would require repairs of existing circuits and/or new circuits. Any new circuitry would utilize the existing pole line.

Natural Gas – Southern California Gas Company (SCG)

There are existing natural gas transmission mains that traverse the project. These are extremely large pipelines designed to serve very large service areas and loads and SCG has stated that they have sufficient capacity in these lines to serve the project. The utility will not typically provide more specific data on the specific locations and capacities of these lines due to Homeland Security constraints. General locations can be determined by title searches for SCG easements. Two identified and potential tie-in locations are where Grapevine Rd. and Laval Rd intersect their facilities/easements.

Large capacity natural gas transmission mains, are covered by stringent State of California, California Public Utilities Commission (CPUC) and operating company safety standards. In addition, a substantial portion of these systems crossing the project are covered by recorded easements that may add more restrictions to proposed development within the control area specified in the document. Because of the size and character of these natural gas transmission lines, construction of project improvements above, below and adjacent to these lines will be limited by stated conditions in the easement documents, strict operating and safety constraints mandated by governmental agencies having jurisdiction, and established industry standards.

New Natural Gas Distribution Systems

Natural gas distribution systems will need to be installed to accommodate gas usage within the project. This will require regulating stations that reduce the pressure for residential/ commercial distribution. Stations located at the main junction with the existing transmission mains could require an area of up to 150' X 150'. Smaller pressure regulating facilities can normally be installed within existing street rights-of-way or small adjacent easements of approximately 15' X 30-50'. Placement of the regulating stations will be negotiated between the Developer and SCG during the planning process.

In order to determine a gas load profile for the types of uses that are expected within the project area, we used typical residential and commercial load assumptions developed by SCG from historical data that they have accumulated for their long range planning processes. We then applied those factors to the current land use program summary in the following chart. The anticipated gas load generated by the proposed project would be approximately 4,345,000 Cubic Feet per Hour (CFH). The breakdown is as follows:

Planning Area	Land Use	Units	Non-Res SF	CFH Demand	Total CFH	Assumptions
1	Residential	1110		350	388500.0	2400 Sq/Ft Home
	Village Center Residential	230		325	74750.0	2000 Sq/Ft Home
	Village Center Commercial		50,000	0.05	2500.0	Typical Office Buildings
	Office / R&D		770,000	0.02	15400.0	Typical Office Buildings
	Lt. Industrial / Warehouse		520,000	0.01	5200.0	College Campus @ 300,000 Sq/Ft and Non-Refrigerated with A/C Warehouse@ 220,000 Sq/Ft
2	Residential	1850		350	647500.0	2400 Sq/Ft Home
	Village Center Residential	980		325	318500.0	2000 Sq/Ft Home
	Village Center Commercial		200,000	0.05	10000.0	Used factor for Office Buildings
	Freeway Oriented Commercial		170,000	0.06	10200.0	Non-Refrigerated with A/C Warehouse
	Office / R&D		600,000	0.02	12000.0	Medical Center
	Lt. Industrial / Warehouse		1,220,000	0.01	12200.0	College Campus @ 690,000 Sq/Ft Non-Refrigerated with A/C Warehouse@ 230,000 Sq/Ft

Planning Area	Land Use	Units	Non-Res SF	CFH Demand	Total CFH	Assumptions
3	Residential	1180		350	413000.0	2400 Sq/Ft Home
	Village Center Residential	730		325	237250.0	2000 Sq/Ft Home
	Village Center Commercial		130,000	0.05	6500.0	Typical Retail
	Freeway Oriented Commercial		830,000	0.06	49800.0	Non-Refrigerated with A/C Warehouse
	Office / R&D		790,000	0.02	15800.0	Typical Office Buildings
	Lt. Industrial / Warehouse		760,000	0.01	7600.0	Non-Refrigerated with A/C Warehouse
4	Residential	1900		350	665000.0	2400 Sq/Ft Home
	Village Center Residential	570		325	185250.0	2000 Sq/Ft Home
	Village Center Commercial		100,000	0.05	5000.0	Typical Office Buildings
5a	Residential	1750		350	612500.0	2400 Sq/Ft Home
	Village Center Residential	330		325	107250.0	2000 Sq/Ft Home
	Village Center Commercial		40,000	0.05	2000.0	Typical Retail
5b	Residential	35		350	12250.0	2400 Sq/Ft Home
6a	Residential	585		350	204750.0	2400 Sq/Ft Home
	Village Center Residential	750		325	270833.3	2000 Sq/Ft Home
	Village Center Commercial		130,000	0.05	6500.0	Typical Retail
	Office / R&D		270,000	0.02	5400.0	Typical Office Buildings
	Lt. Industrial / Warehouse		3,160,000	0.01	31600.0	Non-Refrigerated with A/C Warehouse
6b	Lt. Industrial / Warehouse		708,400	0.01	7084.0	Non-Refrigerated with A/C Warehouse
6c	Lt. Industrial / Warehouse		100,000	0.01	1000.0	Non-Refrigerated with A/C Warehouse
6d	Lt. Industrial / Warehouse		100,000	0.01	1000.0	Non-Refrigerated with A/C Warehouse
6e	Lt. Industrial / Warehouse		100,000	0.01	1000.0	Non-Refrigerated with A/C Warehouse
Total		**12,000**	**10,748,400**		**4,345,117.3**	

Voice, Video, and Data

Within the project boundary there are three major high volume communications facilities that have been identified by their owners as potential sources of future services:

1. A Verizon fiber optic line paralleling and adjacent to Interstate 5 as it traverses the project area
2. An AT&T fiber optic line paralleling and adjacent to Interstate 5 through the project area
3. An MCI fiber optic line through the project approximately 2 miles east of Interstate 5

It is expected that the scope of the proposed project will require the upgrade of, at least, the AT&T facility which would occur on or in the existing infrastructure. Any conflicts between proposed improvements and the existing facility locations could require relocations. Such relocations would normally be directed to proposed new road infrastructure and would be coordinated with each affected utility company.

AT&T is the Incumbent Local Exchange Carrier (ILEC) and is obligated by tariff to serve the project. All new facilities and additional infrastructure to serve the proposed new development would be installed underground in compliance with fiat of the governmental agency having jurisdiction over the planning and mapping requirements.

There are currently no cable TV franchise providers in this area. Initial meetings with Brighthouse Cable indicate that they would need to extend systems from Lamont in order to serve the project. Before committing to serving the project, Brighthouse will review development plans and determine if it is financially feasible for them to serve the project. Should they agree to provide service to the area, it would be anticipated that a fiber optic extension would need to be completed from Lamont to the project area. This type of extension would normally be attached to existing pole lines or installed in a new trench and conduit system along existing roadways or easements where practicable.

All new line extensions would be extended on either existing pole lines or underground positions within new streets.

Joint Dry Utilities Distribution System Trenches

Configurations of joint dry utility trenches (gas, electric, utility communications systems) are subject to standards developed by each individual utility company. Accordingly, SCG (gas) may not allow installation of gas distribution systems in the same trench with electric and communications dry utilities. The numbers of conduits required by electric, telephone and cable TV companies may not be practical for joint installations in a single trench in some locations.

Petroleum products transmission pipe lines are not permitted by State of California safety orders to be installed in multiple use dry utility trenches. They can parallel other wet and dry utility installations within street rights-of-way or easements as long as prescribed separation and clearances are maintained.

EXHIBITS

GO 131 D

GENERAL ORDER NO. 131-D
(Supersedes General Order No. 131-C)

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

RULES RELATING TO THE PLANNING AND CONSTRUCTION OF ELECTRIC GENERATION, TRANSMISSION/POWER/DISTRIBUTION LINE FACILITIES AND SUBSTATIONS LOCATED IN CALIFORNIA.

Adopted June 8, 1994. Effective July 8, 1994
Decision 94-06-014
Modified August 11, 1995. Effective September 10, 1995.
Decision 95-08-038

SECTION I. GENERAL

Pursuant to the provisions of Sections 451, 701, 702, 761, 762, 768, 770, and 1001 of the Public Utilities Code:

IT IS HEREBY ORDERED that except as specifically provided herein, no electric public utility, now subject, or which hereafter may become subject, to the jurisdiction of this Commission, shall begin construction in this state of any new electric generating plant, or of the modification, alteration, or addition to an existing electric generating plant, or of electric transmission/power/distribution line facilities, or of new, upgraded or modified substations without first complying with the provisions of this General Order.

For purposes of this General Order, a transmission line is a line designed to operate at or above 200 kilovolts (kV). A power line is a line designed to operate between 50 and 200 kV. A distribution line is a line designed to operate under 50 kV.

SECTION II. PURPOSE OF THIS GENERAL ORDER

The Commission has adopted these revisions to this General Order to be responsive to:

- the requirements of the California Environmental Quality Act (CEQA) (Public Resources (Pub. Res.) Code § 21000 et seq.);
- the need for public notice and the opportunity for affected parties to be heard by the Commission
- the obligations of the utilities to serve their customers in a timely and efficient manner; and
- the need to replace the present complaint treatment of under-200-kV projects with a new streamlined review mechanism.

SECTION III. NEED FOR COMMISSION AUTHORIZATION

For purposes of this General Order, construction does not include any installation of environmental monitoring equipment, or any soil or geological investigation, or work to determine feasibility of the use of the particular site for the proposed facilities, which do not result in a serious or major disturbance to an environmental resource.

A. Certificate of Public Convenience and Necessity (CPCN)

No electric public utility shall begin construction in this state of any new electric generating plant having in aggregate a net capacity available at the busbar in excess of 50 megawatts (MW), or of the modification, alteration, or addition to an existing electric generating plant that results in a 50 MW or more net increase in the electric generating capacity available at the busbar of the existing plant, or of major electric transmission line facilities which are designed for immediate or eventual operation at 200 kV or more (except for the replacement of existing power line facilities or supporting structures with equivalent facilities or structures, the minor relocation of existing power line facilities, the conversion of existing overhead lines to underground, or the placing of new or additional conductors, insulators, or their accessories on or replacement of supporting structures already built) without this Commission's having first found that said facilities are necessary to promote the safety, health, comfort, and convenience of the public, and that they are required by the public convenience and necessity.

B. Permit to Construct

No electric public utility shall begin construction in this state of any electric power line facilities or substations which are designed for immediate or eventual operation at any voltage between 50 kV or 200 kV or new or upgraded substations with high side voltage exceeding 50 kV without this Commission's having first authorized the construction of said facilities by issuance of a permit to construct in accordance with the provisions of Sections IX.B, X, and XI.B of this General Order. An upgraded substation is one in which there is an increase in substation land area beyond the existing utility-owned property or an increase in the voltage rating of the substation above 50 kV. Activities which increase the voltage of a substation to the voltage for which the substation has been previously rated are deemed to be substation modification projects and not substation upgrade projects.

1. Compliance with Section IX.B is not required for:
   a. power line facilities or substations with an in-service date occurring before January 1, 1996, which have been reported to the Commission in accordance with the Commission's decision adopting GO 131-D.
   b. the replacement of existing power line facilities or supporting structures with equivalent facilities or structures.
   c. the minor relocation of existing power line facilities up to 2,000 feet in length, or the intersetting of additional support structures between existing support structures.
   d. the conversion of existing overhead lines to underground.
   e. the placing of new or additional conductors, insulators, or their accessories on supporting structures already built.
   f. power lines or substations to be relocated or constructed which have undergone environmental review pursuant to CEQA as part of a larger project, and for which the final CEQA document (Environmental Impact Report (EIR) or Negative Declaration) finds no significant unavoidable environmental impacts caused by the proposed line or substation.

g. power line facilities or substations to be located in an existing franchise, road-widening setback easement, or public utility easement; or in a utility corridor designated, precisely mapped and officially adopted pursuant to law by federal, state, or local agencies for which a final Negative Declaration or EIR finds no significant unavoidable environmental impacts.
h. the construction of projects that are statutorily or categorically exempt pursuant to § 15260 et seq. of the Guidelines adopted to implement the CEQA, 14 Code of California Regulations § 15000 et seq. (CEQA Guidelines).

However, notice of the proposed construction of such facilities must be made in compliance with Section XI.B herein, except that such notice is not required for the construction of projects that are statutorily or categorically exempt pursuant to CEQA Guidelines. If a protest of the construction of facilities claimed by the utility to be exempt from compliance with Section IX.B is timely filed pursuant to Section XIII, construction may not commence until the Executive Director or Commission has issued a final determination.

2. The foregoing exemptions shall not apply when any of the conditions specified in CEQA Guidelines § 15300.2 exist:
   a. there is reasonable possibility that the activity may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped and officially adopted pursuant to law by federal, state, or local agencies; or
   b. the cumulative impact of successive projects of the same type in the same place, over time, is significant; or
   c. there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.

C. Electric Distribution Lines and Other Substations

The construction of electric distribution (under 50 kV) line facilities, or substations with a high side voltage under 50 kV, or substation modification projects which increase the voltage of an existing substation to the voltage for which the substation has been previously rated within the existing substation boundaries, does not require the issuance of a CPCN or permit by this Commission nor discretionary permits or approvals by local governments. However, to ensure safety and compliance with local building standards, the utility must first communicate with, and obtain the input of, local authorities regarding land use matters and obtain any non-discretionary local permits required for the construction and operation of these projects.

SECTION IV. UTILITY REPORT OF LOADS AND RESOURCES

Every electric public utility required to submit a report of loads and resources to the California Energy Commission (CEC) in accordance with Section 25300 et seq. of the Public Resources Code shall also furnish six copies of its report to the Public Utilities Commission.

SECTION V. UTILITY REPORT OF PLANNED TRANSMISSION/ POWER LINE, AND SUBSTATION FACILITIES

Every electric public utility shall annually, on or before March 1, furnish to the Commission Advisory and Compliance Division (CACD) for its review three (3) copies[1] of a fifteen-year 15 forecast of planned transmission facilities of 200 kV or greater and a five-year (5) forecast of planned power line facilities and substations of between 50 kV and 200 kV.

A. The report shall include:

1. A list of transmission, power lines, and substations, arranged in chronological order by the planned service date, for which a CPCN or a permit to construct has been received, but which have not yet been placed in service.
2. A list of planned transmission, power lines, and substations of 50 kV or greater or planning corridors, arranged in chronological order by the planned service date, on which proposed route or corridor reviews are being undertaken with governmental agencies or for which applications have already been filed.
3. A list of planned transmission, power lines, and substations of 50 kV or greater or planning corridors, arranged in chronological order by the planned service date, on which planning corridor or route reviews have not started, which will be needed during the forecast periods.

B. For each transmission or power line route, substation, or planning corridor included in the above lists, the following information, if available, shall be included in the report:

1. Planned operating date.
2. Transmission or power line name.
3. The terminal points (substation name and location).
4. Number of circuits.
5. Voltage — kV.
6. Normal and emergency continuous operating ratings — MVA.
7. Length in feet or miles.
8. Estimated cost in dollars as of the year the report is filed.
9. Cities and counties involved.
10. Other comments.

SECTION VI. UTILITY REPORT OF INFORMATION REGARDING FINANCING OF NEW ELECTRIC GENERATING AND TRANSMISSION CAPACITY

Every electric public utility shall biennially, on or before June 1 of every odd numbered year, furnish a report to the Commission of the financial information designated in Appendix A hereto; provided however, that no public utility shall be required to submit such financial information if such utility does not plan for a fifteen-year (15) period commencing with the year in which the financial information is to be filed to (1) construct within the State of California any new electric

[1]One copy to be stored in the CACD Annual Reports Section.

generating plant having in the aggregate a net capacity in excess of 50 MW, or (2) modify, alter, or add to any existing electric generating plant that results in a 50 MW, or more, net increase in the electric generating capacity of an existing plant within the State of California, or (3) construct in California any electric transmission line facilities which are designed for immediate or eventual operation at any voltage in excess of 200 kV (except for the replacement or minor relocation of existing transmission line facilities, or the placing of additional conductors, insulators or their accessories on, or replacement of, supporting structures already built).

SECTION VII. ELECTRIC GENERATING AND RELATED TRANSMISSION FACILITIES SUBJECT TO THE WARREN-ALQUIST ENERGY RESOURCES CONSERVATION AND DEVELOPMENT ACT

If an electric public utility proposes to construct electric generating and related transmission facilities which are subject to the power plant siting jurisdiction of the CEC as set forth in Section 25500 et seq. of the Public Resources Code, it shall comply with the following procedure:

A. In accordance with Public Resources Code Section 25519(c) and Public Utilities Code Section 1001, the CEQA, and this Commission's Rules of Procedure No. 17.1 do not apply to any application filed pursuant to this section.

B. Upon acceptance of an electric utility's Notice of Intent (NOI) filing by the CEC, the utility shall mail six copies of the NOI to the Executive Director of this Commission.

C. When an electric utility files with the CEC an application for a certificate to construct (AFC) an electric generating facility pursuant to Section 25519 of the Public Resources Code and any AFC regulations of the CEC, it shall mail six copies of the AFC, including six copies of the CEC's Final Report in the NOI proceeding for the facility, to the Executive Director of this Commission.

D. No later than 30 days after acceptance for filing of the AFC referred to above in Subsection C, the utility shall file with this Commission an application for a CPCN. The application shall comply with this Commission's Rules of Practice and Procedure, specifically Rules 2 through 8, 15, and 16, and shall include the data and information set forth in Appendix B hereto. In complying with this provision, the utility may include portions of the CEC's Final Report in its NOI proceeding by attaching such portions as an appendix to its application filed with this Commission. The utility may also include portions of the AFC filed with the CEC by reference. A copy of the application shall be mailed to the CEC and to every person, corporation, organization, or public agency that has intervened in the CEC's AFC proceeding.

E. No later than 30 days after the filing of the application, the Commission staff shall review it and notify the utility in writing of any deficiencies in the information and data submitted in the application. The utility shall correct any deficiencies within 60 days thereafter, or explain in writing to the Commission staff why it is unable to do so. It shall include in any such letter an estimate of when it will be able to correct the deficiencies. Upon correction of any deficiencies in the application, any public hearings which are necessary may be held on the application while the utility's AFC application is under process before the CEC. The Commission may issue an interim decision on the application before the issuance by the CEC of a final decision in the AFC proceeding. However, any such interim decision shall not be final and shall be subject to review after the CEC issues its final decision in the AFC proceeding as prescribed in Public Resources Code Sections 25522 and 25530.

F. No later than 30 days after issuance of a certificate by the CEC in a final decision in the utility's AFC proceeding in accordance with Public Resources Code Sections 25209, 25522, and 25530 the Commission shall issue a decision on the application for a CPCN from this Commission, unless a later date for issuance of the decision is mutually agreed to by the Commission and the applicant, or is necessitated by conditions under Paragraph G.

G. In the event that the CEC's certificate in the AFC proceedings sets forth requirements or conditions for the construction of the proposed electric generating facility which were not adequately considered in the proceeding before the Commission, and which will have a significant impact on the economic and financial feasibility of the project, or the rates of the utility, or on utility system reliability, the utility, or Commission staff, or any party, may request that the Commission hold a public hearing on such implications. Any such hearing, if granted, shall be initiated no later than 30 days after the filing of any such request. It is the intent of this Commission that a final decision shall be issued within 90 days after conclusion of the hearing, if held.

H. In the event that judicial review of the CEC's issuance of a certificate in the AFC proceeding is sought in any court, the utility shall immediately notify this Commission and include a copy of the court filing.

SECTION VIII. ELECTRIC GENERATING FACILITIES NOT SUBJECT TO THE WARREN-ALQUIST ENERGY RESOURCES CONSERVATION AND DEVELOPMENT ACT

An electric public utility proposing to construct in this state new generation facilities in excess of 50 MW net capacity, available at the busbar or proposing to modify an existing generation facility in this state in order to increase the total generating capacity of the facility by 50 MW or more net capacity available at the busbar, shall file for a CPCN not less than 12 months prior to the date of a required decision by the Commission unless the Commission authorizes a shorter period for exceptional circumstances.

A. An application for a CPCN shall comply with this Commission's Rules of Practice and Procedure, specifically Rules 2 through 8, 15, and 16. In addition, it shall include or have attached to it the following:

1. The information and data set forth in Appendix B.
2. A statement of the reasons why and facts showing that the completion and operation of the proposed facility is necessary to promote the safety, health, comfort, and convenience of the public.
3. Safety and reliability information, including planned provisions for emergency operations and shutdowns.
4. A schedule showing the program for design, material acquisition, construction, and testing and operating dates.

5. Available site information, including maps and description, present, proposed, and ultimate development; and, as appropriate, geological, aesthetic, ecological, tsunami, seismic, water supply, population, and load center data, locations and comparative availability of alternate sites, and justification for adoption of the site selected.
6. Design information, including description of facilities, plan efficiencies, electrical connections to system, and description of control systems, including air quality control systems.
7. A Proponent's Environment Assessment (PEA) on the environmental impact of the proposed facility and its operation so as to permit compliance with the requirements of CEQA and this Commission's Rule of Practice and Procedure 17.1 and 17.3. If a PEA is filed, it may include the data described in Items 1 through 6, above.

B. No later than 30 days after the filing of the application, the Commission staff shall review it and notify the utility of any deficiencies in the information and data submitted in the application. The utility shall correct any deficiencies within 60 days thereafter or explain in writing to the Commission staff why it is unable to do so. It shall include in any such letter an estimate of when it will be able to correct the deficiencies. Upon correction of any deficiencies in the application, the commission staff shall determine whether CEQA applies, and if so, whether a Negative Declaration or an EIR has been or will be prepared, and the process required by CEQA and Commission Rule 17.1 will be followed in addition to the Commission's standard decision-making process for applications. The Commission shall issue a decision within the time limits prescribed by Government Code Section 65920 et seq. (the Permit Streamlining Act).

SECTION IX. TRANSMISSION LINE, POWER LINE, AND SUBSTATION FACILITIES

A. Transmission Line Facilities of 200 kV and Over

An electric public utility desiring to build transmission line facilities in this state for immediate or eventual operation in excess of 200 kV shall file for a CPCN not less than 12 months prior to the date of a required decision by the Commission unless the Commission authorizes a shorter period because of exceptional circumstances

1. An application for a CPCN shall comply with this Commission's Rules of Practice and Procedure 2 through 8, 15, and 16 and shall also include the following:

   a. A detailed description of the proposed transmission facilities, including the proposed transmission line route and alternative routes, if any; proposed transmission equipment; such as tower design and appearance, heights, conductor sizes, voltages, capacities, substations, switchyards, etc.; and a proposed schedule for certification, construction, and commencement of operation of the facilities.

b. A map of suitable scale of the proposed routing showing details of the right-of-way in the vicinity of settled areas, parks, recreational areas, scenic areas, and existing electrical transmission lines within one mile of the proposed route.
c. A statement of facts and reasons why the public convenience and necessity require the construction and operation of the proposed transmission facilities.
d. A detailed statement of the estimated cost of the proposed facilities.
e. Reasons for adoption of the route selected, including comparison with alternative routes, including the advantages and disadvantages of each.
f. A schedule showing the program of right-of-way acquisition and construction.
g. A listing of the governmental agencies with which proposed route reviews have been undertaken, including a written agency response to applicant's written request for a brief position statement by that agency. (Such listing shall include The Native American Heritage Commission, which shall constitute notice on California Indian Reservation Tribal governments.) In the absence of a written agency position statement, the utility may submit a statement of its understanding of the position of such agencies.
h. A PEA or equivalent information on the environmental impact of the project in accordance with the provisions of CEQA and this Commission's Rule of Practice and Procedure, Rules 17.1 and 17.3. If a PEA is filed, it may include the data described in Items a through g above.

2. No later than 30 days after the filing of the application the Commission staff shall review it and notify the utility in writing of any deficiencies in the information and data submitted in the application. The utility shall correct any deficiencies within 60 days thereafter, or explain in writing to the Commission staff why it is unable to do so. It shall include in any such letter an estimate of when it will be able to correct the deficiencies. Upon correction of any deficiencies in the application, the Commission staff shall determine whether CEQA applies, and if so, whether a Negative Declaration or an EIR has been or will be prepared, and the process required by CEQA and Commission Rules of Practice and Procedure 17.1 will be followed in addition to the Commission's standard decision-making process for applications. The Commission shall issue a decision within the time limits prescribed by Government Code Sections 65920 et seq. (the Permit Streamlining Act).

B. Power Line Facilities Between 50 kV and 200 kV and Substations Designed to Operate Over 50 kV Which Are Not Included in Subsection A of this Section.

Unless exempt as specified in Section III herein, or already included in an application before this Commission for a CPCN, an electric public utility desiring to build power line or substation facilities in this state for immediate or eventual operation between 50 kV and 200 kV or substations for immediate or eventual operation over 50 kV, shall file for a permit to construct not less than nine (9) months prior to the date of a required decision by the Commission unless the Commission authorizes a shorter period because of exceptional circumstances. An application for a permit to construct shall comply with the Commission's Rules of Practice and Procedure No. 2 through 8 and 15 through 17.

1. The application for a permit to construct shall also include the following:

   a. A description of the proposed power line or substation facilities, including the proposed power line route; proposed power line equipment, such as tower design and appearance, heights, conductor sizes, voltages, capacities, substations, switchyards, etc., and a proposed schedule for authorization, construction, and commencement of operation of the facilities.
   b. A map of the proposed power line routing or substation location showing populated areas, parks, recreational areas, scenic areas, and existing electrical transmission or power lines within 300 feet of the proposed route or substation.
   c. Reasons for adoption of the power line route or substation location selected, including comparison with alternative routes or locations, including the advantages and disadvantages of each.
   d. A listing of the governmental agencies with which proposed power line route or substation location reviews have been undertaken, including a written agency response to applicant's written request for a brief position statement by that agency. (Such listing shall include The Native American Heritage Commission, which shall constitute notice on California Indian Reservation Tribal governments.) In the absence of a written agency position statement, the utility may submit a statement of its understanding of the position of such agencies.
   e. A PEA or equivalent information on the environmental impact of the project in accordance with the provisions of CEQA and this Commission's Rules of Practice and Procedure 17.1 and 17.3. If a PEA is filed, it may include the data described in Items a through d above.
   f. The above information requirements notwithstanding, an application for a permit to construct need not include either a detailed analysis of purpose and necessity, a detailed estimate of cost and economic analysis, a detailed schedule, or a detailed description of construction methods beyond that required for CEQA compliance.

2. No later than 30 days after the filing of the application for a permit to construct, the CACD shall review it and notify the utility in writing of any deficiencies in the information and data submitted in the application. Thereafter, within 30 days, the utility shall correct any deficiencies or explain in writing to the CACD when it will be able to correct the deficiencies or why it is unable to do so. Upon correction of any deficiencies in the application, the CACD shall determine whether CEQA applies, and if so, whether a Negative Declaration or an EIR must be prepared, and the process required by CEQA and the Commission's Rules of Practice and Procedure 17.1 will be followed.

3. If the Commission finds that a project properly qualifies for an exemption from CEQA, the Commission will grant the permit to construct.
4. If the CACD determines, after completing its initial study, that the project would not have a significant adverse impact on the environment, the CACD will prepare a Negative Declaration. If the initial study identifies potential significant effects, but the utility revises its proposal to avoid those effects, then the Commission could adopt a Mitigated Negative Declaration. In either case, the Commission will grant the permit to construct.
5. If the initial study identifies potentially significant environmental effects, the CACD will prepare an EIR. The severity and nature of the effects, the feasibility of mitigation, the existence and feasibility of alternatives to the project, and the benefits of the project would all be considered by the Commission in deciding whether to grant or deny the permit to construct. The Commission intends to issue a permit to construct or disapprove the project within eight months of accepting the application as complete. This time limit may be extended if necessary to comply with the requirements of CEQA, but may not exceed the time limits specified in CEQA (for the preparation of an EIR).
6. If no protests or requests for hearing are received (pursuant to Section XII), a CACD Examiner shall be assigned and the Commission shall issue an ex parte decision on the application within the time limits prescribed by Government Code Section 65920 et seq. (the Permit Streamlining Act). If a protest or request for hearing is received, the matter shall be assigned to an administrative law judge, and the Commission shall issue a decision on the application within the time limits prescribed by the Permit Streamlining Act.

SECTION X. POTENTIAL EXPOSURE TO ELECTRIC AND MAGNETIC FIELDS (EMF)

A. Application for CPCN or Permit to Construct

Applications for a CPCN or Permit to Construct shall describe the measures taken or proposed by the utility to reduce the potential exposure to electric and magnetic fields generated by the proposed facilities, in compliance with Commission order. This information may be included in the PEA required by Rules of Practice and Procedure 17.1.

B. EMF Technical Assistance

The EMF education program administered by the California Department of Health Services for regulated electric utility facilities, established in Investigation (I.) 91-01-012, is available to provide independent information about EMF to local government, other state agencies, and the public to assist in their consideration of the potential impacts of facilities proposed by electric utilities hereunder. Local government and the public should first contact their public health department.

SECTION XI. NOTICE

A. Applications for a CPCN or Permit to Construct

Notice of the filing of each application for a CPCN for facilities subject to the provisions of Sections VII, VIII, and IX.A of this General Order and of the filing of each application for a permit to construct for facilities subject to Section IX.B of this General Order, shall be given by the electric public utility within ten days of filing the application:

1. By direct mail to:

   a. The planning commission and the legislative body for each county or city in which the proposed facility would be located, the CEC, the State Department of Transportation and its Division of Aeronautics, the Secretary of the Resources Agency, the Department of Fish and Game, the Department of Health Services, the State Water Resources Control Board, the Air Resources Board, and other interested parties having requested such notification. The utility shall also give notice to the following agencies and subdivisions in whose jurisdiction the proposed facility would be located: the Air Pollution Control District, the California Regional Water Quality Control Board, the State Department of Transportation's District Office, and any other State or Federal agency which would have jurisdiction over the proposed construction; and
   b. All owners of land on which the proposed facility would be located and owners of property within 300 feet of the right-of-way as determined by the most recent local assessor's parcel roll available to the utility at the time notice is sent; and

2. By advertisement, not less than once a week, two weeks successively, in a newspaper or newspapers of general circulation in the county or counties in which the proposed facilities will be located, the first publication to be not later than ten days after filing of the application; and

3. By posting a notice on-site and off-site where the project would be located.

A copy of the notice shall be delivered to the CPUC Public Advisor and the CACD on the same day it is mailed. A declaration of mailing and posting as required by this subsection shall be filed with the Commission within five (5) days of completion.

Three copies of each application for electric generation facilities shall be served on the Executive Director of the Energy Commission. If applicable, three copies shall be served on the Executive Director of the Coastal Commission. If applicable, three copies shall be served on the Executive Director of the S.F. Bay Conservation and Development Commission. Upon request by any public agency, the applicant shall provide at least one copy of its application to said public agency. A copy of the application shall be kept available for public inspection at the utility's office(s) in the county or counties in which the proposed facility would be located.

B. Power Line Facilities Between 50 kV and 200 kV and Substations Designed to Operate Over 50 kV Which Are Not Included in Subsection A of this Section

The utility shall give notice of the construction of any power line facilities or substations between 50 kV and 200 kV deemed exempt pursuant to Section III herein, not less than 30 days before the date when construction is intended to begin by:

1. Direct mail to the planning director for each county or city in which the proposed facility would be located and the Executive Director of the Energy Commission; and
2. Advertisement, not less than once a week, two weeks successively, in a newspaper or newspapers of general circulation in the county or counties in which the proposed facility would be located, the first publication to be not later than 45 days before the date when construction is intended to begin; and
3. By posting a notice on-site and off-site where the project would be located.
4. Filing an informational advice letter with the CACD in accordance with General Order 96-A, which includes a copy and distribution list of the notices required by items 1-3 herein. On the same day, a copy of the advice letter must be delivered to the CPUC Public Advisor.

C. Contents of Notices

Each utility shall consult with the CACD and CPUC Public Advisor to develop and approve a standard for the notice required by subsections A and B, which shall contain, at a minimum, the following information:

1. The Application Number assigned by the CPUC or the Advice Letter Number assigned by the utility; and
2. A concise description of the proposed construction and facilities, its purpose and its location in terms clearly understandable to the average reader; and
3. A summary of the measures taken or proposed by the utility to reduce the potential exposure to electric and magnetic fields generated by the proposed facilities, in compliance with Commission order; and
4. Instructions on obtaining or reviewing a copy of the application, including the Proponent's Environmental Assessment or available equivalent, from the utility; and
5. The applicable procedure for protesting the application or advice letter, as defined in Sections XII and XIII, including the grounds for protest, when the protest period expires, delivery addresses for the CPUC Docket Office, CACD, and the applicant and how to contact the CPUC Public Advisor for assistance in filing a protest.

SECTION XII. PROTEST AND REQUEST FOR PUBLIC HEARINGS

Pursuant to the Commission Rules of Practice and Procedure, Article 2.5, those to whom notice has been sent under Section XI.A hereof and any other person entitled under the Commission's Rules of Procedure to participate in a proceeding for a CPCN or a permit to construct may, within 30 days after the notice was mailed or published, object to the granting in whole or in part of the authority sought by the utility and request that the Commission hold hearings on the application. Any such protest shall be filed in accordance with Article 2.5. If the Commission, as a result of its preliminary investigation after such requests, determines that public hearings should be held, notice shall be sent to each person who is entitled to notice or who has requested a hearing.

The Commission's Public Advisor shall provide information to assist the public in submitting such protests.

SECTION XIII. PROTEST TO REQUIRE THE UTILITY TO FILE FOR PERMIT TO CONSTRUCT

Those to whom notice has been given under Section XI.B hereof and any other person or entity entitled to participate in a proceeding for a permit to construct may, within 20 days after the notice was mailed and published, contest any intended construction for which exemption is claimed by the utility from the requirements of Section III.B if such persons or entities have valid reason to believe that any of the conditions described in Section III.B.2 exist or the utility has incorrectly applied an exemption as defined in Section III herein. The protest shall be filed with the CACD, specifying the relevant utility advice letter number, in accordance with General Order 96-A, Section III.H. On the same date a protest is filed with the Commission, the protestant shall serve a copy on the subject utility by mail. The utility shall respond within five business days of receipt and serve copies of its response on each protestant and the CACD. Construction shall not commence until the Executive Director has issued an Executive Resolution.

Within 30 days after the utility has submitted its response, the Executive Director, after consulting with CACD, shall issue an Executive Resolution on whether: the utility is to file an application for a permit to construct, or the protest is dismissed for failure to state a valid reason. Also, the Executive Director shall state the reasons for granting or denying the protest and provide a copy of each Executive Resolution to the Commission's Public Advisor.

The Commission's Public Advisor shall provide information to assist the public in submitting such protests.

SECTION XIV. COMPLAINTS AND PREEMPTION OF LOCAL AUTHORITY

A. Complaints may be filed with the Commission for resolution of any alleged violations of this General Order pursuant to the Commission's Rules of Practice and Procedure 9 through 13.1. A complaint which does not allege that the matter has first been brought to the staff for informal resolution may be referred to the staff to attempt to resolve the matter informally (Rules of Practice and Procedure No. 10).

B. This General Order clarifies that local jurisdictions acting pursuant to local authority are preempted from regulating electric power line projects, distribution lines, substations, or electric facilities constructed by public utilities subject to the Commission's jurisdiction. However, in locating such projects, the public utilities shall consult with local agencies regarding land use matters. In instances where the public utilities and local agencies are unable to resolve their differences, the Commission shall set a hearing no later than 30 days after the utility or local agency has notified the Commission of the inability to reach agreement on land use matters.

C. Public agencies and other interested parties may contest the construction of under-50-kV distribution lines and electric facilities by filing a complaint with the Commission pursuant to the Commission's Rules of Practice and Procedure 9 through 13.1.

SECTION XV. STATE AGENCY REVIEW OF ELECTRIC GENERATING AND RELATED TRANSMISSION FACILITIES NOT SUBJECT TO THE WARREN-ALQUIST ENERGY RESOURCES CONSERVATION AND DEVELOPMENT ACT

Nothing in this order shall be construed to preempt or otherwise limit the jurisdiction of state agencies other than this Commission to exercise the full range of their jurisdiction under state or federal law over facilities subject to this order.

A coastal development permit shall be obtained from the Coastal Commission for development of facilities subject to this order in the coastal zone.

SECTION IXV. CEQA COMPLIANCE

Construction of facilities for which a CPCN or permit to construct is required pursuant to this General Order shall not commence without either a finding that it can be seen with certainty that there is no possibility that the construction of those facilities may have a significant effect on the environment or that the project is otherwise exempt from CEQA, or the adoption of a final EIR or Negative Declaration. Where authority must be granted for a project by this Commission, applicant shall comply with Rule 17.1 of our Rules of Practice and Procedure:

Special Procedure for Implementation of the CEQA of 1970 (Preparation of EIRs). This latter requirement does not apply to applications covering generating and related transmission facilities for which a certificate authorizing construction of the facilities has been or will also be issued by the CEC. For all issues relating to the siting, design, and construction of electric generating plant or transmission lines as defined in Sections VIII and IX.A herein or electric power lines or substations as defined in Section IX.B herein, the Commission will be the Lead Agency under CEQA, unless a different designation has been negotiated between the Commission and another state agency consistent with CEQA Guidelines § 15051(d).

PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

By WESLEY M. FRANKLIN
Acting
Executive Director

August 11, 1995

Appendix A - General Order No. 131-D

INFORMATION TO BE INCLUDED IN THE UTILITY REPORT REGARDING FINANCING OF NEW ELECTRIC GENERATING CAPACITY AND TRANSMISSION LINE PROJECTS

I. A statement, detailing the economic assumptions used to project all construction expenditures and annual operating costs, including the methodology, assumptions, and sources and authorities associated therewith for a fifteen-year (15) period commencing with the year in which the report is filed, for each of the following:

A. Operating Revenues
1. Electric
2. Gas, if applicable
3. Miscellaneous
4. Total

B. Operating Expenses
1. Cost of Electric Energy
2. Cost of Gas sold, if applicable
3. Transmission and Distribution
4. Maintenance
5. Depreciation
6. Taxes on Income
7. Property and Other Taxes
8. Other
9. Total

C. Operating Income

D. Other Income and Deductions
1. Allowance for Equity Funds Used During Construction
2. Gains on Bonds Purchased for Sinking Fund
3. Subsidiary Income
4. Other — Net
5. Total

E. Income Before Interest Charges

F. Interest Charges
1. Short-term
2. Long-term
3. Less Allowance for Borrowed Funds Used During Construction
4. Total

G. Net Income

H. Preferred Dividend Requirement

I. Earnings Available for Common Stock

J. Average Number of Shares of Common Stock Outstanding (Thousands)

K. Earnings Per Share of Common Stock

L. Dividends Per Share of Common Stock
   1. Declared Basis
   2. Paid Basis

II. An estimate for each of the following capital requirements items for each year for a fifteen-year period commencing with the year in which the report is filed:

A. Construction expenditures by year broken down by:
   1. Generation projects over $100 million, including those, if any, located out-of-state
      a. Busbar, including switchyard, expenditures
   2. All other generation projects, including those, if any, located out-of-state
      a. Busbar, including switchyard, expenditures
      b. Associated transmission expenditures
   3. Non-generation transmission expenditures
   4. Distribution expenditures
   5. Other expenditures

Breakdown of each item in 1 above into the following elements:

Directs (M&S + Labor)	Indirects	AFDC	Total
$	$	$	$

B. Bond retirements, sinking fund retirements, etc.

C. Investments in subsidiary companies

III. An estimate for each of the following items for each year for a fifteen-year period commencing with the year in which the report is filed:

A. Capital balances as of January 1

B. Capital ratios as of January 1

C. Imbedded costs of debt and preferred stock

D. Debt, preferred and common stock issues:
   1. Amount ($ and shares)
   2. Yield and cost of each issue

E. Income tax information
   1. Tax operating expense
   2. State tax depreciation
   3. Federal tax depreciation
   4. ITC or other credits available and used

F. Short-term debt balances

G. Annual equivalent rate used to compute the Allowance for Funds Used During Construction

IV. Data showing the estimated Results of Operation for electric utility operations for each year for a fifteen-year (15) period, commencing with the year in which the report is filed, in the formal set forth below:

A. Kilowatt-hour Sales
   1. Total
   2. Residential

B. Average Price (¢/kWh)

C. Number of Residential Customers

D. Gross Revenue – Total
   1. Base Rates
   2. ECAC Rates
   3. ECAC Rate Increases
   4. Non-ECAC Rate Increases
   5. Misc. Operating Revenues

E. Operating Expenses – Total
   1. Production – Fuel and Purchased Power – Total
      a. Oil
      b. Gas
      c. Nuclear
      d. Coal
      e. Geothermal
      f. Combined Cycle
      g. Purchased Power
      h. Other (explain)
   2. Production O&M (non-fuel)
   3. Transmission
   4. Distribution
   5. Customer Accounts
   6. A&G
   7. Depreciation & Amortization

8. Taxes – Total

   a. State Income
   b. Federal Income
   c. Ad Valorem
   d. Other

9. Other (explain)

F. Net Operating Income

G. Rate Base (Weighted Average)

H. Rate of Return

I. Net-to-Gross Multiplier

V. For those electric utilities which also operate other public utility departments, such as natural gas, steam, and water service, an estimate of the following financial information by department for each year for a fifteen-year (15) period, commencing with the year in which the report is filed. Any separate utility operation that contributes to less than one (1) percent of the utility's total gross operating revenues may be excluded.

   A. Gross Revenue
   B. Operating Expenses
   C. Net Operating Income
   D. Rate Base (Weighted Average)
   E. Rate of Return

VI. The following variable will be provided by the staff of the Public Utilities Commission for use by the utility in generating certain financial information required by Appendix A:

   A. Return on Common Equity
   B. Dividend Yield
   C. Market to Book Ratio
   D. Cost of Long-Term Debt (including incremental cost)
   E. Cost of Preferred Stock (including incremental cost)
   F. Common Stock Price
   G. Annual equivalent rate used to compute the Allowance for Funds Used During Construction

These variable will be furnished 60 days before the annual utility report is due and will be developed by the staff based on its independent expertise.

INFORMATION TO BE INCLUDED IN AN APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR ELECTRIC GENERATING FACILITIES

I. A detailed description of the proposed generating facility and related facilities and the manner in which the same will be constructed, including the type, size, fuel capabilities, and capacity of the generating facilities.

II. A map of suitable scale showing the location of the proposed power plant and related facilities, and a description of the location of the proposed power plant and related facilities.

III. A listing of federal, state, regional, county, district, or municipal agencies from which approvals either have been obtained or will be required covering various aspects of the proposed facility, including any franchises and health and safety permits and the planned schedule for obtaining those approvals not yet received.

IV. Load and resource data setting forth recorded and estimated loads (energy and demands), available capacity and energy, and margins for 5 years actual and 20 years estimated on the same basis, as reported to the CEC including a statement of the compatibility of the proposed generating facility with the most recent biennial report issued by the CEC pursuant to Section 25309 of the Public Resources Code.

V. Existing rated and effective operating capacity of generating plants and the planned additions for a ten-year (10) period.

VI. Estimated cost information, including plant costs by accounts, all expenses by categories, including fuel costs, plant service life, capacity factor, total generating cost per kWh (1) at plant, and (2) including related transmission, levelized for the economic life of the plant, year by year for the 12 years commencing with the date of commercial operation of the plant, and comparative costs of other alternatives considered on a levelized or year-by-year basis depending upon availability of data. Estimated capital and operating costs of power to be generated by the proposed plant for all competitive fuels which may be lawfully used in the proposed plant. When substantially the same data are prepared for utility planning purposes they may be used to satisfy all or any portion of these requirements.

VII. For any nuclear plant a statement indicating that the requisite safety and other license approvals have been obtained or will be applied for.

VIII. Such additional information and data as may be necessary for a full understanding and evaluation of the proposal.

(End of Appendix)

Appendix V

Solid Waste Management Study

SOLID WASTE MANAGEMENT STUDY

Grapevine Project

Prepared for:

Tejon Ranchcorp
4436 Lebec Road
Tejon Ranch, California 93243

Prepared by:

McINTOSH & ASSOCIATES
LAND SURVEYING • CIVIL ENGINEERING © 2014

2001 Wheelan Court
Bakersfield, CA 93309
Contact: Diana Hurlbert –Tejon Ranchcorp

AUGUST 2015

Printed on 30% post-consumer recycled material.

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

INTENTIONALLY LEFT BLANK

1.0 INTRODUCTION

Tejon Ranchcorp is proposing the development of the Grapevine Project (Project). The Project is both a specific and community plan that includes 12,000 – 14,000 residences and approximately 5.1 million square feet of commercial development. The commercial development could include a mix of service retail, office, educational, medical, and industrial uses.

The Project is located approximately 25 miles south of Downtown Bakersfield in southwestern Kern County, encompassing 8,010 acres of the 15,644-acre Grapevine Planning Area. The majority of the project is on the east side of I-5, but a smaller portion lies on the west side of I-5. The project site is bisected by the California Aqueduct (See Figures 1-1 and 1-2).

In order to estimate the impacts the Project may have to the County's solid waste infrastructure system, this study will analyze the ongoing and construction related waste generation for residential and non-residential functions. The study will also consider the anticipated amount of waste that will be diverted from the landfill as a result of project design features that have been created to ensure minimum diversion goals are being accomplished throughout the County.

1.1 Executive Summary

The Project will generate both short and long-term waste streams from construction activities and ongoing residential and non-residential development. Increased waste streams have the potential to increase demand for solid waste services and impact the existing solid waste infrastructure. In accordance with the California Environmental Quality Act (CEQA) Guidelines, a significant impact would occur if the Project was served by a landfill that did not have sufficient permitted capacity to accommodate the Project's solid waste disposal needs or if the Project did not comply with federal, state, and local statues and regulations relating to solid waste. Sufficient permitted capacity involves three components that include daily tonnage, daily traffic (vehicles per day), and permitted volume.

The Project is committed to providing a superior level of development and has incorporated specific Project elements to minimize impacts on the environment. Project elements relating to solid waste management require the Project to divert solid waste from the landfill and commit to recycling various waste streams. Upon incorporation of the project elements, analysis of the Project's anticipated waste stream indicates there is sufficient capacity in the landfill. The Project's reduction and recycling of waste streams goes beyond the mandated regulations to accommodate an increase in daily tonnage, daily traffic, and volume of waste resulting from the development of the Project. Incorporation of the project elements meet all mandated regulations. Impacts from the Project are reduced to a less than significant level.

1.2 Objectives of the Study

This Solid Waste Management Study addresses the Project's solid waste generation resulting from new development and incoming waste to the regional landfill.

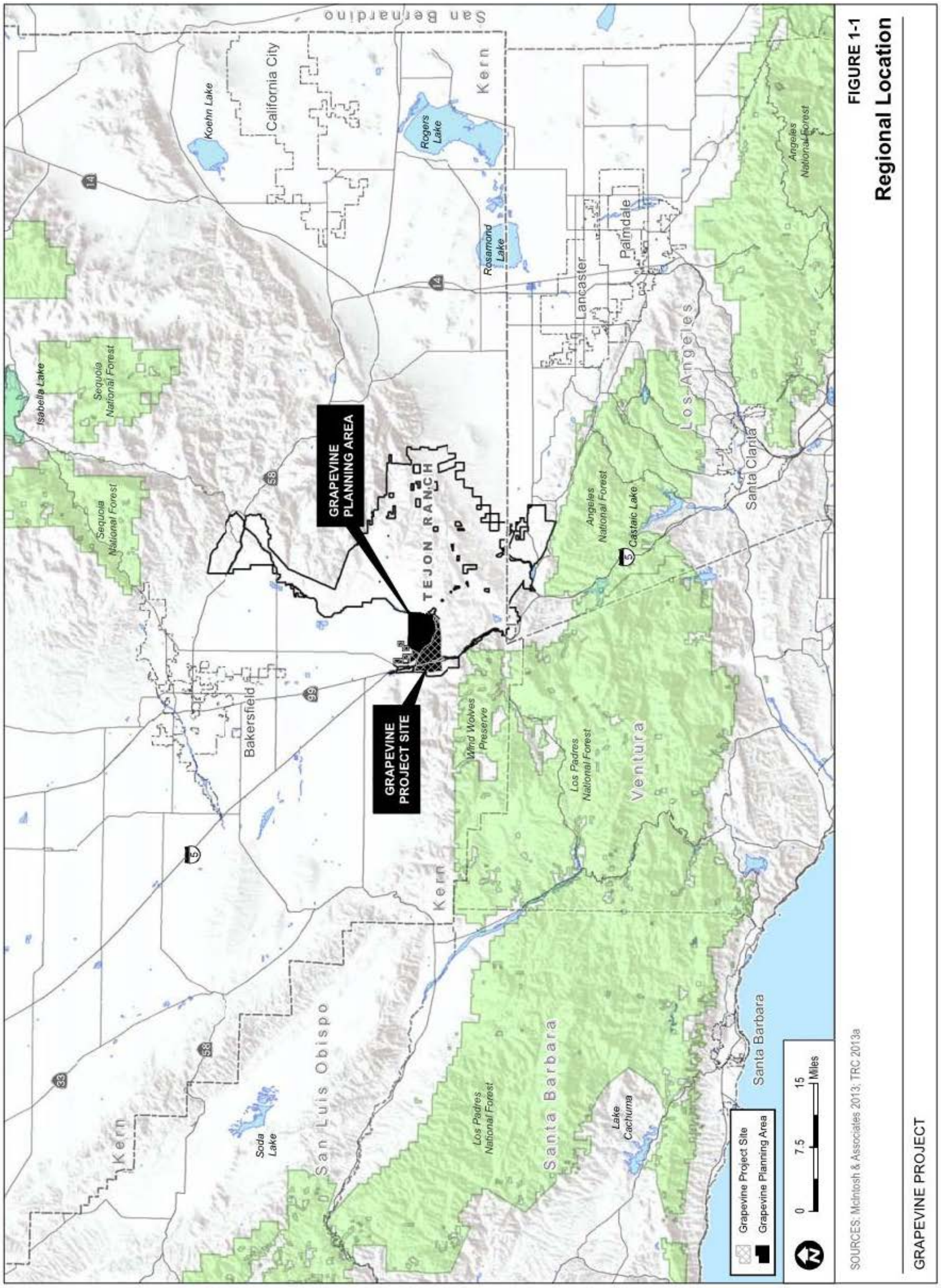
The primary objectives of this study are to determine if the Project will:

- Be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs
- Comply with federal, state, and local statues and regulations relating to solid waste
- Comply with CEQA

While determining the above objectives, this study will also identify opportunities for residential and non-residential recycling and/or diversion programs that may be incorporated into the design of the Project. These opportunities will become commitments of the project in order to mitigate impacts the Project may have to the existing solid waste infrastructure to a less than significant level and to meet all mandated regulations.

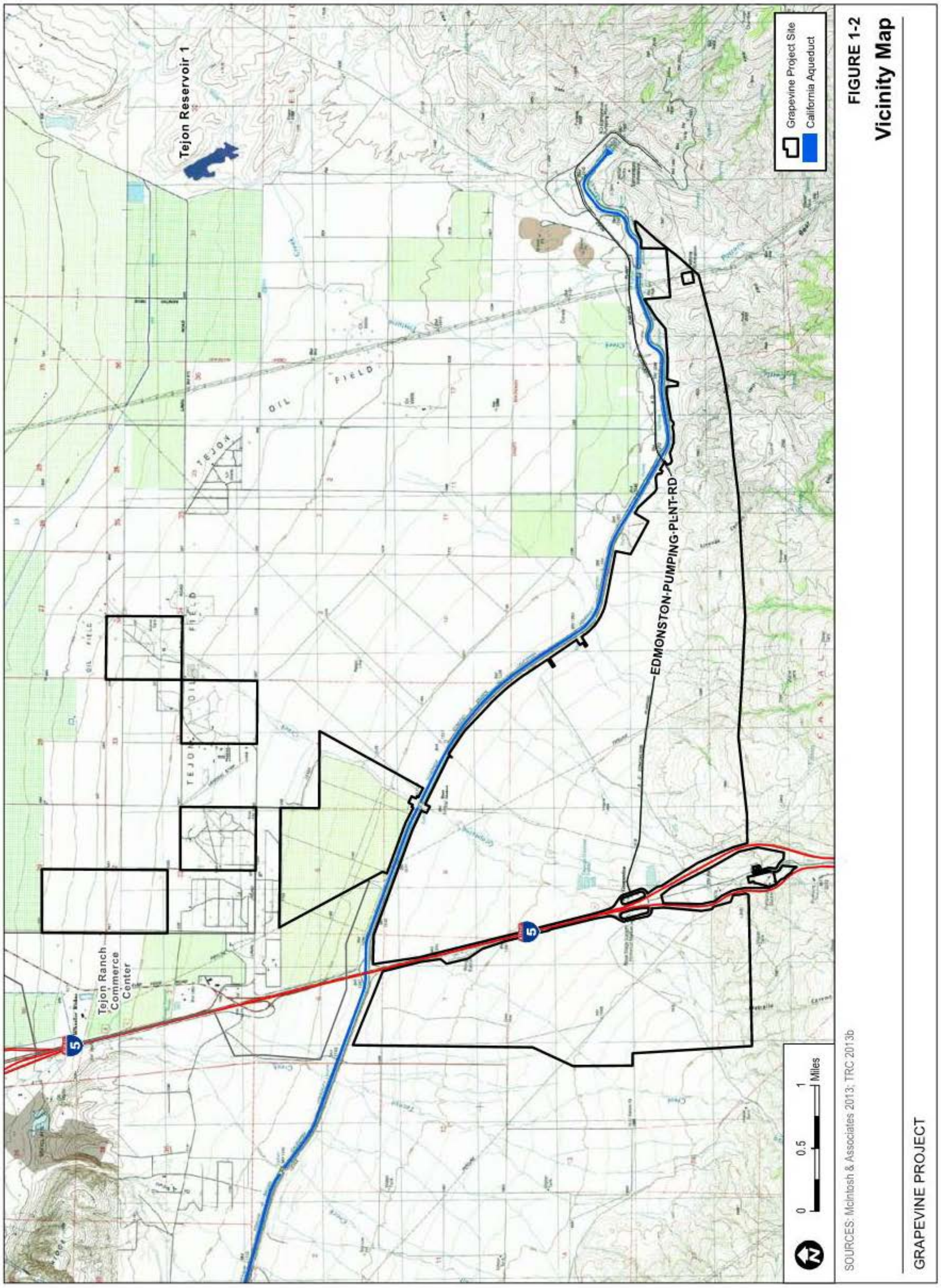
INTENTIONALLY LEFT BLANK

Figure 1-1 Regional Location Map



INTENTIONALLY LEFT BLANK

Figure 1-2 Vicinity Map



INTENTIONALLY LEFT BLANK

2.0 ENVIRONMENTAL SETTING

The Kern County Waste Management Department (KCWMD or Department) provides environmentally safe management of liquid and solid waste. The Department is responsible for operating seven landfills and seven transfer stations (which includes three bin sites). The Department also operates three special waste facilities and provides information to the residents of Kern County regarding recycling and ways to reduce waste[1]. The Kern County and Incorporated Cities Integrated Waste Management Plan is the long-term planning document for landfill facilities. Kern County also has a land use and gate fee program to pay for solid waste infrastructure improvements and operation.

2.1 Existing Facilities and Services

Regional Landfill

The Bena Sanitary Landfill (Bena SLF), located at 2951 Neumarkel Road in Edison, California (approximately 36 miles northeast of the project site), is anticipated to be the primary landfill receiving municipal solid waste generated from the project site[2] (See Figure 2-1). According to KCWMD, in 2013, the incoming solid waste stream to the Bena SLF was an average of 1,253 tons per day (TPD) with a permitted daily capacity of 4,500 TPD[3]. The current permitted capacity at this facility is 53,000,000 cubic yards and is estimated to reach capacity in the year 2044[4].

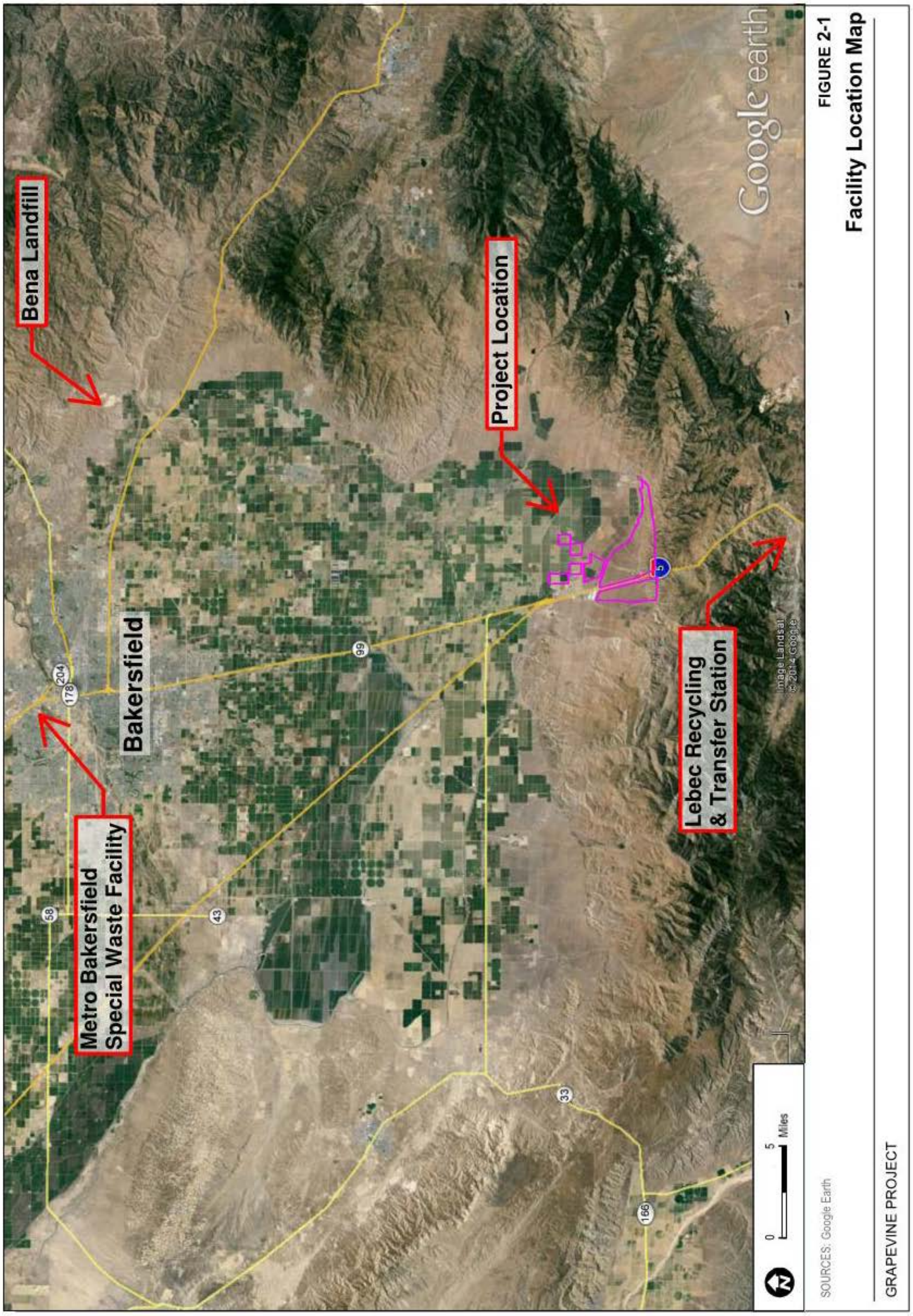
The Bena SLF is a Class III facility and municipal solid waste is the only waste stream acceptable for disposal. Municipal waste, more commonly known as trash or garbage, is defined by the Environmental Protection Agency to consist of everyday items such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries[5]. However, in order to comply with state recycling legislation, portions of these materials are designated for diversion. These materials include, but are not limited to, tires, white goods, scrap metal, inert materials, wood, grass, leaves and other materials suitable for acceptance at local composting facilities, and cathode ray tubes. The Bena SLF can also accept triple-rinsed pesticide containers and nonfriable asbestos; however, these items are accepted only by appointment. The KCWMD obtained special clearance to be able to accept these materials. Infectious medical waste is not accepted unless treated properly, contained, and labeled.

---

1 Kern County Waste Management Department: http://www.kerncountywaste.com/about-us.
2 Letter from Kern County Waste Management Department, April 30, 2014.
3 *Ibid*.
4 Capacity date cited from the Kern County Waste Management Department Capacity Study dated January 1, 2014.
5 United States Environmental Protection Agency Municipal Solid Waste, http://www.epa.gov/epawaste/non-haz/municipal/index.htm.

INTENTIONALLY LEFT BLANK

Figure 2-1 Facility Location Map



INTENTIONALLY LEFT BLANK

Special Waste Facility

The Metro Bakersfield Special Waste Facility, located at 4951 Standard Street in Bakersfield, California is the nearest permanent collection site for hazardous waste in relation to the Project. This facility is approximately 32 miles north of the Laval Road / Interstate 5 intersection. Acceptable hazardous waste materials include, but are not limited to, Antifreeze, batteries, electronics, mercury, paint and paint related products, pesticides/herbicides, propane tanks, and used motor oil. The Department operates a temporary collection event two to three times a year at the Lebec Recycling & Transfer Station to provide residential hazardous waste collection services to residents in outlying County communities. This facility is approximately 15 miles south of the Laval Road / Interstate 5 intersection (See Figure 2-1).

2.2 Expansion of Facilities

As part of the Countywide effort to address source reduction and recycling, future facilities may be needed within or near the Project area. The minimum services the County is anticipated to provide at future facilities, if any are deemed necessary, include self-haul of municipal solid waste and special waste collection including Household Hazardous Waste and Conditionally Exempt Small Quantity Generators (CESQG). One example of a future facility that could potentially serve the Grapevine and mountain communities would be a transfer station. In order to meet the solid waste management needs of the residents, a transfer station would need to be sited nearby to discourage illegal dumping.

Requirements for development of a transfer station facility include, but are not limited to, the following:

- Appropriate land use designations that are consistent with the activities to take place
- Compatible adjacent land uses that provide separation from sensitive uses (i.e. schools, residential uses, churches)
- Ingress and egress access availalilty that will not significantly impact off-site traffic operations
- Sufficient lot size to accommodate anticipated waste streams

Research indicates that management of municipal solid waste generated from the Project will be most cost efficient if directly hauled to the nearest landfill rather than being taken to a large-volume transfer station for transfer haul[6]. Given this basis, a limited use transfer station accepting only

[6] Waste Haul Analysis prepared by McIntosh & Associates, February 2014.

household hazardous waste and waste from self-haulers may be inappropriate and costly during initial growth for the Grapevine and mountain community area. However, since the Department previously identified the establishment of additional waste facilities to be consistent with the state regulations for source reduction and recycling, the siting of a transfer station within the vicinity of the Project may be necessary in the future. In the event a future facility is required within or near the Project area, KCWMD will prepare site-specific environmental documents necessary to obtain permits for the construction and operation of the facility[7].

3.0 REGULATORY SETTING

The Kern County Waste Management Department operates the County owned public solid waste facilities and oversees the transportation of nonhazardous solid waste. The Department is one of several government agencies responsible for maintaining compliance with local, state, and federal regulations in unincorporated Kern County.

3.1 Applicable Policies and Regulations

Kern County and Incorporated Cities Integrated Waste Management Plan

The California Integrated Waste Management Act of 1989 (AB 939) set the precedent for mandating local jurisdictions to increase diversion of solid waste going to landfills. To help increase the diversion rates, each jurisdiction was required to create an Integrated Waste Management Plan that looked at recycling programs, purchasing of recycled products, and waste minimization. Accordingly, the Kern County and Incorporated Cities Integrated Waste Management Plan (IWMP) was prepared and consists of the Source Reduction and Recycling Element (SRRE), the Household Hazardous Waste Element (HHWE), the Countywide Siting Element, and the Countywide Integrated Waste Management Summary Plan. The IWMP generally allows the County to use a combination of programs to meet or exceed state regulations for solid waste management.

Kern County Ordinance Code, Title 8 Health and Safety, Chapter 8.28 - Solid Waste

Chapter 8.28 of the County’s Ordinance Code is used to regulate proper storage, transportation, and disposal of solid waste. Specific requirements for controlling unsanitary conditions will be required during all phases of development and during ongoing operations of the Project. Activities that could create unsanitary conditions or permit or encourage the accumulation or breeding of vectors are prohibited and punishable by law. The Project will be subject to standard compliance with the health and safety code to ensure sanitary conditions are existing at all times.

[7] Memorandum from KCWMD to Kern County Planning Department, dated June 18, 2014.

California Green Building Standards Code

Construction- and demolition-generated (C&D) waste is heavy, inert material. This material creates significant problems when disposed of in landfills. Since C&D debris is heavier than paper and plastic, it is more difficult for counties and cities to reduce the tonnage of disposed waste. For this reason, C&D waste debris has been specifically targeted by the State of California for diversion from the waste stream.

The California Green Building Standards Code (Standards Code) will apply to the construction related activities of this project. The purpose of the Standards Code is to improve public health, safety, and general welfare by enhancing the design and construction of buildings using building concepts that have a positive environmental impact and encouraging sustainable construction practices. Provisions of the Standards Code shall apply to the design and construction of building structures subject to state regulation.

Per § 708.3 – Construction Waste Reduction, Disposal, and Recycling of the Standards Code, a commercial entity is to recycle and/or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition debris, or meet a local construction and demolition waste management ordinance, whichever is more stringent.

In order to comply with the Standards Code, all county landfills have areas for diversion of waste. The KCWMD has a goal to divert as much material as possible to prolong the life of the landfills. Although the County offers gate fee discounts for construction and demolition materials that have been pre-separated for recycling, lower costs are typically found at local recycling centers that accept construction and debris in large roll off bins, such as the Construction and Demolition Materials Recovery Facility (C&D MRF) at the Mt. Vernon Recycling Complex in Bakersfield, CA.

Assembly Bill 341

According to the 2008 Statewide Waste Characterization data, the commercial sector generates more than two-thirds of the solid waste in California[8]. In response to reducing commercial solid waste that is landfilled, the State Legislature passed Assembly Bill (AB) 341 declaring that it is the policy goal of the state that not less than 75 percent of solid waste generated be source separated, reduced, recycled, or composted by the year 2020. AB 341 sets forth the requirements of the statewide mandatory commercial recycling program which defines that a business, including any commercial or public entity, generating four cubic yards or more of commercial solid waste

[8] Study is available online at http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1346.

per week are required to recycle. Businesses are required to take one or any combination of the following actions in order to reuse, recycle, or otherwise divert solid waste from disposal:

- Subscribe to a source separated recycling service with a regional franchise hauler authorized to provide service for the area in which the business is located;
- Subscribe to a mixed solid waste recycling service with a regional franchise hauler authorized to provide service for the area in which the business is located;
- Self-recycle and certify compliance with Kern County Ordinance No. G-8337.

Assembly Bill 1826

Despite California's robust recycling infrastructure for traditional recyclables, the state has continued to landfill organic materials, such as yard trimmings and food scraps. Landfilled food and other organic materials produce methane, which is a major contributor to climate change. Instead, these organic materials can be recycled into renewable resources such as biofuels and nutrient-rich compost for agriculture.

Assembly Bill 1826, which has been created to drive the recycling of yard trimmings and food scraps, was recently signed into law and will become effective April 2016. The bill requires businesses generating a specified amount of organic solid waste per week to arrange for recycling for that material. This bill will also require the contract or work agreement between a business and a gardening or landscaping service to require the organic waste generated by those services to comply with the requirements of the law. Business within the Project area will be required to comply with any codes/regulations promulgated from AB 1826.

4.0 PROJECT ANALYSIS

In order to estimate the impacts the Project may have to the County's solid waste infrastructure system, the following section will introduce the Project in more detail and determine how much waste will be generated from development of the Project. The amount of waste generated from the Project will then be compared to the current waste streams at the regional landfill. This comparison will indicate if there is sufficient permitted capacity to accommodate the Project's solid waste disposal needs.

4.1 Project Description

4.1.1 Project Location

The Project is located in the west-central portion of Tejon Ranch (the Ranch). The approximately 270,000-acre Ranch is currently held in private ownership by Tejon Ranchcorp. The Ranch includes a large portion of the Tehachapi Mountains as well as smaller portions of the San Joaquin and Antelope Valleys. Generally, the Ranch extends from Interstate 5 (I-5) on the western side to State Route 58 (SR 58) on the northern side and SR 138 on the southern side (Figure 1-1).

The project site is entirely within unincorporated Kern County, just south of the junction of I-5 and SR 99. The majority of the project is on the east side of I-5, but a small portion lies on the west side of I-5. The 8,010-acre project site is within the boundaries of the 15,644-acre Grapevine Planning Area identified in the Tejon Ranch Land Use and Conservation Agreement, a landmark agreement reached in 2008 with leading environmental organizations (including the Sierra Club, Natural Resources Defense Council, California Audubon Society, Endangered Habitats League, and Planning and Conservation League) to permanently preserve over 90% of Tejon Ranch as open space and limit development to designated areas near existing infrastructure such as I-5. The project site is bisected by the California Aqueduct (Figures 1-1 and 1-2) which partly serves as a boundary between the project site and the remainder of the Grapevine Planning Area which extends towards the foothills to the east. The precise boundaries of the 8,010-acre project site may be further adjusted based on the results of the ongoing environmental review and permitting process for the project, but will remain within the Grapevine Planning Area. Since the amount of waste generated by the Project is not determined by the precise location of the boundary, but rather from construction activities and ongoing residential and non-residential functions, any future adjustments to the boundary will not alter the analysis on solid waste.

4.1.2 Project Overview

The Project, which will include 12,000 – 14,000 residential units and up to 5.1 million square feet of commercial land uses, is designed as a series of conveniently located village centers, each composed of a mix of housing, neighborhood-serving retail and office uses, schools, parks, and community services. Outside the village cores, the Project includes a mix of residential uses, office, research and development, regional commercial, freeway-oriented commercial, and light industrial/warehouse uses. Other potential public facilities, including a fire station, sheriff substation, transit facility/park-and-ride, and water and wastewater treatment facilities, are proposed throughout the community.

Development of the Project is divided into six individual phasing areas, each of which may be developed independently, partially or completely, in response to market conditions. The Project is conceptually designed to be phased over a period of 19+ years, starting with the development of Planning Areas 6a, 2, and or 2 followed by planning areas 1, 3, 4, 5, and 6b-e. Build-out of each phase is projected to take approximately 2 to 4 years, depending on market conditions (Phase 1: 2-4 years; Phase 2: 4-6 years; Phase 3: 3-5 years; Phase 4: 4-6 years; Phase 5: 4-6 years; Phase 6: 2-4 years), with the first phase commencing in 2016. The shorter phase completion schedules are assumed for planning and environmental evaluation purposes.

Access to the first phases of the Grapevine community will be from Interstate 5 at the existing Grapevine Road and Laval Road interchanges. During later phases of development, the existing Grapevine Road/ Interstate 5 interchange may be expanded and relocated to the north. To allow for the relocation and replacement of the interchange, an existing Vehicle Enforcement Facility may be relocated to a Tejon Ranch Company (TRC) owned parcel on the west side of the junction of I-5 and CA-99. The project will also improve an existing TRC agricultural road east of the project area to provide access for truck traffic currently using Edmonston Pumping Plant Road to travel to properties east of the project. The circulation network within the project is composed of two- and four-lane arterials, collector streets, and local streets organized in a grid pattern. All roads within the project site will be public. Multipurpose trails are proposed along Grapevine Creek, Cattle Creek, the southern foothills, and the open space adjacent to the California Aqueduct and at other locations throughout the project site. Some of these trails will connect to on-street, Class 1 and 2 bike lanes. Water and sewer service will be provided by the Tejon–Castac Water District.

4.2 Project Elements

The Project is committed to providing a superior level of development that respects the open space and development boundaries identified in the Tejon Ranch Conservation and Land Use Agreement. As part of this commitment, the Project is required to incorporate specific design features to minimize impacts on the environment. Project elements relating to solid waste management have been identified below and will be considered in Section 4.3's discussion on anticipated waste coming from the Project area.

The Project will incorporate the following elements during and after construction activities take place, in order to reduce impacts to the existing solid waste infrastructure:

Element SW-1 To reduce the amount of construction related waste taken to the landfill, the following shall be incorporated into the design of the Project:

1. During construction, demolition debris and construction wastes shall be recycled and taken to the Construction & Demolition Materials Recovery Facility or similar facility located within a reasonable distance to the Project area. The applicant shall submit a Construction Waste Management Plan to the Building Inspection Division of the Kern County Engineering, Surveying & Permit Services Department and the Kern County Planning and Community Development Department for review and approval. An onsite recycling coordinator shall be designated by the project applicant to facilitate recycling of construction waste through coordination with the onsite contractor, local waste haulers, and/or other faculties that recycle construction/demolition wastes. The onsite recycling coordinator will also be responsible for ensuring that wastes are sorted as appropriate and those requiring special disposal are handled according to the State and County regulations

that are in effect at the time of disposal. The name and phone number of the coordinator and the site plan for the construction area shall be provided to the Building Inspection Division of the Kern County Engineering, Surveying, & Permit Services Department prior to the issuance of grading and building permits.

2. The Project shall implement construction waste-reduction measures applicable to the Project, including:

    i. Requiring builders, developers, and custom lot owners to recycle construction waste, including waste and unused materials generated during the construction and building process, and existing waste and unused materials on site prior to construction. Recycling options may include the use of onsite spoils and bulk site-clearing materials for existing project needs, such as backfill, mulch, erosion and sedimentation control, the donation of materials to charitable organizations, or the export of materials for use in other construction projects;

    ii. Maintaining a centralized information repository on site to identify which construction materials can be recycled, how materials are to be sorted prior to disposal and provide direction as to which sources will accept recyclable building and construction materials; and

    iii. Requiring building or construction materials that are not recyclable to be taken to the nearest waste disposal facility. These materials shall be sorted as necessary prior to being transported in bulk to reduce multiple truck trips, thereby reducing emissions generated from waste transportation.

Element SW-2 To reduce the amount of ongoing waste disposal that will be taken to the landfill, the following shall be incorporated into the Project:

1. Implementation of mandatory three-cart residential solid waste collection within the Project area. Universal collection will be serviced by the local franchise hauler and waste will be hauled to the nearest landfill, the Bena SLF, or as determined through coordination with KCWMD. Household recyclable materials (i.e. cardboard, paper) and green waste (i.e. yard trimmings) shall be diverted from the landfill and hauled to the nearest recycling facility, as applicable. Green waste that can be composted on-site shall be reused within common area landscaping.

2. Prior to recordation of the first tract or parcel map for division of the project site, the owner of the project site shall coordinate with Kern County for the implementation of universal solid waste collection on all residential and commercial development. The owner further

shall agree to vote for (or waive his protest rights connected with the imposition of such) solid waste collection fees or assessments. It is a goal that this development will have solid waste collection, source separated curbside organic waste collection, source separated curbside recycling collection, and bulky item collection.

3. Prior to the first certificate of occupancy for any multifamily unit, the applicant shall construct, subject to the review and approval of the Building Inspection Division of the Kern County Engineering, Surveying & Permit Services Department and the Kern County Planning and Community Development Department, adequate, segregated, onsite screened storage for the collection of multifamily residential solid waste and source separated recyclable materials. The area shall be distinct and in addition to any requirements for the development of multifamily units. The area shall not prevent security of the recyclables. Recycling area bins or containers must provide for the preclusion of vectors and offer protection against adverse environmental conditions, such as rain or snow, which might render the collected materials unmarketable. Driveways and/or travel aisles shall provide, at a minimum, unobstructed access for collection vehicles and personnel. A sign clearly identifying all recycling/solid waste collection and loading areas and the materials accepted shall be posted adjacent to all points of direct access to the area.

Element SW-3 To reduce the amount of solid waste generated from the commercial sector being taken to the landfill, the following shall be incorporated into the design of the Project:

1. Businesses generating four cubic yards or more of commercial solid waste per week are required to recycle and take one, or any combination of the following actions:

   - Subscribe to source separated recycling service with a regional franchise hauler authorized to provide service for the area in which the business is located;

   - Subscribe to a mixed solid waste recycling service with a regional franchise hauler authorized to provide service for the areas in which the business is located; and

   - Self-recycle and certify compliance with Kern County Ordinance No. G-8337.

2. Prior to the first certificate of occupancy for any commercial development, the applicant shall construct, subject to the review and approval of the Building Inspection Division of the Kern County Engineering, Surveying & Permit Services Department and the Kern County Planning and Community Development Department, adequate, segregated, onsite screened storage for collection of commercial solid waste and source separated recyclable materials. The area shall be designed to be architecturally compatible with the development and shall not prevent security of the recyclables. Recycling areas of the bins or containers must provide for the preclusion of vectors and offer protection against adverse

environmental conditions, such as rain or snow, which might render the collected materials unmarketable. Driveways and/or travel aisles shall provide, at a minimum, unobstructed access for collection vehicles and personnel. A sign clearly identifying all recycling/solid waste collection and loading areas and the materials accepted shall be posted adjacent to all points of direct access to the area.

Element SW-4 To discourage self-haulers from dumping municipal waste and hazardous waste in surrounding agricultural areas, the following shall be incorporated into the design of the Project:

1. Designation of a future transfer station facility with a minimum size of 10 acres to be located at an approporately accessible site anywhere in Planning areas 6b-e, by means of coordinated efforts between the applicant and KCWMD to determine final suitable size, location and access, to provide the following services:

   i. Self-haul municipal solid waste segregation, processing and transfer; and

   ii. Special Waste Collection including Household Hazardous Waste and Conditionally Exempt Small Quantity Generators (CESQG) (aka small businesses).

   iii. KCWD will Prepare any necessary additional site-specific environmental documents, if necessary, and obtain the necessary permits for construction of the transfer station.

5. **Element SW-5** To provide efficient means of universal solid waste collection and reduce the impacts the Project may have on roadways and increased traffic resulting from the local franchise hauler's collection routes, the following shall be incorporated into the design of the Project:

1. Streets within the Project area shall be wide enough to safely accommodate the maneuverability of standard refuse collection vehicles, including the ability to turn around in cul-de-sac areas and the ability to make right turns without encroachment into on-coming traffic.

Element SW-6 To reduce the impacts the Project may have on air quality, the following shall be incorporated into the design of the Project:

1. Implementation of mandatory three-cart universal solid waste collection within the Project area shall be used to prevent self-haulers from driving long distances to the nearest landfill to dispose of municipal solid waste. Universal solid waste collection will decrease vehicle

trips to the landfill thereby reducing the amount of vehicle emissions that contribute to air pollution and smog.

Element SW-7 To reduce the effects the Project may have on roadways and increased traffic, the following shall be incorporated into the design of the Project:

1. Designation of a future transfer station facility, in coordination with the developer and KCWMD to determine suitable size and location in Planning Areas 6b-e, shall be planned so that roads within the vicinity of the facility are able to accommodate anticipated wear and increased traffic from self-haulers and franchise haulers utilizing/serving the facility. The siting of the facility shall have adequate road capacity and structural integrity as well as a proper maintenance program to mitigate to some extent the adverse impacts of the increased traffic within the immediate vicinity.

2. Designation of a future transfer station facility shall be planned so that the siting of the facility is within a convenient distance to the residents thereby discouraging users from driving long distances to the nearest landfill and/or Special Waste Facility and limiting users wear on County roads and State Highways.

3. KCWD will Prepare any necessary additional site-specific environmental documents, if necessary, and obtain the necessary permits for construction of the transfer station.

4.3 Solid Waste Management

The Project will generate ongoing and construction related waste during each phase of development. To estimate the general volume of solid waste resulting from new development and incoming waste to the landfill, the KCWMD Solid Waste Worksheet was used (see Appendix A). As part of the analysis, the construction related waste streams are analyzed independently of the ongoing waste streams. The resulting estimate of each waste stream helps determine what impacts, if any, the Project will have on the daily operations at the landfill. Solid waste generated from off-site improvements is not included in the analysis since details of these improvements have yet to be finalized. Without knowing the scale of improvements, solid waste genereated from off-site improvements cannot be calculated at this time.

4.3.1 Construction Related Waste Streams

Construction related waste typically consists of non-hazardous building material or debris generated during the construction, renovation, and demolition of buildings, roads, and bridges. The materials often contain bulky, heavy materials, such as concrete, wood, metals, glass, and salvaged building components. Waste generated during construction activities is considered a one-time waste stream as opposed to an annual waste stream.

Compliance with the Standards Code requires a minimum of 50 percent of the nonhazardous construction and demolition waste by recycled and/or salvaged for reuse. In order for the Project to meet the minimum requirements by law, construction related waste may be taken to the Bena SLF or similar facility that accepts construction and demolition materials to be recycled. The Project's compliance with California's Green Building Standards and its proposed recycling plan will further serve to ensure compliance with existing laws addressing the disposal of construction related waste.

All county landfills have areas for diversion of waste and offer gate fee discounts for construction and demolition materials that have been pre-separated for recycling. KCWMD does not perform substantial separation of construction and demolition loads, meaning any material that the County is unable to sort ends up being landfilled. Generally, there is no way to determine if any individual party has complied with the mandatory 50 percent reduction law under the Standards Code. This is largely due to the operations of the facility in which waste, whether presorted or comingled, is not processed to be recycled until after the hauler has left the facility. For construction and demolition waste taken to the landfill, sorting efforts would be made prior to delivery to comply with the Standards Code and maximize recycling. The C&D MRF located in Bakersfield, CA is considered a large volume facility and is efficient at recycling both presorted as well as comingled construction and demolition materials and is, therefore, well suited to serving the Project's C7D recycling needs. Under its current operations, the facility takes in more source-separated materials than items that have been comingled[9]. Residual waste resulting from sorting efforts are taken to the nearest waste disposal facility.

As discussed in the Project elements in Section 4.2, waste generated from the Project is to be taken to the C&D MRF, which will substantially decrease the amount of construction waste being disposed of at the landfill. However, since this study intends to analyze any impacts the Project may have to the County's solid waste infrastructure system resulting from construction activities, the following section will consider a worst-case scenario in which minimal diversion of construction waste is calculated for its effects on the landfill.

4.3.1.1 Projected Construction Waste Stream

This section of the study assumes the Project's total construction related waste stream to be evaluated is based on a daily average amount of waste that will be taken to a landfill or material recycling facility. In order to determine the Project's impact to the solid waste infrastructure, particularly how it affects the Bena SLF, this study will take into account two scenarios on how construction related waste could be managed:

[9] Personal communication with Jacob Panero of Metropolitan Recycling and Varner Brothers, Inc.

Scenario 1- In accordance with the California Green Building Standards Code, a minimum of 50 percent of nonhazardous construction and demolition waste will be presorted and delivered to the Bena SLF ready for diversion. The remaining 50 percent of non-recyclable and/or contaminated construction waste will be landfilled.

Scenario 2- All construction related waste will be taken directly to the C&D MRF and some residual waste from sorting efforts will be taken to the Bena SLF. However, the project may utilize any solid waste facility that can provide construction related C&D recycling.

Although the Project is committed to incorporating project design features that will enable Scenario 2 to be achieved, it is important to identify Scenario 1's worst-case circumstances. Comparison of these scenarios shows the extent to which the Project is able to reduce impacts to the existing solid waste infrastructure once diversion and recycling take place.

Details of the construction related waste streams generated by the Project prior to diversion are shown in Table 4.3-1[10]. In order to determine the average daily waste stream being taken to the landfill for both scenarios, daily waste for each phase will be calculated based the number of operating days for each facility receiving the waste throughout the construction time period.

Table 4.3-1
Project's Construction Related Waste Prior to Diversion

Phase	Construction Related Waste from Residential Functions (tons)	Construction Related Waste from Non-Residential Functions (tons)	Total Construction Related Waste (tons)	Anticipated Years for Build-out
1	4,770	5,360	10,130	2
2	10,097	11,374	21,471	4
3	6,815	10,476	17,290	3
4	8,823	3,014	11,836	4
5	8,367	596	8,963	4
6	4,739	18,709	23,448	2
Total	43,612	49,528	93,139	19

Source: Compiled from Data in *Appendix A,* by McIntosh & Associates, August 2014.

Scenario 1- In accordance with the California Green Building Standards Code, a minimum of 50 percent of nonhazardous construction and demolition waste will be presorted (ie. source separated

[10] Note: All calculations of Project waste stream presented in this report and Appendix A are based on a project description of 12,000 du and 10.7 million square feet of commercial/industrial, therefore the analysis of potential waste generation should be considered conservative.

during construction activites) prior to being delivered to the Bena SLF ready for diversion. The remaining 50 percent of non-recyclable and/or contaminated construction waste will be landfilled.

Waste generation is based on 360 disposal days per year, which is the number of days the Bena SLF operates. Although it is unlikely waste will be hauled all 360 days, this provides a general average. It can be expected that some days will have peak waste streams coming from the Project whereas other days may have less waste.

The facility is capable of receiving up to 4,500 TPD of municipal solid waste and currently receives approximately 1,253 TPD. At a minimum, 50 percent of construction related waste being taken to this facility from the project would be diverted for recycling in order to facilitate achievement of mandated diversion goals.

The average amount of construction waste that will be produced on a daily basis throughout each phase of the Project is identified in Table 4.3-2. It also compares the Project's construction waste as a percent of the current daily waste stream at the Bena SLF. After diversion of 50 percent of the waste, the cumulative percent of construction related waste generated by all phases of the Project represents approximately 3.67 percent of the current waste stream to the Bena SLF[11].

Table 4.3-2
Project's Construction Related Waste as a Percent of the Existing Waste Stream at Bena SLF Before and After Diversion

Phase	Total Construction Related Waste (tons)	Average Construction Waste Per Day[1] (TPD)	% of Current TPD at Bena SLF		Cumulative % of Current TPD at Bena SLF	
			Before Diversion	After 50% Diversion	Before Diversion	After 50% Diversion
1	10,130	14	1.12%	0.56%	1.12%	0.56%
2	21,471	15	1.19%	0.59%	2.31%	1.16%
3	17,290	16	1.28%	0.64%	3.59%	1.80%
4	11,836	8	0.66%	0.33%	4.25%	2.12%
5	8,963	6	0.50%	0.25%	4.74%	2.37%
6	23,448	33	2.60%	1.30%	7.30%	3.67%
Total	93,139				7.30%	3.67%

11 Cumulative percent is derived by first multiplying each phase's TPD by the diversion rate of 0.50. This product is then divided into the current incoming TPD at Bena SLF and multiplied by 100 to get the percentage. Add up each percentage for cumulative percent (i.e. Phase 1: 14 TPD x 0.50 = 7; 7 / 1,253 = 0.0055; 0.0055 x 100 = approximately 0.56%).

Source: Compiled from Data in *Appendix A,* by McIntosh & Associates, August 2014.
[1] The Bena SLF operates 360 days out the year. The average waste per day (tons per day) is determined by dividing Total Construction Related Waste by (Years for Build-out x 360 days).

Scenario 2- All construction related waste will be taken directly to the C&D MRF and some residual waste from sorting efforts will be taken to the Bena SLF.

Waste generation is based on 309 disposal days per year, which is the average number of days the C&D MRF operates[12]. Although it is unlikely waste will be hauled all 309 days, this provides a general average. It can be expected that some days will have peak waste streams coming from the Project whereas other days may have less waste.

The facility is capable of receiving over 400 tons of C&D waste per day and currently receives between 55 and 75 TPD of C&D waste[13]. Due to recent efforts to move towards better methods for diverting construction and debris waste, the C&D MRF anticipates large-scale projects to be capable of achieving up to 90 percent recycling with the remaining 10 percent residual waste from sorting efforts going to landfills. Less optimal conditions reveal approximately 70 percent recycling and 30 percent residual waste[14].

Table 4.3-3a identifies the average amount of construction waste that will be produced on a daily basis throughout each phase of the Project and how much of it is capable of being diverted. It compares the amount of residual waste sent to the landfill when 70 percent and 90 percent of the waste is recycled, respectively.

Table 4.3-3b compares the Project's residual waste that is sent to the landfill as a percent of the current daily waste stream at the Bena SLF. If the project is capable of recycling 90 percent of the waste, each phase of the Project will produce a fraction of 1 percent of the current waste stream to the Bena SLF.

Table 4.3-3a
Project's Construction Related Waste Capable of Diversion

Phase	Total Construction Related Waste (tons)	Average Construction Waste Per Day[1] (TPD)	70% Diversion – 30% Residual (TPD)		90% Diversion – 10% Residual (TPD)	
			Recycled	Landfilled	Recycled	Landfilled
1	10,130	16	11.5	4.9	14.8	1.6
2	21,471	17	12.2	5.2	15.6	1.7
3	17,290	19	13.1	5.6	16.8	1.9

12 Personal communication with Jacob Panero of Metropolitan Recycling and Varner Brothers, Inc. stating average operating days for the facility is approximately 309 days.
13 Personal communication with Jacob Panero of Metropolitan Recycling and Varner Brothers, Inc.
14 *Ibid.*

4	11,836	10	6.7	2.9	8.6	1.0
5	8,963	7	5.1	2.2	6.5	0.7
6	23,448	38	26.6	11.4	34.1	3.8

Source: Compiled from Data in *Appendix A,* by McIntosh & Associates, August 2014.

[1] According to Jacob Panero of Metropolitan Recycling and Varner Brothers, Inc., the C&D MRF operates approximately 309 days out the year. The average waste per day (tons per day) is determined by dividing Total Construction Related Waste by (Years for Build-out x 309 days).

Table 4.3-3b
Residual Waste as a Percent of the Existing Waste Stream at Bena SLF

Phase	30% Residual Waste Landfilled		10% Residual Waste Landfilled	
	TPD	% of Current Incoming TPD at Bena SLF	TPD	% of Current Incoming TPD at Bena SLF
1	4.9	0.39%	1.6	0.13%
2	5.2	0.42%	1.7	0.14%
3	5.6	0.45%	1.9	0.15%
4	2.9	0.23%	1.0	0.08%
5	2.2	0.17%	0.7	0.06%
6	11.4	0.91%	3.8	0.30%

Source: Compiled from Data in *Appendix A,* by McIntosh & Associates, August 2014.

4.3.2 Ongoing Operating Waste Streams

Ongoing operating waste streams generated by residential and non-residential functions is the total amount of waste produced each year for the life of the Project. The Solid Waste Worksheet used in the analysis does not take into account differences between universal collection using a local franchise hauler and self-haul. The analysis assumes all waste will eventually end up at the landfill, regardless of how it is hauled. Thus, the worksheet is used to understand how much waste is generated and destined for disposal, prior to implementation of recycling programs. As part of the Project's commitment to the proposed design features, the analysis in this section will also consider 3-cart universal collection and how it will reduce the Project's waste stream to the Bena SLF.

4.3.2.1 Projected Ongoing Waste Stream

Ongoing waste generated by the Project may be taken to the Bena SLF for disposal by local franchise haulers or self-haulers. Waste generation throughout this section is based on 360 disposal days per year, which is the number of days the Bena SLF operates[15]. Although it is unlikely waste from the Project area will be hauled all 360 days, this provides a general average when taking into consideration franchise haulers typically operate during the week and self-haulers are likely to dispose of waste on weekends. It can be expected that some days will have peak waste streams coming from the Project whereas other days may have less waste. Peak waste streams are typically a result of days in which the disposal facility receives weekly garbage collection in addition to multiple self-haulers.

[15] The Bena SLF is closed 5 days out of the year per Kern County Waste Management Department, available online at http://www.kerncountywaste.com/disposal-sites/bena. Since waste cannot be hauled on closure days, the analysis utilizes 360 haul days.

This section of the study assumes the Project's total ongoing waste stream to be evaluated is based on the annual amount of waste that will be taken to the Bena SLF, regardless of haul-type, and can be used to generalize an average daily tonnage based on the number of operating days for the landfill. Generally, solid waste management anticipates approximately 10.5 percent of incoming commercial waste and 2.6 percent of incoming residential waste to be self-hauled (See Table 4.3-4). Since the self-haul waste is accounted for in the calculations for ongoing waste, it will not pose additional impacts to the existing solid waste infrastructure.

Waste coming from residential and non-residential functions is typically characterized as waste containing food spoils, paper, cardboard, plastics, rubber, leather, and textiles, to name a few. Yard trimmings are also accounted for in this type of waste, representing approximately 13.5 percent of all waste streams[16].

Table 4.3-4
Estimated Contribution of Each Sector to the Overall Disposed Waste Stream

Sector	Estimated Percent of Waste Stream
Commercial	48.8%
Residential	38.1%
Single-family residential	*28.0%*
Multifamily residential	*10.0%*
Self-haul	13.1%
Commercial Self-haul	*10.5%*
Residential Self-haul	*2.6%*
Total	100%

Source: 1999 vehicle survey findings applied to CIWMB Disposal Reporting System 1998 tonnage figures; Cited in California 2008 Statewide Waste Characterization Study, August 2009. Available online at http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1346.

The Project's ongoing waste streams from both residential and non-residential functions for each phase of development (prior to diversion) is identified in Table 4.3-5a. The Project is expected to produce approximately 70,537 tons of waste per year (TPY), or 196 tons per day, upon completion of all phases. Currently, approximately 1,253 tons per day is accepted at the Bena SLF, representing approximately 28 percent of the permitted daily maximum waste that can be accepted[17]. After build-out of the Project, the average daily waste stream before diversion will be

16 A breakdown of municipal solid waste by material before recycling available online at http://www.epa.gov/-wastes/nonhaz/municipal/index.htm.

17 Percentage derived by dividing 1,253 TPD by 4,500 TPD then multiplying product by 100.

approximately 32 percent of the permitted daily maximum, representing a 4 percent increase in daily operations[18].

Table 4.3-5a
Project's Ongoing Waste Prior to Diversion

Phase	Ongoing Waste from Residential Functions (TPY)	Ongoing Waste from Non-Residential Functions (TPY)	Total Ongoing Waste (TPY)	Total Ongoing Waste (TPD)[1]
1	2,474	6,890	9,364	26
2	5,165	10,782	15,947	44
3	3,478	13,791	17,269	48
4	4,543	1,467	6,010	17
5	3,909	396	4,305	12
6	2,401	15,241	17,643	49
Total	21,970	48,567	70,537	196

Source: Compiled from Data in *Appendix A* by McIntosh & Associates, August 2014.
1 TPD is based on the Bena SLF's total operating days of 360 days in a year as opposed to 365 days in a year.

Efforts throughout Kern County to divert as much waste from the landfills, to the extent feasible, are applicable to the Project and will affect the amount of waste being disposed of at the Bena SLF. The Project's commitment to implementation of a universal recycling system will divert materials including paper, plastic, and cardboard. Green waste from yard trimmings and other common area landscaping will also be diverted from the landfill under this system, with most of the green waste being used for compost. For the purpose of analyzing the Project's impact to the solid waste infrastructure when considering diversion of recyclable material, this study will assume that approximately 23.5 percent of all municipal solid waste will be diverted prior to collection[19].

Utilizing information from Table 4.3-5a, the average amount of ongoing waste that will be produced on a daily basis throughout each phase of the Project has been identified in Table 4.3-5b. Additionally, Table 4.3-5b compares the Project's ongoing waste stream as a percent of the current daily waste stream at the Bena SLF. When 23.5 percent of waste from the Project is diverted from the landfill, the total ongoing waste generated by all phases of the Project represents approximately 11.96 percent of the current waste to the Bena SLF[20].

---

18 Percentage derived by dividing (1,253+196) TPD by 4,500 TPD then multiplying product by 100.

19 Personal communication with Ray Scott of Price Disposal indicates that communities that are less likely to have recyclable material divert up to 7 percent of their household material. This project will assume a more successful diversion rate of 10 percent. An additional 13.5 percent of waste will be diverted when considering yard trimmings, based on the EPA's breakdown of yard trimmings compared to all municipal solid waste.

20 Total ongoing waste from all phases of development is 196 TPD. After 23.5 percent diversion, approximately 149.94 TPD will be landfilled; (149.94 TPD / 1,253 TPD) x 100 = 11.96%; actual values in Table 4.3-5b may differ due to rounding in each respective phase.

Table 4.3-5b
Project's Ongoing Waste as a Percent of the Existing Waste Stream at Bena SLF Before and After Diversion

Phase	Average Ongoing Waste Before Diversion (TPD)[1]	Average Ongoing Waste After Diversion (TPD)[2]	% of Current TPD at Bena SLF		Cumulative % of TPD at Bena SLF	
			Before Diversion	After 23.5% Diversion	Before Diversion	After 23.5% Diversion
1	26	20	2.08%	1.59%	2.08%	1.59%
2	44	34	3.54%	2.70%	5.61%	4.29%
3	48	37	3.83%	2.93%	9.44%	7.22%
4	17	13	1.33%	1.02%	10.77%	8.24%
5	12	9	0.95%	0.73%	11.73%	8.97%
6	49	37	3.91%	2.99%	15.64%	11.96%
Total	196	150	15.64%	11.96%		

Source: Compiled from Data in *Appendix A* by, McIntosh & Associates, August 2014.

1 The Bena SLF operates 360 days out the year. The average TPD of waste has been calculated using Kern County Solid Waste Worksheet and dividing the waste per year by 360 days.

2 The project assumes 10 percent of household waste and 13.5 percent of yard trimmings will be diverted from the landfill when implementing collection of source separated recyclables, totaling 23.5 percent diversion.

5.0 IMPACT ANALYSIS

In accordance with CEQA Guidelines, Appendix 'G', the effects of a Project are evaluated to determine whether they would result in a significant adverse impact on the environment.

A significant impact would occur if the Project:

- Is served by a landfill that does not have sufficient permitted capacity to accommodate the Project's solid waste disposal needs
- Does not comply with federal, state, and local statues and regulations relating to solid waste

Sufficient permitted capacity involves three components: (1) daily tonnage, (2) daily traffic, and (3) permitted volume.

Table 5.0-1 identifies the permitted conditions at the Bena SLF and considers how the Project will impact the current operational conditions before and after diversion of solid waste. Daily tonnage generated by the Project is based on the Project's ongoing annual waste stream and excludes the construction related waste since construction waste will not pose a long term effect on the County's solid waste infrastructure. The anticipated increase in daily tonnage, daily traffic (vehicles per day) and volume of waste resulting from development of the Project indicates there is sufficient capacity to accommodate solid waste disposal needs.

Compliance with federal, state, and local statues related to solid waste for the unincorporated Kern County area is achieved through the Kern County Waste Management Department. The Project is subject to current and future regulations relating to solid waste management and will incorporate design features (Refer to Section 4.2) into the Project to meet all mandated regulations.

Table 5.0-1
Bena SLF Existing Permitted Capacity with Project Build-out

	Permitted	Existing Operation	Grapevine Project						
			Ph 1	Ph 2	Ph 3	Ph 4	Ph 5	Ph 6	All
Daily Tonnage (TPD)	4,500	1,253							
Before Diversion			26	44	48	17	12	49	196
After Diversion			20	34	37	13	9	37	150
Daily Traffic (VPD)	3,400	461[1]							
Before Diversion			10[2]	16	18	6	4	18	72
After Diversion			7	12	14	5	3	14	55
Capacity (YD^3)	53,000,000	20,191,740[3]							
Before Diversion			35[4]	59	64	23	16	65	261
After Diversion			27	45	49	17	12	50	200

1 Current daily traffic (VPD) is an average of the traffic counts from the Disposal Facility Inspection Reports for January 2014-March 2014.

2 The approximate daily traffic (VPD) resulting from the Grapevine Project is determined by first calculating the average tons per trip for current operations (1,253 TPD / 461 VPD = 2.72 tons per trip). This value is then divided into the Project's TPD for each phase (i.e. Phase 1: 26 TPD / 2.72 tons per trip = 10 VPD)

3 Current capacity is derived from Facility/Site Summary Details available online, http://www.calrecycle.ca.gov/SWFacilities/Directory/ 15-AA-0273/ Detail/.

4 The approximate daily capacity (YD^3) resulting from the Grapevine Project is determined by using the tons to cubic yards conversion factor from California Department of Resources Recycling and Recovery available online at http://www.calrecycle.ca.gov/FacIT/Conversion1.pdf. Mixed solid waste (compacted in-place in a landfill) assumes that 0.75 tons = 1 cubic yard; (i.e. Phase 1: 26 TPD / 0.75 tons = 35 YD^3 per day). For comparison, the average daily capacity for current operations of 1,253 TPD is 1,670 YD^3 (1,253 TPD / 0.75 = 1,670 YD^3).

5.1 Project Specific Impacts

Impact 1: *Implementation of the Project may result in increased demand for solid waste services. Short-term construction impacts resulting from construction debris will increase solid waste for a temporary duration.*

Impact Discussion: Implementation of the Project has the potential to increase demand for solid waste services. The Project will generate construction debris on a short-term, temporary basis during construction. Waste from construction of the Project could be disposed of at either the Bena SLF or the C&D MRF. The County charges a fee of up to $54.50 per ton at the Bena SLF for disposal of construction and demolition debris and a minimum fee of $5 per ton for source separated clean inert material such as asphalt, brick, and concrete. Individuals are not required to recycle 50 percent of construction waste; the 50 percent diversion rate is a countywide rate and takes into account all landfills and disposal sites.

Recycling of construction debris will reduce the potential amount of waste disposed of at landfills in the County, and will contribute to the recycling goals set forth by the County of Kern and AB 939. Taking construction waste to the C&D MRF is generally less expensive than paying the gate fees at the Bena SLF and will allow the Project to divert a minimum of approximately 70 percent of material and the remaining 30 percent of the material being taken to the landfill. Diverting material at this rate will produce less than 1 percent of the existing waste stream to the Bena SLF for each phase of development.

As discussed in Section 4.2, incorporation of Project Design Feature PDF SW-1 will require that the Project divert and recycle construction related waste. The Project will reduce the amount of construction related waste being landfilled at a rate well below the California Green Building Standards Code, therefore waste being landfilled will be reduced to below a level of significance. **The Project will be served by a landfill with sufficient permitted capacity and be in compliance with all mandated regulations, the Project's impacts will be reduced to a less than significant level**.

Impact 2: *Implementation of the Project may result in increased demand for solid waste services. Long-term operational waste generation resulting from residential and non-residential functions will increase solid waste on a continuous duration.*

Impact Discussion: Implementation of the Project has the potential to increase demand for solid waste services. The Project will generate ongoing waste on an annual basis. Waste from the Project site will be disposed of at the Bena SLF. The reported average waste stream at the landfill in 2013 was 1,253 TPD or 451,080 tons per year. Bena SLF has a permitted maximum tonnage of 4,500 TPD. Current daily waste streams at the Bena SLF represents approximately 28 percent of the permitted daily maximum waste that can be accepted[21]. After build-out of the Project, the waste stream is projected to include an additional 196 TPD before diversion, which is approximately 32 percent of the permitted daily maximum. This represents a 4 percent increase in daily operations[22].

Incorporation of Project Design Features PDF SW-2 and PDF SW-3 will require that the Project divert and recycle ongoing waste generated from residential and non-residential functions. Kern County's diversion goals are generally calculated system-wide and not on an individual basis. For that reason, some landfills may fall short of diverting material whereas other landfills exceed the diversion rates. Currently, Kern County diverts approximately 62 percent of waste intended for

[21] Percentage derived by dividing 1,253 TPD by 4,500 TPD then multiplying product by 100.
[22] Percentage derived by dividing (1,253+196) TPD by 4,500 TPD then multiplying product by 100.

disposal[23]. The Project will reduce the amount of ongoing waste being landfilled in compliance with the County's diversion programs and be subject to commercial recycling requirements per AB 341; therefore, waste being landfilled will be reduced to below a level of significance. **The Project will be served by a landfill with sufficient permitted capacity and be in compliance with all mandated regulations, the Project's impacts will be reduced to a less than significant level**.

5.2 Cumulative Impacts

CEQA requires that an environmental impact report contain an assessment of the cumulative impacts that could be associated with the Project. According to CEQA Guidelines Section 15130(a), an EIR shall discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (as defined by Section 15130).

Development of Projects within the vicinity and surrounding area will produce both short and long-term waste streams from construction activities and ongoing operations. The KCWMD utilizes a solid waste worksheet to estimate the general volume of solid waste and to rate the environmental significance of a project's solid waste impacts per CEQA. The work sheet is intended for use by "major projects" defined as follows:

- Urban Development on sites over 15 acres;
- General Plan Amendments to commercial/industrial for sites over 15 acres;
- Zone Changes to commercial/industrial for sites over 15 acres;
- Subdivision tracts over 15 acres or over 50 dwellings; and
- Conditional Use Permits for recreational/public facilities projects over 15 acres

According to the County's list of major projects in the vicinity of the Project area, it is estimated that an additional 5.6 TPD of solid waste will result from short-term construction activities prior to diversion[24]. This represents approximately 0.44% of current incoming waste to the Bena SLF. Long-term ongoing operations will result in approximately 4.2 TPD of solid waste before diversion, representing approximately 0.33% of current incoming waste to the Bena SLF.

The addition of solid waste resulting from cumulative projects within the vicinity of the Project is less than significant and will not substantially increase the demand for solid waste services. Thus,

---

23 Personal communication with Dave Lee of Kern County Waste Management Department.

24 Analysis of cumulative project list provided by the County indicates one project qualifies as "major" and will generate up to 503,000 SF of industrial building space. Construction and ongoing waste projections have been determined using the County's solid waste worksheet.

cumulative effects related to solid waste resulting from implementation of the Project and development in the surrounding area, as determined by the County of Kern, are less than significant.

REFERENCES

California 2008 Statewide Waste Characterization Study, August 2009. Available online at http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1346.

California Department of Education Guide to School Site Analysis and Development, 2000. Available online at http://www.cde.ca.gov/ls/fa/sf/guideschoolsite.asp.

California Department of Resources Recycling and Recovery Conversion Table. Available online at http://www.calrecycle.ca.gov/FacIT/Conversion1.pdf.

Cal Recycle Facility/Site Summary Details: Bakersfield Metropolitan (Bena) SLF (15-AA-0273). Available online at http://www.calrecycle.ca.gov/SWFacilities/Directory/ 15-AA-0273/ Detail/.

Development Projections Comparison Chart, Grapevine at Tejon Ranch, Prepared by KenKay Associates, July 18, 2014.

Disposal Facility Inspection Report, Inspection Date February 28, 2014.

Disposal Facility Inspection Report, Inspection Date March 28, 2014.

Disposal Facility Inspection Report, Inspection Date April 25, 2014.

Disposal Facility Inspection Report, Inspection Date May 29, 2014.

Kern County Waste Management Department. Available online at http://www.kerncountywaste.com/about-waste-management.

Kern County Commercial Recycling Program Ordinance, Ordinance No. G-8337.

Kern County Cumulative Projects List, 1 and 6 mile radius, created June 10, 2014.

Kern County Gate Fee Ordinance, Ordinance No. G-8075.

Land Use Program Summary, Grapevine at Tejon Ranch, Prepared by KenKay Associates, July 18, 2014.

Magee, Chuck. Personal Communication. July 2014.

Scott, Ray. Personal Communication. July 2014.

Solid Waste Facility Permit for the Bakersfield Metropolitan (Bena) Sanitary Landfill, Facility No. 15-AA-0273.

Statewide Waste Characterization Study: Results and Final Report, December 1999. Available online at http://www.calrecycle.ca.gov/Publications/Detail.aspx?PublicationID=824.

Update on AB 341 Legislative Report: Statewide Strategies to Achieve the 75 Percent Goal by 2020, October 2013.

Waste Haul Analysis, Grapevine Project, Prepared by McIntosh & Associates, February 2014.

APPENDIX A

Kern County Waste Management Department (KCWMD)
Solid Waste Work Sheet - Introduction

This work sheet provides information and formulas to estimate the general volume of solid waste resulting from new development and incoming waste to the landfill. This work sheet is intended to help KCWMD rate the environmental significance of a project's solid waste impacts per the California Environmental Quality Act (CEQA). Additional solid waste has the potential to impact Kern County's system of sanitary landfills, transfer stations, or effect local recycling programs mandated by the State. KCWMD is, per CEQA, the responsible agency in Kern County for solid waste. This work sheet also allows KCWMD to track and forecast future solid waste estimates.

This work sheet is intended for use by "major projects" defined as follows:

- Urban Development on sites over 15 acres.
- General Plan Amendments to commercial/industrial for sites over 15 acres
- Zone Changes to commercial/industrial for sites over 15 acres.
- Subdivision tracts over 15 acres or over 50 dwellings.
- Conditional Use Permit for recreational / public facilities projects over 15 acres.

Instructions. Project applicants/agents should review Sections A, B, C, and D.

For residential projects, please answer Sections A, B and D. For non residential projects, please answer Sections A, C and D. For combined residential/non residential projects, please answer Sections A, B, C and D.

Property information may be obtained at the Planning Department of the County or City.

Census tract data is available from:

Kern Council of Governments
1401 19th Street, Bakersfield, Ca.
(661) 861-2191 www/KernCog.org.

Solid waste information may be obtained from:

Kern County Waste Management Department
2700 "M" Street, Suite 500 Bakersfield, CA.
(661) 862-8900.

If you have any questions or comments regarding this form please contact Katrina Slayton at (661) 862 - 8810 or email at slaytonk@co.kern.ca.us.

KCWMD Form: 2012

A. Project Identification & Solid Waste Input from the Project Applicants

A-1. Project Identification

Applicant/Agent McIntosh & Associates Ph # (661) - 834-4814
Address: 2001 Wheelan Court City: Bakersfield, CA 93309
Check: Residential Project x Non-Residential Project x
Check: Applications: GPA ___ ZC ___ CUP ___ Tract ___ Site Plan ___ Other x

Project Description is / is not attached (circle one) or is defined as follows:
See Specific Plan.

Nearest city or community Lebec, CA
Township ___ Range ___ Section ___ Assessor Parcel Number See Specific Plan.-
Landfill or Transfer Station *(KCWMD)* Bena SLF
Franchise Hauler *(KCWMD)* Mountainside Disposal

B. Residential Projects: Data and Calculation Formulas

Residential waste streams are based on a county wide average, type of dwelling unit and household population. Projects which have higher than average household populations may involve higher waste streams and may need to be evaluated on a case by case basis.

Residential Waste Profile

Dwelling type	Persons per Dwelling	Waste per Person	Total Waste per Household
Single Family	3.05	1,225 lbs	3,735 lbs
Apartments	2.85	1,225 lbs	3,490 lbs
MH park	2.15	1,225 lbs	2,635 lbs

Residential Data Needs:
Average number of persons per dwelling unit (census data). See Table Above
Total # of proposed dwelling units. 1,110 Single-family; 230 Village Center Residential

Pounds per year

B-1. Single Family Residential Units

Factor: The residents of one standard S.F. dwelling generate 3,735 pounds of solid waste per year.
Calculation: 3,735 lbs times # of dwelling units — 4,145,850

B-2. Multi Family Apartments / Condominium

Factor: The residents of one standard apartment /condominium generate 3,490 pounds of solid waste per year.
Calculation: 3,490 lbs times # of apartment /condominium — 802,700

B-3. Mobilehome Park Residential Units
Factor: One residents of one standard mobilehome generate 2,635 pounds of solid waste per year.
Calculation: 2,635 lbs times # of dwelling units — N/A

B-4. Residential construction waste
Factor: 4 pounds of construction waste per square foot.
Calculation: 4 lbs times # average square feet times # of dwelling units — 9,540,800
Note: This waste is a one time waste, not an annual waste.
*Average square feet of residential units is 1,780 sf

B-5 Total residential waste (Non-Construction B-1, B-2, B-3): 4,948,550

C. Non –Residential Projects: Data Needs and Calculation Formulas

Solid waste projections are based on calculations unique to a given land use. A Non-residential project includes commercial, industrial and public facilities. If a commercial project is proposed where the building land uses are unknown, please use Section C-1. Use Section C-11 for unspecified industrial land uses.

Non- Residential Data Needs:

117 Project site net area in acres (1 acre = 43,560 sq. ft.).
1,340,000 Building footprint square footage.
26.29% Percentage ratio of building footprint square footage to net site acreage

Commercial Waste

Pounds per year

C-1. Unspecified Mix Commercial
Factor: One square foot of building will generate 13.0 pounds per year.
Calculation: 13.0 lbs times # of building square feet — 10,660,000

C-2. General Retail
Factor: One square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet — See C-1

C-3. Neighborhood Commercial (30,000 to 100,000 square feet).
Factor: One per square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet — See C-1

C-4. Regional Mall (100,000 to 300,000 square feet)
Factor: One square foot will generate 9 pounds per year.
Calculation: 9 lbs times # of square feet — See C-1

C-5. Restaurants, Fast Food Restaurants, and Drinking Establishments
Factor: One square foot will generate 22 pounds per year.
Calculation: 22 lbs times # of square feet — See C-1

C-6. Supermarkets
Factor: One square foot of space will generate 15 pounds per year.
Calculation: 15 lbs times # of square feet — See C-1

C-7. Office
Factor: One square foot of office space will generate 3.5 pounds per year.
Calculation: 3.5 lbs times # of square feet — See C-1

C-8. Medical /Dental offices
Factor: One per square foot will generate 6.0 pounds per year.
Calculation: 6 lbs times number of square feet — See C-1

C-9. Hotel/Motel Units
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

C-10. Auto Dealer, Services, Repair and Service Station
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

Industrial Waste

C-11. Unspecified Mixed Industrial
Factor: One square foot will generate 6 pounds per year
Calculation: 6 lbs times # of square feet — 3,120,000

C-12. Warehouse
Factor: One square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times # of square feet — See C-11

C-13. Manufacturing with 100 to 400 employees
Factor: One square foot will generate 5 pounds per year
Calculation: 5 lbs times # of square feet — See C-11

C-14. Manufacturing with 401 to 3000 employees
Factor: One square foot will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-11

Public Facility Waste

C-15. Schools
Factor: One per square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times number of square feet — N/A

C-16. Nursing & Retirement Care Facility
Factor: One per square foot will generate 9 pounds per year.
Calculation: 9 lbs times number of square feet — N/A

C-17. Hospitals
Factor: One per square foot will generate 11 pounds per year.
Calculation: 11 lbs times number of square feet N/A

C-18. Industrial/Commercial/ Public Facility Construction Waste
Factor: 8 pounds of construction waste per building square foot.
Calculation: 8 lbs times building square footage 10,720,000

D. Calculation Summary for Publication

Please merge the Section A,B, and C data onto Section D.

Category of WastePer Year		*WMD Formula Pounds*
D-1. Residential	(Section B-5)	4,948,550
D-2. Commercial	(Section C 1-10)	10,660,000
D-3. Industrial	(Section C11-14)	3,120,000
D-4. Public Facility	(Section C15-17)	0
D-5. Construction /Demolition	(Section B-4 & C-18)	20,260,800

D-5 Total Construction Waste Stream: 20,260,800 pounds per year

Add D-1, D-2, D-3, and D-4 Total Annual Operating Waste Stream: 18,728,550 pounds per year

Kern County Waste Management Department (KCWMD)
Solid Waste Work Sheet - Introduction

This work sheet provides information and formulas to estimate the general volume of solid waste resulting from new development and incoming waste to the landfill. This work sheet is intended to help KCWMD rate the environmental significance of a project's solid waste impacts per the California Environmental Quality Act (CEQA). Additional solid waste has the potential to impact Kern County's system of sanitary landfills, transfer stations, or effect local recycling programs mandated by the State. KCWMD is, per CEQA, the responsible agency in Kern County for solid waste. This work sheet also allows KCWMD to track and forecast future solid waste estimates.

This work sheet is intended for use by "major projects" defined as follows:

- Urban Development on sites over 15 acres.
- General Plan Amendments to commercial/industrial for sites over 15 acres
- Zone Changes to commercial/industrial for sites over 15 acres.
- Subdivision tracts over 15 acres or over 50 dwellings.
- Conditional Use Permit for recreational / public facilities projects over 15 acres.

Instructions. Project applicants/agents should review Sections A, B, C, and D.

For residential projects, please answer Sections A, B and D. For non residential projects, please answer Sections A, C and D. For combined residential/non residential projects, please answer Sections A, B, C and D.

Property information may be obtained at the Planning Department of the County or City.

Census tract data is available from:

Kern Council of Governments
1401 19th Street, Bakersfield, Ca.
(661) 861-2191 www/KernCog.org.

Solid waste information may be obtained from:

Kern County Waste Management Department
2700 "M" Street, Suite 500 Bakersfield, CA.
(661) 862-8900.

If you have any questions or comments regarding this form please contact Katrina Slayton at (661) 862 - 8810 or email at slaytonk@co.kern.ca.us.

KCWMD Form: 2012

A. Project Identification & Solid Waste Input from the Project Applicants

A-1. Project Identification

Applicant/Agent McIntosh & Associates Ph # (661) - 834-4814
Address: 2001 Wheelan Court City: Bakersfield, CA 93309
Check: Residential Project x Non-Residential Project x
Check: Applications: GPA ___ ZC ___ CUP ___ Tract ___ Site Plan ___ Other x

Project Description is / is not attached (circle one) or is defined as follows:
See Specific Plan.

Nearest city or community Lebec, CA
Township ___ Range ___ Section ___ Assessor Parcel Number See Specific Plan.
Landfill or Transfer Station *(KCWMD)* Bena SLF
Franchise Hauler *(KCWMD)* Mountainside Disposal

B. Residential Projects: Data and Calculation Formulas

Residential waste streams are based on a county wide average, type of dwelling unit and household population. Projects which have higher than average household populations may involve higher waste streams and may need to be evaluated on a case by case basis.

Residential Waste Profile

Dwelling type	Persons per Dwelling	Waste per Person	Total Waste per Household
Single Family	3.05	1,225 lbs	3,735 lbs
Apartments	2.85	1,225 lbs	3,490 lbs
MH park	2.15	1,225 lbs	2,635 lbs

Residential Data Needs:
Average number of persons per dwelling unit (census data). See Table Above
Total # of proposed dwelling units. 1,850 Single-family; 980 Village Center Residential

Pounds per year

B-1. Single Family Residential Units
Factor: The residents of one standard S.F. dwelling generate 3,735 pounds of solid waste per year.
Calculation: 3,735 lbs times # of dwelling units 6,909,750

B-2. Multi Family Apartments / Condominium
Factor: The residents of one standard apartment /condominium generate 3,490 pounds of solid waste per year.
Calculation: 3,490 lbs times # of apartment /condominium 3,420,200

B-3. Mobilehome Park Residential Units
Factor: One residents of one standard mobilehome generate 2,635 pounds of solid waste per year.
Calculation: 2,635 lbs times # of dwelling units — N/A

B-4. Residential construction waste
Factor: 4 pounds of construction waste per square foot.
Calculation: 4 lbs times # average square feet times # of dwelling units — 20,194,880
Note: This waste is a one time waste, not an annual waste.
*Average square feet of residential units is 1,784 sf

B-5 Total residential waste (Non-Construction B-1, B-2, B-3): — 10,329,950

C. Non –Residential Projects: Data Needs and Calculation Formulas

Solid waste projections are based on calculations unique to a given land use. A Non-residential project includes commercial, industrial and public facilities. If a commercial project is proposed where the building land uses are unknown, please use Section C-1. Use Section C-11 for unspecified industrial land uses.

Non- Residential Data Needs:

223 Project site net area in acres (1 acre = 43,560 sq. ft.).
2,843,400 Building footprint square footage.
29.27% Percentage ratio of building footprint square footage to net site acreage

Commercial Waste

Pounds per year

C-1. Unspecified Mix Commercial
Factor: One square foot of building will generate 13.0 pounds per year.
Calculation: 13.0 lbs times # of building square feet — 12,610,000

C-2. General Retail
Factor: One square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet — See C-1

C-3. Neighborhood Commercial (30,000 to 100,000 square feet).
Factor: One per square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet — See C-1

C-4. Regional Mall (100,000 to 300,000 square feet)
Factor: One square foot will generate 9 pounds per year.
Calculation: 9 lbs times # of square feet — See C-1

C-5. Restaurants, Fast Food Restaurants, and Drinking Establishments
Factor: One square foot will generate 22 pounds per year.
Calculation: 22 lbs times # of square feet — See C-1

C-6. Supermarkets
Factor: One square foot of space will generate 15 pounds per year.
Calculation: 15 lbs times # of square feet — See C-1

C-7. Office
Factor: One square foot of office space will generate 3.5 pounds per year.
Calculation: 3.5 lbs times # of square feet — See C-1

C-8. Medical /Dental offices
Factor: One per square foot will generate 6.0 pounds per year.
Calculation: 6 lbs times number of square feet — See C-1

C-9. Hotel/Motel Units
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

C-10. Auto Dealer, Services, Repair and Service Station
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

Industrial Waste

C-11. Unspecified Mixed Industrial
Factor: One square foot will generate 6 pounds per year
Calculation: 6 lbs times # of square feet — 7,320,000

C-12. Warehouse
Factor: One square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times # of square feet — See C-11

C-13. Manufacturing with 100 to 400 employees
Factor: One square foot will generate 5 pounds per year
Calculation: 5 lbs times # of square feet — See C-11

C-14. Manufacturing with 401 to 3000 employees
Factor: One square foot will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-11

Public Facility Waste

C-15. Schools
Factor: One per square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times number of square feet — 1,633,500
-Approximate sf of schools is 653,400 sf

C-16. Nursing & Retirement Care Facility
Factor: One per square foot will generate 9 pounds per year.
Calculation: 9 lbs times number of square feet — N/A

C-17. Hospitals
Factor: One per square foot will generate 11 pounds per year.
Calculation: 11 lbs times number of square feet N/A

C-18. Industrial/Commercial/ Public Facility Construction Waste
Factor: 8 pounds of construction waste per building square foot.
Calculation: 8 lbs times building square footage 22,747,200

D. Calculation Summary for Publication

Please merge the Section A,B, and C data onto Section D.

Category of WastePer Year		*WMD Formula Pounds*
D-1. Residential	(Section B-5)	10,329,950
D-2. Commercial	(Section C 1-10)	12,610,000
D-3. Industrial	(Section C11-14)	7,320,000
D-4. Public Facility	(Section C15-17)	1,633,500
D-5. Construction /Demolition	(Section B-4 & C-18)	42,942,080

D-5 Total Construction Waste Stream: 42,942,080 pounds per year

Add D-1, D-2, D-3, and D-4 Total Annual Operating Waste Stream: 31,893,450 pounds per year

Kern County Waste Management Department (KCWMD)
Solid Waste Work Sheet - Introduction

This work sheet provides information and formulas to estimate the general volume of solid waste resulting from new development and incoming waste to the landfill. This work sheet is intended to help KCWMD rate the environmental significance of a project's solid waste impacts per the California Environmental Quality Act (CEQA). Additional solid waste has the potential to impact Kern County's system of sanitary landfills, transfer stations, or effect local recycling programs mandated by the State. KCWMD is, per CEQA, the responsible agency in Kern County for solid waste. This work sheet also allows KCWMD to track and forecast future solid waste estimates.

This work sheet is intended for use by "major projects" defined as follows:

- Urban Development on sites over 15 acres.
- General Plan Amendments to commercial/industrial for sites over 15 acres
- Zone Changes to commercial/industrial for sites over 15 acres.
- Subdivision tracts over 15 acres or over 50 dwellings.
- Conditional Use Permit for recreational / public facilities projects over 15 acres.

Instructions. Project applicants/agents should review Sections A, B, C, and D.

For residential projects, please answer Sections A, B and D. For non residential projects, please answer Sections A, C and D. For combined residential/non residential projects, please answer Sections A, B, C and D.

Property information may be obtained at the Planning Department of the County or City.

Census tract data is available from:

Kern Council of Governments
1401 19th Street, Bakersfield, Ca.
(661) 861-2191 www/KernCog.org.

Solid waste information may be obtained from:

Kern County Waste Management Department
2700 "M" Street, Suite 500 Bakersfield, CA.
(661) 862-8900.

If you have any questions or comments regarding this form please contact Katrina Slayton at (661) 862 - 8810 or email at slaytonk@co.kern.ca.us.

KCWMD Form: 2012

A. Project Identification & Solid Waste Input from the Project Applicants

A-1. Project Identification

Applicant/Agent McIntosh & Associates Ph # (661) - 834-4814
Address: 2001 Wheelan Court City: Bakersfield, CA 93309
Check: Residential Project x Non-Residential Project x
Check: Applications: GPA ___ ZC ___ CUP ___ Tract ___ Site Plan ___ Other x

Project Description is / is not attached (circle one) or is defined as follows:
See Specific Plan.

Nearest city or community Lebec, CA
Township ___ Range ___ Section ___ Assessor Parcel Number See Specific Plan.
Landfill or Transfer Station *(KCWMD)* Bena SLF
Franchise Hauler *(KCWMD)* Mountainside Disposal

B. Residential Projects: Data and Calculation Formulas

Residential waste streams are based on a county wide average, type of dwelling unit and household population. Projects which have higher than average household populations may involve higher waste streams and may need to be evaluated on a case by case basis.

Residential Waste Profile

Dwelling type	Persons per Dwelling	Waste per Person	Total Waste per Household
Single Family	3.05	1,225 lbs	3,735 lbs
Apartments	2.85	1,225 lbs	3,490 lbs
MH park	2.15	1,225 lbs	2,635 lbs

Residential Data Needs:
Average number of persons per dwelling unit (census data). See Table Above
Total # of proposed dwelling units. 1,180Single-family; 730 Village Center Residential

Pounds per year

B-1. Single Family Residential Units

Factor: The residents of one standard S.F. dwelling generate 3,735 pounds of solid waste per year.
Calculation: 3,735 lbs times # of dwelling units 4,407,300

B-2. Multi Family Apartments / Condominium

Factor: The residents of one standard apartment /condominium generate 3,490 pounds of solid waste per year.
Calculation: 3,490 lbs times # of apartment /condominium 2,547,700

B-3. **Mobilehome Park Residential Units**
Factor: One residents of one standard mobilehome generate 2,635 pounds of solid waste per year.
Calculation: 2,635 lbs times # of dwelling units — N/A

B-4. **Residential construction waste**
Factor: 4 pounds of construction waste per square foot.
Calculation: 4 lbs times # average square feet times # of dwelling units — 13,629,760
Note: This waste is a one time waste, not an annual waste.
*Average square feet of residential units is 1,784 sf

B-5 **Total residential waste (Non-Construction B-1, B-2, B-3):** 6,955,000

C. Non –Residential Projects: Data Needs and Calculation Formulas

Solid waste projections are based on calculations unique to a given land use. A Non-residential project includes commercial, industrial and public facilities. If a commercial project is proposed where the building land uses are unknown, please use Section C-1. Use Section C-11 for unspecified industrial land uses.

Non- Residential Data Needs:

259 Project site net area in acres (1 acre = 43,560 sq. ft.).
2,618,900 Building footprint square footage.
23.21% Percentage ratio of building footprint square footage to net site acreage

Commercial Waste

Pounds per year

C-1. **Unspecified Mix Commercial**
Factor: One square foot of building will generate 13.0 pounds per year.
Calculation: 13.0 lbs times # of building square feet — 22,750,000

C-2. **General Retail**
Factor: One square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet — See C-1

C-3. **Neighborhood Commercial** (30,000 to 100,000 square feet).
Factor: One per square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet — See C-1

C-4. **Regional Mall** (100,000 to 300,000 square feet)
Factor: One square foot will generate 9 pounds per year.
Calculation: 9 lbs times # of square feet — See C-1

C-5. **Restaurants, Fast Food Restaurants, and Drinking Establishments**
Factor: One square foot will generate 22 pounds per year.
Calculation: 22 lbs times # of square feet — See C-1

C-6. Supermarkets
Factor: One square foot of space will generate 15 pounds per year.
Calculation: 15 lbs times # of square feet — See C-1

C-7. Office
Factor: One square foot of office space will generate 3.5 pounds per year.
Calculation: 3.5 lbs times # of square feet — See C-1

C-8. Medical /Dental offices
Factor: One per square foot will generate 6.0 pounds per year.
Calculation: 6 lbs times number of square feet — See C-1

C-9. Hotel/Motel Units
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

C-10. Auto Dealer, Services, Repair and Service Station
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

Industrial Waste

C-11. Unspecified Mixed Industrial
Factor: One square foot will generate 6 pounds per year
Calculation: 6 lbs times # of square feet — 4,560,000

C-12. Warehouse
Factor: One square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times # of square feet — See C-11

C-13. Manufacturing with 100 to 400 employees
Factor: One square foot will generate 5 pounds per year
Calculation: 5 lbs times # of square feet — See C-11

C-14. Manufacturing with 401 to 3000 employees
Factor: One square foot will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-11

Public Facility Waste

C-15. Schools
Factor: One per square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times number of square feet — 272,250
-Approximate sf of schools is 653,400 sf

C-16. Nursing & Retirement Care Facility
Factor: One per square foot will generate 9 pounds per year.
Calculation: 9 lbs times number of square feet — N/A

C-17. Hospitals
Factor: One per square foot will generate 11 pounds per year.
Calculation: 11 lbs times number of square feet N/A

C-18. Industrial/Commercial/ Public Facility Construction Waste
Factor: 8 pounds of construction waste per building square foot.
Calculation: 8 lbs times building square footage 20,951,200

D. Calculation Summary for Publication

Please merge the Section A,B, and C data onto Section D.

Category of WastePer Year		*WMD Formula Pounds*
D-1. Residential	(Section B-5)	6,955,000
D-2. Commercial	(Section C 1-10)	22,750,000
D-3. Industrial	(Section C11-14)	4,560,000
D-4. Public Facility	(Section C15-17)	272,250
D-5. Construction /Demolition	(Section B-4 & C-18)	34,580,960

D-5 Total Construction Waste Stream: 34,580,860 pounds per year

Add D-1, D-2, D-3, and D-4 Total Annual Operating Waste Stream: 34,537,250 pounds per year

Kern County Waste Management Department (KCWMD)
Solid Waste Work Sheet - Introduction

This work sheet provides information and formulas to estimate the general volume of solid waste resulting from new development and incoming waste to the landfill. This work sheet is intended to help KCWMD rate the environmental significance of a project's solid waste impacts per the California Environmental Quality Act (CEQA). Additional solid waste has the potential to impact Kern County's system of sanitary landfills, transfer stations, or effect local recycling programs mandated by the State. KCWMD is, per CEQA, the responsible agency in Kern County for solid waste. This work sheet also allows KCWMD to track and forecast future solid waste estimates.

This work sheet is intended for use by "major projects" defined as follows:

- Urban Development on sites over 15 acres.
- General Plan Amendments to commercial/industrial for sites over 15 acres
- Zone Changes to commercial/industrial for sites over 15 acres.
- Subdivision tracts over 15 acres or over 50 dwellings.
- Conditional Use Permit for recreational / public facilities projects over 15 acres.

Instructions. Project applicants/agents should review Sections A, B, C, and D.

For residential projects, please answer Sections A, B and D. For non residential projects, please answer Sections A, C and D. For combined residential/non residential projects, please answer Sections A, B, C and D.

Property information may be obtained at the Planning Department of the County or City.

Census tract data is available from:

Kern Council of Governments
1401 19th Street, Bakersfield, Ca.
(661) 861-2191 www/KernCog.org.

Solid waste information may be obtained from:

Kern County Waste Management Department
2700 "M" Street, Suite 500 Bakersfield, CA.
(661) 862-8900.

If you have any questions or comments regarding this form please contact Katrina Slayton at (661) 862 - 8810 or email at slaytonk@co.kern.ca.us.

KCWMD Form: 2012

A. Project Identification & Solid Waste Input from the Project Applicants

A-1. Project Identification

Applicant/Agent McIntosh & Associates Ph # (661) - 834-4814
Address: 2001 Wheelan Court City: Bakersfield, CA 93309
Check: Residential Project x Non-Residential Project x
Check: Applications: GPA ___ ZC ___ CUP ___ Tract ___ Site Plan ___ Other x

Project Description is / is not attached (circle one) or is defined as follows:
See Specific Plan.

Nearest city or community Lebec, CA
Township ___ Range ___ Section ___ Assessor Parcel Number See Specific Plan.
Landfill or Transfer Station *(KCWMD)* Bena SLF
Franchise Hauler *(KCWMD)* Mountainside Disposal

B. Residential Projects: Data and Calculation Formulas

Residential waste streams are based on a county wide average, type of dwelling unit and household population. Projects which have higher than average household populations may involve higher waste streams and may need to be evaluated on a case by case basis.

Residential Waste Profile

Dwelling type	Persons per Dwelling	Waste per Person	Total Waste per Household
Single Family	3.05	1,225 lbs	3,735 lbs
Apartments	2.85	1,225 lbs	3,490 lbs
MH park	2.15	1,225 lbs	2,635 lbs

Residential Data Needs:
Average number of persons per dwelling unit (census data). See Table Above
Total # of proposed dwelling units. 1,900 Single-family; 570 Village Center Residential

Pounds per year

B-1. Single Family Residential Units

Factor: The residents of one standard S.F. dwelling generate 3,735 pounds of solid waste per year.
Calculation: 3,735 lbs times # of dwelling units 7,096,500

B-2. Multi Family Apartments / Condominium

Factor: The residents of one standard apartment /condominium generate 3,490 pounds of solid waste per year.
Calculation: 3,490 lbs times # of apartment /condominium 1,989,300

B-3. **Mobilehome Park Residential Units**
Factor: One residents of one standard mobilehome generate 2,635 pounds of solid waste per year.
Calculation: 2,635 lbs times # of dwelling units — N/A

B-4. **Residential construction waste**
Factor: 4 pounds of construction waste per square foot.
Calculation: 4 lbs times # average square feet times # of dwelling units — 17,645,680
Note: This waste is a one time waste, not an annual waste.
*Average square feet of residential units is 1,786 sf

B-5 **Total residential waste (Non-Construction B-1, B-2, B-3):** — 9,085,800

C. Non –Residential Projects: Data Needs and Calculation Formulas

Solid waste projections are based on calculations unique to a given land use. A Non-residential project includes commercial, industrial and public facilities. If a commercial project is proposed where the building land uses are unknown, please use Section C-1. Use Section C-11 for unspecified industrial land uses.

Non- Residential Data Needs:

- 90 Project site net area in acres (1 acre = 43,560 sq. ft.).
- 2,618,900 Building footprint square footage.
- 19.22% Percentage ratio of building footprint square footage to net site acreage

Commercial Waste

Pounds per year

C-1. **Unspecified Mix Commercial**
Factor: One square foot of building will generate 13.0 pounds per year.
Calculation: 13.0 lbs times # of building square feet — 1,300,000

C-2. **General Retail**
Factor: One square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet — See C-1

C-3. **Neighborhood Commercial** (30,000 to 100,000 square feet).
Factor: One per square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet — See C-1

C-4. **Regional Mall** (100,000 to 300,000 square feet)
Factor: One square foot will generate 9 pounds per year.
Calculation: 9 lbs times # of square feet — See C-1

C-5. **Restaurants, Fast Food Restaurants, and Drinking Establishments**
Factor: One square foot will generate 22 pounds per year.
Calculation: 22 lbs times # of square feet — See C-1

C-6. Supermarkets
Factor: One square foot of space will generate 15 pounds per year.
Calculation: 15 lbs times # of square feet — See C-1

C-7. Office
Factor: One square foot of office space will generate 3.5 pounds per year.
Calculation: 3.5 lbs times # of square feet — See C-1

C-8. Medical /Dental offices
Factor: One per square foot will generate 6.0 pounds per year.
Calculation: 6 lbs times number of square feet — See C-1

C-9. Hotel/Motel Units
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

C-10. Auto Dealer, Services, Repair and Service Station
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

Industrial Waste

C-11. Unspecified Mixed Industrial
Factor: One square foot will generate 6 pounds per year
Calculation: 6 lbs times # of square feet — 0

C-12. Warehouse
Factor: One square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times # of square feet — See C-11

C-13. Manufacturing with 100 to 400 employees
Factor: One square foot will generate 5 pounds per year
Calculation: 5 lbs times # of square feet — See C-11

C-14. Manufacturing with 401 to 3000 employees
Factor: One square foot will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-11

Public Facility Waste

C-15. Schools
Factor: One per square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times number of square feet — 1,633,500
-Approximate sf of schools is 653,400 sf

C-16. Nursing & Retirement Care Facility
Factor: One per square foot will generate 9 pounds per year.
Calculation: 9 lbs times number of square feet — N/A

C-17. Hospitals
Factor: One per square foot will generate 11 pounds per year.
Calculation: 11 lbs times number of square feet N/A

C-18. Industrial/Commercial/ Public Facility Construction Waste
Factor: 8 pounds of construction waste per building square foot.
Calculation: 8 lbs times building square footage 6,027,200

D. Calculation Summary for Publication

Please merge the Section A,B, and C data onto Section D.

Category of WastePer Year		*WMD Formula Pounds*
D-1. Residential	(Section B-5)	9,085,800
D-2. Commercial	(Section C 1-10)	1,300,000
D-3. Industrial	(Section C11-14)	0
D-4. Public Facility	(Section C15-17)	1,633,500
D-5. Construction /Demolition	(Section B-4 & C-18)	23,672,880

D-5 Total Construction Waste Stream: 23,672,880 pounds per year

Add D-1, D-2, D-3, and D-4 Total Annual Operating Waste Stream: 12,019,300 pounds per year

Kern County Waste Management Department (KCWMD)
Solid Waste Work Sheet - Introduction

This work sheet provides information and formulas to estimate the general volume of solid waste resulting from new development and incoming waste to the landfill. This work sheet is intended to help KCWMD rate the environmental significance of a project's solid waste impacts per the California Environmental Quality Act (CEQA). Additional solid waste has the potential to impact Kern County's system of sanitary landfills, transfer stations, or effect local recycling programs mandated by the State. KCWMD is, per CEQA, the responsible agency in Kern County for solid waste. This work sheet also allows KCWMD to track and forecast future solid waste estimates.

This work sheet is intended for use by "major projects" defined as follows:

- Urban Development on sites over 15 acres.
- General Plan Amendments to commercial/industrial for sites over 15 acres
- Zone Changes to commercial/industrial for sites over 15 acres.
- Subdivision tracts over 15 acres or over 50 dwellings.
- Conditional Use Permit for recreational / public facilities projects over 15 acres.

Instructions. Project applicants/agents should review Sections A, B, C, and D.

For residential projects, please answer Sections A, B and D.
For non residential projects, please answer Sections A, C and D.
For combined residential/non residential projects, please answer Sections A, B, C and D.

Property information may be obtained at the Planning Department of the County or City.

Census tract data is available from:

Kern Council of Governments
1401 19th Street, Bakersfield, Ca.
(661) 861-2191 www/KernCog.org.

Solid waste information may be obtained from:

Kern County Waste Management Department
2700 "M" Street, Suite 500 Bakersfield, CA.
(661) 862-8900.

If you have any questions or comments regarding this form please contact Katrina Slayton at (661) 862 - 8810 or email at slaytonk@co.kern.ca.us.

KCWMD Form: 2012

A. Project Identification & Solid Waste Input from the Project Applicants

A-1. Project Identification

Applicant/Agent McIntosh & Associates Ph # (661) - 834-4814
Address: 2001 Wheelan Court City: Bakersfield, CA 93309
Check: Residential Project x Non-Residential Project x
Check: Applications: GPA ___ ZC ___ CUP ___ Tract ___ Site Plan ___ Other x

Project Description is / is not attached (circle one) or is defined as follows:
See Specific Plan.

Nearest city or community Lebec, CA
Township ____ Range ___ Section ____ Assessor Parcel Number See Specific Plan
Landfill or Transfer Station *(KCWMD)* Bena SLF
Franchise Hauler *(KCWMD)* Mountainside Disposal

B. Residential Projects: Data and Calculation Formulas

Residential waste streams are based on a county wide average, type of dwelling unit and household population. Projects which have higher than average household populations may involve higher waste streams and may need to be evaluated on a case by case basis.

Residential Waste Profile

Dwelling type	Persons per Dwelling	Waste per Person	Total Waste per Household
Single Family	3.05	1,225 lbs	3,735 lbs
Apartments	2.85	1,225 lbs	3,490 lbs
MH park	2.15	1,225 lbs	2,635 lbs

Residential Data Needs:
Average number of persons per dwelling unit (census data). See Table Above
Total # of proposed dwelling units. 1,785 Single-family; 330 Village Center Residential

Pounds per year

B-1. Single Family Residential Units
Factor: The residents of one standard S.F. dwelling generate 3,735 pounds of solid waste per year.
Calculation: 3,735 lbs times # of dwelling units — 6,666,975

B-2. Multi Family Apartments / Condominium
Factor: The residents of one standard apartment /condominium generate 3,490 pounds of solid waste per year.
Calculation: 3,490 lbs times # of apartment /condominium — 1,151,700

B-3. **Mobilehome Park Residential Units**
Factor: One residents of one standard mobilehome generate 2,635 pounds of solid waste per year.
Calculation: 2,635 lbs times # of dwelling units — N/A

B-4. **Residential construction waste**
Factor: 4 pounds of construction waste per square foot.
Calculation: 4 lbs times # average square feet times # of dwelling units — 16,733,880
Note: This waste is a one time waste, not an annual waste.
*Average square feet of residential units is 1,978 sf

B-5 **Total residential waste (Non-Construction B-1, B-2, B-3):** — 7,818,675

C. Non –Residential Projects: Data Needs and Calculation Formulas

Solid waste projections are based on calculations unique to a given land use. A Non-residential project includes commercial, industrial and public facilities. If a commercial project is proposed where the building land uses are unknown, please use Section C-1. Use Section C-11 for unspecified industrial land uses.

Non- Residential Data Needs:

10 Project site net area in acres (1 acre = 43,560 sq. ft.).
148,900 Building footprint square footage.
34.18% Percentage ratio of building footprint square footage to net site acreage

Commercial Waste

Pounds per year

C-1. **Unspecified Mix Commercial**
Factor: One square foot of building will generate 13.0 pounds per year.
Calculation: 13.0 lbs times # of building square feet — 520,000

C-2. **General Retail**
Factor: One square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet — See C-1

C-3. **Neighborhood Commercial** (30,000 to 100,000 square feet).
Factor: One per square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet — See C-1

C-4. **Regional Mall** (100,000 to 300,000 square feet)
Factor: One square foot will generate 9 pounds per year.
Calculation: 9 lbs times # of square feet — See C-1

C-5. **Restaurants, Fast Food Restaurants, and Drinking Establishments**
Factor: One square foot will generate 22 pounds per year.
Calculation: 22 lbs times # of square feet — See C-1

C-6. Supermarkets
Factor: One square foot of space will generate 15 pounds per year.
Calculation: 15 lbs times # of square feet — See C-1

C-7. Office
Factor: One square foot of office space will generate 3.5 pounds per year.
Calculation: 3.5 lbs times # of square feet — See C-1

C-8. Medical /Dental offices
Factor: One per square foot will generate 6.0 pounds per year.
Calculation: 6 lbs times number of square feet — See C-1

C-9. Hotel/Motel Units
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

C-10. Auto Dealer, Services, Repair and Service Station
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

Industrial Waste

C-11. Unspecified Mixed Industrial
Factor: One square foot will generate 6 pounds per year
Calculation: 6 lbs times # of square feet — 0

C-12. Warehouse
Factor: One square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times # of square feet — See C-11

C-13. Manufacturing with 100 to 400 employees
Factor: One square foot will generate 5 pounds per year
Calculation: 5 lbs times # of square feet — See C-11

C-14. Manufacturing with 401 to 3000 employees
Factor: One square foot will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-11

Public Facility Waste

C-15. Schools
Factor: One per square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times number of square feet — 272,250
-Approximate sf of schools is 653,400 sf

C-16. Nursing & Retirement Care Facility
Factor: One per square foot will generate 9 pounds per year.
Calculation: 9 lbs times number of square feet — N/A

C-17. Hospitals

Factor: One per square foot will generate 11 pounds per year.

Calculation: 11 lbs times number of square feet N/A

C-18. Industrial/Commercial/ Public Facility Construction Waste

Factor: 8 pounds of construction waste per building square foot.

Calculation: 8 lbs times building square footage 1,191,200

D. Calculation Summary for Publication

Please merge the Section A,B, and C data onto Section D.

Category of WastePer Year		*WMD Formula Pounds*
D-1. Residential	(Section B-5)	7,818,675
D-2. Commercial	(Section C 1-10)	520,000
D-3. Industrial	(Section C11-14)	0
D-4. Public Facility	(Section C15-17)	272,250
D-5. Construction /Demolition	(Section B-4 & C-18)	17,925,080

D-5 Total Construction Waste Stream: 17,925,080 pounds per year

Add D-1, D-2, D-3, and D-4 Total Annual Operating Waste Stream: 8,610,925 pounds per year

Kern County Waste Management Department (KCWMD)
Solid Waste Work Sheet - Introduction

This work sheet provides information and formulas to estimate the general volume of solid waste resulting from new development and incoming waste to the landfill. This work sheet is intended to help KCWMD rate the environmental significance of a project's solid waste impacts per the California Environmental Quality Act (CEQA). Additional solid waste has the potential to impact Kern County's system of sanitary landfills, transfer stations, or effect local recycling programs mandated by the State. KCWMD is, per CEQA, the responsible agency in Kern County for solid waste. This work sheet also allows KCWMD to track and forecast future solid waste estimates.

This work sheet is intended for use by "major projects" defined as follows:

- Urban Development on sites over 15 acres.
- General Plan Amendments to commercial/industrial for sites over 15 acres
- Zone Changes to commercial/industrial for sites over 15 acres.
- Subdivision tracts over 15 acres or over 50 dwellings.
- Conditional Use Permit for recreational / public facilities projects over 15 acres.

Instructions. Project applicants/agents should review Sections A, B, C, and D.

For residential projects, please answer Sections A, B and D. For non residential projects, please answer Sections A, C and D. For combined residential/non residential projects, please answer Sections A, B, C and D.

Property information may be obtained at the Planning Department of the County or City.

Census tract data is available from:

Kern Council of Governments
1401 19th Street, Bakersfield, Ca.
(661) 861-2191 www/KernCog.org.

Solid waste information may be obtained from:

Kern County Waste Management Department
2700 "M" Street, Suite 500 Bakersfield, CA.
(661) 862-8900.

If you have any questions or comments regarding this form please contact Katrina Slayton at (661) 862 - 8810 or email at slaytonk@co.kern.ca.us.

KCWMD Form: 2012

A. Project Identification & Solid Waste Input from the Project Applicants

A-1. Project Identification

Applicant/Agent McIntosh & Associates Ph # (661) - 834-4814
Address: 2001 Wheelan Court City: Bakersfield, CA 93309
Check: Residential Project x Non-Residential Project x
Check: Applications: GPA ___ ZC ___ CUP ___ Tract ___ Site Plan ___ Other x

Project Description is / is not attached (circle one) or is defined as follows:
See Specific Plan.

Nearest city or community Lebec, CA
Township ___ Range ___ Section ___ Assessor Parcel Number See Specific Plan.
Landfill or Transfer Station *(KCWMD)* Bena SLF
Franchise Hauler *(KCWMD)* Mountainside Disposal

B. Residential Projects: Data and Calculation Formulas

Residential waste streams are based on a county wide average, type of dwelling unit and household population. Projects which have higher than average household populations may involve higher waste streams and may need to be evaluated on a case by case basis.

Residential Waste Profile

Dwelling type	Persons per Dwelling	Waste per Person	Total Waste per Household
Single Family	3.05	1,225 lbs	3,735 lbs
Apartments	2.85	1,225 lbs	3,490 lbs
MH park	2.15	1,225 lbs	2,635 lbs

Residential Data Needs:
Average number of persons per dwelling unit (census data). See Table Above
Total # of proposed dwelling units. 585 Single-family; 750 Village Center Residential

Pounds per year

B-1. Single Family Residential Units

Factor: The residents of one standard S.F. dwelling generate 3,735 pounds of solid waste per year.
Calculation: 3,735 lbs times # of dwelling units 2,184,975

B-2. Multi Family Apartments / Condominium

Factor: The residents of one standard apartment /condominium generate 3,490 pounds of solid waste per year.
Calculation: 3,490 lbs times # of apartment /condominium 2,617,500

B-3. **Mobilehome Park Residential Units**
Factor: One residents of one standard mobilehome generate 2,635 pounds of solid waste per year.
Calculation: 2,635 lbs times # of dwelling units N/A

B-4. **Residential construction waste**
Factor: 4 pounds of construction waste per square foot.
Calculation: 4 lbs times # average square feet times # of dwelling units 9,478,500
Note: This waste is a one time waste, not an annual waste.
*Average square feet of residential units is 1,775 sf

B-5 **Total residential waste (Non-Construction B-1, B-2, B-3):** 4,802,475

C. Non –Residential Projects: Data Needs and Calculation Formulas

Solid waste projections are based on calculations unique to a given land use. A Non-residential project includes commercial, industrial and public facilities. If a commercial project is proposed where the building land uses are unknown, please use Section C-1. Use Section C-11 for unspecified industrial land uses.

Non- Residential Data Needs:

1,109 Project site net area in acres (1 acre = 43,560 sq. ft.).
4,677,300 Building footprint square footage.
34.18% Percentage ratio of building footprint square footage to net site acreage

Commercial Waste

Pounds per year

C-1. **Unspecified Mix Commercial**
Factor: One square foot of building will generate 13.0 pounds per year.
Calculation: 13.0 lbs times # of building square feet 5,200,000

C-2. **General Retail**
Factor: One square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet See C-1

C-3. **Neighborhood Commercial** (30,000 to 100,000 square feet).
Factor: One per square foot will generate 7 pounds per year.
Calculation: 7 lbs times # of square feet See C-1

C-4. **Regional Mall** (100,000 to 300,000 square feet)
Factor: One square foot will generate 9 pounds per year.
Calculation: 9 lbs times # of square feet See C-1

C-5. **Restaurants, Fast Food Restaurants, and Drinking Establishments**
Factor: One square foot will generate 22 pounds per year.
Calculation: 22 lbs times # of square feet See C-1

C-6. Supermarkets
Factor: One square foot of space will generate 15 pounds per year.
Calculation: 15 lbs times # of square feet — See C-1

C-7. Office
Factor: One square foot of office space will generate 3.5 pounds per year.
Calculation: 3.5 lbs times # of square feet — See C-1

C-8. Medical /Dental offices
Factor: One per square foot will generate 6.0 pounds per year.
Calculation: 6 lbs times number of square feet — See C-1

C-9. Hotel/Motel Units
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

C-10. Auto Dealer, Services, Repair and Service Station
Factor: One square foot of space will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-1

Industrial Waste

C-11. Unspecified Mixed Industrial
Factor: One square foot will generate 6 pounds per year
Calculation: 6 lbs times # of square feet — 25,010,400

C-12. Warehouse
Factor: One square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times # of square feet — See C-11

C-13. Manufacturing with 100 to 400 employees
Factor: One square foot will generate 5 pounds per year
Calculation: 5 lbs times # of square feet — See C-11

C-14. Manufacturing with 401 to 3000 employees
Factor: One square foot will generate 10 pounds per year.
Calculation: 10 lbs times # of square feet — See C-11

Public Facility Waste

C-15. Schools
Factor: One per square foot will generate 2.5 pounds per year.
Calculation: 2.5 lbs times number of square feet — 272,250
-Approximate square footage of schools is 653,400 sf

C-16. Nursing & Retirement Care Facility
Factor: One per square foot will generate 9 pounds per year.
Calculation: 9 lbs times number of square feet — N/A

C-17. Hospitals
Factor: One per square foot will generate 11 pounds per year.
Calculation: 11 lbs times number of square feet N/A

C-18. Industrial/Commercial/ Public Facility Construction Waste
Factor: 8 pounds of construction waste per building square foot.
Calculation: 8 lbs times building square footage 37,418,400

D. Calculation Summary for Publication

Please merge the Section A,B, and C data onto Section D.

Category of WastePer Year		*WMD Formula Pounds*
D-1. Residential	(Section B-5)	4,802,475
D-2. Commercial	(Section C 1-10)	5,200,000
D-3. Industrial	(Section C11-14)	25,010,400
D-4. Public Facility	(Section C15-17)	272,250
D-5. Construction /Demolition	(Section B-4 & C-18)	46,896,900

D-5 Total Construction Waste Stream: 46,896,900 pounds per year

Add D-1, D-2, D-3, and D-4 Total Annual Operating Waste Stream: 35,012,875 pounds per year

Appendix W
Waste Haul Analysis

WASTE HAUL ANALYSIS

Grapevine Project

Prepared for:

Tejon Grapevine, LLC
4436 Lebec Road
Tejon Ranch, California 93243

Project Management Provided by:

DMB Pacific Ventures
801 Montgomery Street, Suite 200
San Francisco, California 94133
Contact: Steve Letterly

REGISTERED PROFESSIONAL ENGINEER
ROGER A. McINTOSH
No. 3332[illegible]
Exp. 6-30-14
CIVIL
STATE OF CALIFORNIA

Prepared by:

McINTOSH & ASSOCIATES
© 2014

February 2014

TABLE OF CONTENTS:

Executive Summary

Future development of the Grapevine area will result in large quantities of waste and other recyclable material that will need to be managed. The Kern County Waste Management Department will be responsible for providing safe management of this waste and will be tasked with identifying the least expensive option for managing waste generated by future growth in the Grapevine area. The costs associated with direct haul and transfer haul are examined to determine which option is the most cost effective in terms of both short and long-term growth.

Using information provided by Kern County Waste Management and local contracted waste hauling entity Price Environmental, costs for both direct haul and transfer haul could be derived on an annual basis. This report concludes that direct haul is the most cost effective option when it comes to managing waste generated by the Grapevine Project.

Now that Kern County Waste Management has begun looking into the most cost effective method of hauling waste, it may be worthwhile for decision-makers to study the cost effectiveness of a shared transfer facility with nearby communities to understand if this would drive the cost of transfer haul down to a more economical expense. Other issues the County may consider are the outcomes associated with vehicle miles traveled using direct haul as it will result in increased emissions and wear on the roads.

1.0 Introduction

1.1 Study Purpose and Background

As Kern County continues to grow, the Kern County Waste Management Department (KCWMD) will continue to be responsible for providing safe management of municipal solid waste (waste). Currently, the department operates seven landfills and eight transfer stations that offer both disposal and recycling services. Landfills, in the traditional sense, are final destinations for waste to be disposed of and buried (see Figure 1). Since California state law mandates the amount of garbage going to landfills be reduced, Kern County has implemented various recycling programs, to divert waste. Kern County's landfills also have areas where waste can be diverted on-site which is convenient for people who self-haul items to the landfill (i.e. bulk refrigerators, glass, plastic, etc.). The KCWMD has implemented several programs to increase waste recycling for residences and businesses. For example, the communities of Arvin, Metropolitan Bakersfield, Delano, Shafter, and Wasco participate in Curbside Green Waste Recycling as part of the regular trash service. Arvin, Delano, McFarland, and Metropolitan Bakersfield also participate in the blue bin Curbside Recycling Program in addition to regular trash service. Both programs allow customers to dispose of recyclable material in a designated curbside bin, which gets collected during routine routes, and taken to a nearby recycling center.

Figure 1: Bena Landfill before and after showing waste that has been buried and covered by dirt.
Source: http://www.kerncountywaste.com/landfills-transfer-stations-bin-sites/landfills/bena

Future development and large-scale projects that will result in population growth within the county may benefit from an in depth analysis of how waste will be managed since the associated costs can vary depending on method of disposal and type of recycling program being implemented. This study provides a methodology for determining the costs associated with waste management by comparing two types of disposal methods: direct haul and transfer haul.

Direct Haul

Direct haul means that waste is directly hauled from the collection site to the nearest landfill. Other recyclable materials are also hauled to their respective destinations. For solid waste, direct haul requires collection trucks to make trips to the landfill each time the trucks reach their carrying capacity. When the distance between collection site and disposal site increases, collection trucks spend more time driving to and from each location, resulting in less time to collect waste.

Transfer Haul

Transfer haul means that waste is collected and temporarily disposed of at a nearby transfer facility. Although there are many ways to operate a transfer facility, the basic model for a transfer station shows that waste brought to the station by a contracted collection truck is eventually loaded onto a much larger hauling vehicle or transfer trailer that transports waste in large volumes to the nearest landfill. The typical collection vehicle can hold anywhere from 7-10 tons, depending on compaction of materials. Large transfer vehicles can hold upwards to 21 tons[1]. This equates to about 17 or 18 cubic yards of waste. Some materials may be heavier than others without taking up much space, therefore the legal capacity for the transfer trailer is 80,000 lbs. Figure 2 shows waste being (A) dumped directly into a transfer trailer from the tipping floor and (B) an alternative option in which waste that has been dumped onto a tipping floor is later pushed into a transfer trailer. Transfer facilities do not serve as long-term storage sites.

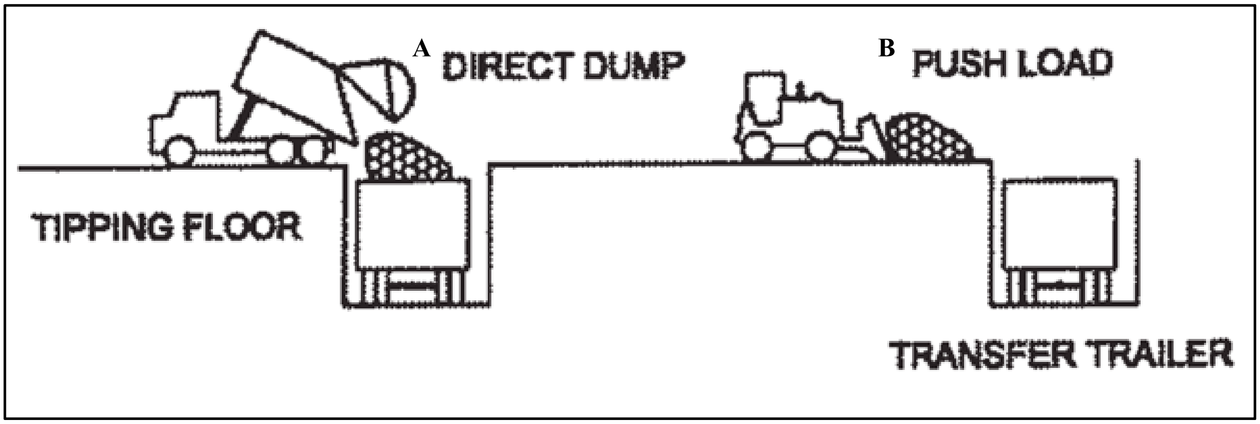


Figure 2: Example of basic Transfer Station operations

Source: Waste Transfer Stations: A Manual for Decision-Making. (2002). Available online at http://www.epa.gov/epawaste/nonhaz/municipal/pubs/r02002.pdf.

Decision-makers need to determine the least expensive option for managing the waste that will be generated by the Grapevine Project. In view of that, this report will examine local trends associated with waste management within Kern County and will apply these trends to the Grapevine Project. In order to determine which disposal method will be the most cost-effective, this study will discuss the projected amount of waste to be generated by the Project, which is broken down by residential waste and non-residential waste, since different trucks are used to collect trash from residential areas and businesses. Costs for collecting recyclable material is also discussed in addition to regular refuse. Although this report emphasizes Planning Area One's (PA 1) waste production and how much it will cost to manage the waste, the entire Project area is also discussed for a thorough comparison.

[1] Carrying capacity of 7-10 tons for collection trucks and 21 tons for hauler vehicles is based on personal communication with Chuck Magee of the KCWMD and researching the following study: United State Environmental Protection Agency. *Waste Transfer Stations: A Manual for Decision-Making.*(2002). Available online at http://www.epa.gov/epawaste/nonhaz/municipal/pubs/r02002.pdf.

1.2 Grapevine Project Description

The proposed Grapevine Project is located within the unincorporated area of southwest Kern County, State of California (see Figure 3). The project site encompasses 8,010 acres and will be phased over a number of years. The project is composed of six planning areas with land uses ranging from Village Mixed Use, Mixed Use, Industrial, and Exclusive Agriculture. Each planning area has development projections for specific uses. For example, Planning Area One has the following development projections:

- 1,409 Residential Dwelling Units
- 195,000 sq ft of Village Center Commercial space
- 365,000 sq ft of Office/R&D space
- 70,000 sq ft of Freeway-Oriented Commercial space

The Grapevine Project is comprised of 10,748,000 sq ft of commercial space and 12,000 residential dwelling units. The total population at build-out of the project is projected to be approximately 38,400 persons[2].

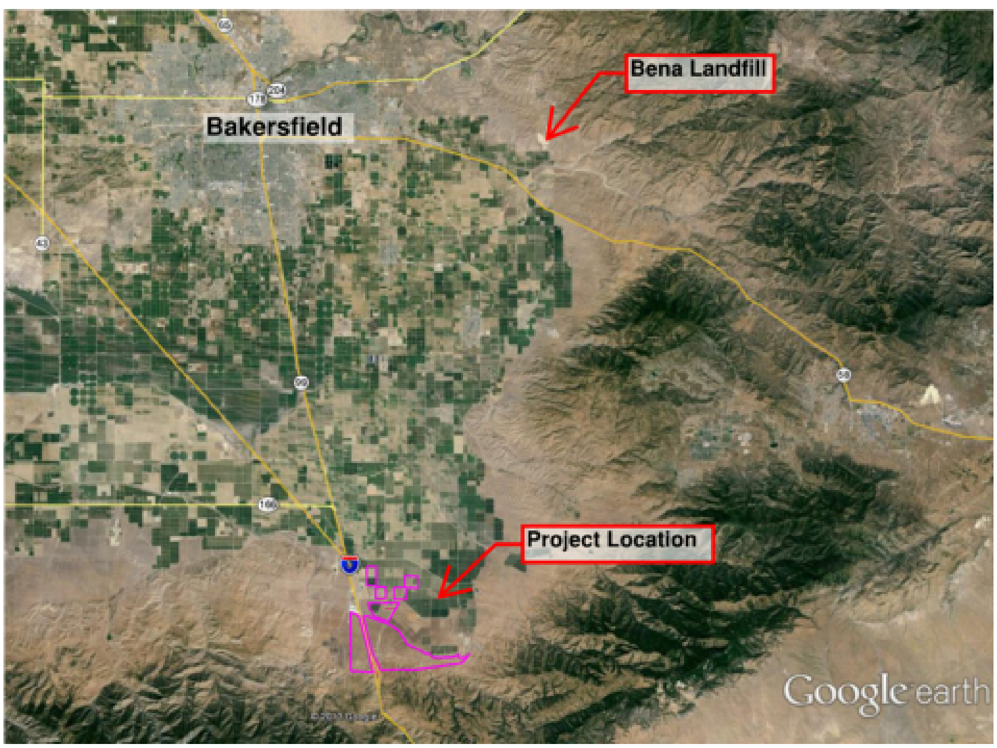


Figure 3: Project location map and nearest landfill.

Source: Google Earth, 8/12/2013.

[2] Personal communication with Steve Letterly and Roberta Marshall. Assuming 3.20 persons per household and a maximum of 12,000 dwelling units.

2.0 Research

2.1 Waste Produced from the Grapevine Project

Residential Waste

The 2011 U.S. average amount of waste produced by a person per day is 4.40 lbs, or 1,606 lbs per person per year[3]. Assuming an average of 3.20 persons per dwelling unit, the total waste per dwelling per year is 5,139.20 lbs (See Table 1). This figure equates to about 98.8 lbs of waste per dwelling per week. When converted to tons, the total waste per household per week is 0.049 tons per dwelling per week (98.8 lbs / 2,000 lbs = 0.049 tons).

TABLE 1 AVERAGE ANNUAL WASTE PER DWELLING UNIT BASED ON NATIONAL AVERAGE OF 4.40 LBS PER PERSON PER DAY

DWELLING TYPE	PERSONS PER DWELLING	WASTE PER PERSON PER YEAR (LBS)	TOTAL WASTE PER DWELLING PER YEAR (LBS)
All Dwelling Units	3.2	1,606 *	5,139.2

Applying these figures to the total number of dwelling units anticipated for Planning Area One, an estimated 69.6 tons of waste per week is generated for all 1,409 dwelling units (See Table 2).

TABLE 2 AVERAGE WEEKLY WASTE PER DWELLING UNIT BASED ON NATIONAL AVERAGE OF 4.40 LBS PER PERSON PER DAY

TOTAL DWELLINGS IN PA1	WASTE PER DWELLING PER YEAR (LBS)	TOTAL WASTE PER YEAR – ALL PA1 (LBS)	TOTAL WASTE PER YEAR – ALL PA1 (TONS)	TOTAL WASTE PER WEEK – ALL PA1 (TONS)
1,409	5,139.20	7,241,132.80	3,621	69.6

*2,000 lbs = 1 Ton for conversion

The national average of 4.40 lbs of waste per person per day may be high when considering Kern County waste trends. Although there has not been a study to determine Kern County's average waste being produced, local municipal waste statistics can be used for estimating an average. Transfer and Recycling Supervisor for the KCWMD, Chuck Magee, says approximately 330 homes will produce 9-10 tons of waste for pick up by a Packer Body collection truck in Kern County during a weekly collection route. From this information, it was determined that the average

[3] United State Environmental Protection Agency. *Municipal Solid Waste Home.* Last updated 12/2/2013. Available online at http://www.epa.gov/epawaste/nonhaz/municipal/index.htm.

tonnage per home per week in Kern County ranged from 0.027 to 0.030 tons compared to the national average of 0.049 tons per dwelling per week.

When 330 homes produce 9 tons:

330 homes * x tons per home = 9 tons waste

x tons per home = 9 tons waste/ 330 homes

x tons per home = 0.0273

When 330 homes produce 10 tons:

330 homes * x tons per home = 10 tons waste

x tons per home = 10 tons waste/ 330 homes

x tons per home = 0.0303

Based on the above, the national average and Kern County high and low range can be added up and divided by 3 to arrive at a combined average for Kern County's waste (0.0273 + 0.0303 + 0.049 = 0.1066 ; 0.1066 / 3 = 0.0356). Each week, approximately 0.0356 tons, or 71.2 lbs, is produced in Kern County. Dividing this value by 7 days in a week, then dividing by the 3.20 persons per dwelling unit, it is determined that 3.18 lbs of waste is produced per person per day. This value is much less than the national average of 4.40 lbs.

Moving forward with the new average amount of waste produced per person per day, it is determined that an average of 71.2 lbs of waste per dwelling per week will produce a total of approximately 50.2 tons of waste each week upon build-out of Planning Area One's residential uses (See Tables 3 and 4).

TABLE 3 RESIDENTIAL WASTE PER DWELLING UNIT

WASTE PER PERSON PER DAY	PERSONS PER DWELLING	WASTE PER DWELLING PER DAY (LBS)	WASTE PER DWELLING PER WEEK (LBS)
3.18 lbs	3.2	10.176	71.2

TABLE 4 RESIDENTIAL WASTE FOR PLANNING AREA ONE

WASTE PER DWELLING PER WEEK	TOTAL DWELLINGS IN PLANNING AREA 1 (PA1)	TOTAL WASTE PER WEEK – ALL PA1 (TONS)
71.2 lbs	1,409	50.2

*2,000 lbs = 1 Ton for conversion

Non-Residential Waste

Using the Grapevine Project's projected square footage for commercial, office, and freeway-oriented commercial uses within Planning Area One, the average amount of waste being generated on a weekly basis from the non-residential uses can be estimated. Table 5 shows varying amounts of waste produced per square foot for different commercial, industrial, and public facility uses for Planning Area One[4]. With the addition of a minimum of 60,000 sq ft for a potential school site, Planning Area One has a total annual waste stream of 2,331.25 tons per year for non-residential uses. This number equates to approximately 44.83 tons per week (2,331.25tons / 52 weeks = 44.83 tons per week).

TABLE 5 NON-RESIDENTIAL WASTE FOR PLANNING AREA ONE

COMMERCIAL USES	**# SQ. FT.**	**FACTOR**	**LBS/YR**	**TONS/YR**
MIXED COMMERCIAL	*195,000*	*13.00*	2,535,000	1267.50
GENERAL RETAIL		*7.00*	-	0.00
NEIGHBORHOOD COMMERCIAL		*7.00*	-	0.00
REGIONAL MALL		*9.00*	-	0.00
RESTAURANTS, FAST FOOD & DRINKING ESTABLISHMENTS		*22.00*	-	0.00
SUPERMARKETS		*15.00*	-	0.00
OFFICE	*365,000*	*3.50*	1,277,500	638.75
MEDICAL/DENTAL		*6.00*	-	0.00
HOTEL/MOTEL		*10.00*	-	0.00
AUTO DEALER, SERVICE, REPAIR, SERVICE STATION	*70,000*	*10.00*	700,000	350.00
SUBTOTAL COMMERCIAL				*2,256.25*
INDUSTRIAL USES	**# SQ. FT.**	**FACTOR**	**LBS/YR**	**TONS/YR**
MIXED INDUSTRIAL		*6.00*	0	0.00
WAREHOUSE		*2.50*	0	0.00
MANUFACTURING W/ 100 - 400 EMPLOYEES		*5.00*	0	0.00
MANUFACTURING W/ 401 - 3000 EMPLOYEES		*10.00*	0	0.00
SUBTOTAL INDUSTRIAL				*0.00*
PUBLIC FACILITY USES	**# SQ. FT.**	**FACTOR**	**LBS/YR**	**TONS/YR**
SCHOOLS	*60,000*	*2.50*	150,000	62.50
NURSING & RETIREMENT CARE FACILITY		*9.00*	0	0.00
HOSPITALS		*11.00*	0	0.00
INDUSTRIAL/COMMERCIAL/PUBLIC FACILITY CONSTRUCTION WASTE		*8.00*	0	0.00
SUBTOTAL PUBLIC FACILITY				*12.50*
TOTAL NON-RESIDENTIAL WASTE			***2,321.32 TONS/YR***	

[4] Column identified as "Factor", which is used for determining waste for each land use, has been provided by the KCWMD.

Combined Waste (Residential & Non-Residential)

Combining both the total residential and non-residential waste projections for Planning Area One, the total amount of waste generated comes out to be approximately 95.03 tons per week, or 4,941.6 tons per year (50.2 tons residential waste per week + 44.83 tons non-residential waste per week = 95.03 tons per week ; 95.03 tons x 52 weeks = 4,941.6 tons per year). Total waste generated by the entire Grapevine Project is discussed in Section 2.2, with estimations for each Planning Area presented in Table 6 (residential uses) and Table 8 (non-residential uses).

2.2 Costs for Direct Haul

Both national and state level studies conclude that when it comes to direct haul vs. transfer haul, it is less expensive to directly haul waste from a collection site to a landfill when distances are short. As distance increases, it becomes more cost effective to utilize a transfer station. The Environmental Protection Agency estimates that communities in which waste collection vehicles must travel roundtrip distances over 35 miles from collection point to disposal point may find a transfer facility to be a much cheaper alternative[5]. The study, which was done by the Office of Solid Waste (OSW), was developed as a guide for decision-makers tasked with identifying issues associated with planning and building a transfer station and is viewed as a highly helpful tool due to the agency's reputation.

The average distance from the base of the Grapevine to the nearest landfill (Bena Landfill) is approximately 36 miles one-way, or 72 miles roundtrip. From the northern portion of the project site, the Bena Landfill is approximately 30.9 miles, or 62 miles roundtrip[6]. These numbers suggest collection trucks will spend a large portion of their time driving to and from the landfill. The following section discusses the costs for directly hauling residential waste, non-residential waste and recyclable material (i.e. cardboard, paper, green waste).

Costs for Hauling Residential Waste

Residential waste is collected using a side-loader Packer truck with a payload capacity of about 9-tons. For the Grapevine Project, it will take approximately 3.35 hours to service a residential area and collect 9 tons of waste[7]. Once a Packer truck reaches its capacity of 9 tons, it will take an additional 1.81 hours to get from the Grapevine area to the Bena Landfill and back again to begin a second collection (72 miles roundtrip / 55 mph + 0.50 hours dumping time = 1.81 hours)[8].

---

[5] The study is available as a PDF online at http://www.epa.gov/osw/nonhaz/municipal/transfer.htm.
[6] The 36 mile one-way distance was calculated using Google Maps Suggested Routes and is the shortest suggested route. Directions are from point A "Grapevine, CA" to point B "2951 Neumarkel Road, Arvin, CA". The 30.9 mile one-way distance was calculated from a location close to planning area 6b, with point A being "5149 1st Street, Arvin, CA" and point B being "2951 Neumarkel Road, Arvin, CA".
[7] Information provided by Ray Scott of Price Environmental Services: 3.35 hours to collect 9 tons of residential waste and 3.1 hours to collect 8 tons of non-residential waste.
[8] Highway average speed of 55 mph provided by Ray Scott of Price Environmental Services.

This totals to a roundtrip time of 5.16 hours to process 9 tons of waste from collection to disposal. According to Chuck Magee, local waste haulers can haul between 9 and 10 tons per truck and charge anywhere from $150-$165/hour[9].

Figuring out how much it costs to manage waste is usually derived by determining the ***cost per ton***. Determining the cost per ton for direct haul can be done by taking the annual costs charged for hauling waste and dividing that number by the total annual waste in tons. For example, Planning Area One's residential uses will produce approximately 50.16 tons per week, or 2,608.34 tons per year (See Table 6). After dividing the annual costs charged by the packer trucks (Table 7) by the annual tonnage in Planning Area One (Table 6), the per ton cost is calculated to be **$90.30 per ton** ($235,533.17 / 2,608.34 = $90.30). Since there are no tipping fees for residential waste being taken to the landfill, the estimated per ton cost would not be affected by additional fees once taken to the landfill. The same procedure used for determining per ton costs for Planning Area One's residential uses can be applied to each of the Planning Areas within the Grapevine Project.

TABLE 6 AMOUNT OF RESIDENTIAL WASTE BY PLANNING AREA

	DWELLING UNITS	FACTOR (LBS/WEEK)	WASTE (LBS/WEEK)	WASTE (TONS/YEAR)	WASTE (TONS/WEEK)
AREA 1	1,409	71.2	100,320.80	2,608.34	50.16
AREA 2	2,960	71.2	210,752.00	5,479.55	105.38
AREA 3	1,872	71.2	133,286.40	3,465.45	66.64
AREA 4	2,636	71.2	187,683.20	4,879.76	93.84
AREA 5A-B	2,274	71.2	161,908.80	4,209.63	80.95
AREA 6A	849	71.2	60,448.80	1,571.67	30.22
ALL AREAS	12,000	71.2	854,400.00	22,214.40	427.20

[9] The 9 ton average has been used for Tables 6 and 7. The average of $150-165/hour is approximately $157.50/hour (($150 + $165)/2 = $157.50)

TABLE 7 DIRECT HAUL COSTS FOR RESIDENTIAL WASTE BY PLANNING AREA

	WASTE (TPW)[10]	WASTE (TPY)[11]	TRIPS PER WEEK[12]	TIME PER TRIP	TIME NEEDED	COST PER WEEK[13]	COST PER YEAR	COST PER TON
AREA 1	50.2	2,608.3	5.57	5.16	28.8	$ 4,529.48	$ 235,533.17	$ 90.30
AREA 2	105.4	5,479.6	11.71	5.16	60.4	$ 9,515.45	$ 494,803.55	$ 90.30
AREA 3	66.6	3,465.4	7.40	5.16	38.2	$ 6,017.88	$ 312,929.81	$ 90.30
AREA 4	93.8	4,879.8	10.43	5.16	53.8	$ 8,473.90	$ 440,642.62	$ 90.30
AREA 5A-B	81.0	4,209.6	8.99	5.16	46.4	$ 7,310.18	$ 380,129.48	$ 90.30
AREA 6A	30.2	1,571.7	3.36	5.16	17.3	$ 2,729.26	$ 141,921.69	$ 90.30
6B-E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ALL AREAS	427.2	22,214.4	47.47	5.16	244.9	$ 38,576.16	$ 2,005,960.32	$ 90.30

Costs for Hauling Non-Residential Waste

Non-residential waste is collected using a front-loader Packer truck. These trucks are similar to the side-loaders, which collect residential waste, however the amount of waste collected in an 8-hour day is different than the amount collected during a typical residential-route. Front-loader trucks typically collect 8 tons of commercial waste during each collection, before discharging at the landfill.

Just as a “per ton cost” for residential waste was determined, the “per ton cost” for non-residential waste from commercial, industrial, and office land uses can also be determined. Table 8 shows the approximate tonnage being produced by each land use within each of the Project’s planning areas[14]. The total weekly tonnage for all planning areas is approximately 410.63 tons. Additional tonnage coming from public facilities, such as schools, is not included in these projections.

[10] TPW stands for *tons per week*.
[11] TPY stands for *tons per year*.
[12] The number of trips needed per week is determined by dividing the total weekly tons by 9-ton payload of Packer truck.
[13] Approximate cost per week is determined by multiplying the time needed by $157.50 per hour.
[14] Column identified as “Factor”, which is used for determining waste for each land use, has been provided by KCWM.

TABLE 8 AMOUNT OF NON-RESIDENTIAL WASTE BY PLANNING AREA & LAND USE

	NON-RESIDENTIAL USE	SQUARE FOOTAGE	FACTOR (LBS/SF)	WASTE (LBS/YEAR)	WASTE (TONS/YEAR)	WASTE (TONS/WEEK)
AREA 1	Village Center Commercial	195,000	13	2,535,000	1,267.50	24.38
	Office/R&D	365,000	3.5	1,277,500	638.75	12.28
	Freeway-Oriented Commercial	70,000	10	700,000	350.00	6.73
AREA 2	Office/R&D	350,000	3.5	1,225,000	612.50	11.78
	Freeway-Oriented Commercial	100,000	10	1,000,000	500.00	9.62
	Lt. Indust./Warehouse	2,400,000	2.5	6,000,000	3,000.00	57.69
AREA 3	Village Center Commercial	170,000	13	2,210,000	1,105.00	21.25
	Office/R&D	450,000	3.5	1,575,000	787.50	15.14
	Freeway-Oriented Commercial	760,000	10	7,600,000	3,800.00	73.08
	Lt. Indust./Warehouse	1,100,000	2.5	2,750,000	1,375.00	26.44
AREA 4	Village Center Commercial	147,000	13	1,911,000	955.50	18.38
AREA 5A	N/A	N/A	N/A	N/A	N/A	N/A
AREA 5B	N/A	N/A	N/A	N/A	N/A	N/A
AREA 6A	Village Center Commercial	138,000	13	1,794,000	897.00	17.25
	Office/R&D	870,000	3.5	3,045,000	1,522.50	29.28
	Lt. Indust./Warehouse	2,930,000	2.5	7,325,000	3,662.50	70.43
AREA 6B	Lt. Indust./Warehouse	503,400	2.5	1,258,500	629.25	12.10
AREA 6C	Lt. Indust./Warehouse	N/A	N/A	N/A	N/A	N/A
AREA 6D	Lt. Indust./Warehouse	100,000	2.5	250,000	125.00	2.40
AREA 6E	Lt. Indust./Warehouse	100,000	2.5	250,000	125.00	2.40
ALL AREAS		**10,748,400**	N/A	**42,706,000**	**21,353.00**	**410.63**

The cost per ton for direct haul of non-residential waste is displayed in Table 9. Data in this table has been arranged so that the cost per ton is reflective of all land uses within each Planning Area. The number of trips per week is determined by dividing the tons per week (TPW) by 8-ton loads. Additionally, Price Environmental Services has stated that approximately 3.1 hours are needed to collect 8 tons of commercial waste to reach a capacity of 8 tons. The addition of 1.81 hours to get from the Grapevine area to the Bena Landfill and back again to begin a second collection means a roundtrip time of 4.91 hours to process 8 tons of waste from collection to disposal. In addition to the \$96.67 per ton cost, a \$45.00/ton tipping fee[15] would be added.

[15] Tipping Fee information provided online at http://www.kerncountywaste.com/landfills-transfer-stations-bin-sites/landfills/bena. Tipping fees are charged to offset costs associated with operating a landfill. Tipping fees for ordinary household trash and greenwaste are \$45.00/ton for all commercial waste collection vehicles.

TABLE 9 DIRECT HAUL COSTS FOR NON-RESIDENTIAL WASTE BY PLANNING AREA

	WASTE (TPW)	WASTE (TPY)	TRIPS PER WEEK	TIME PER TRIP	TIME NEEDED	APPROXIMATE COST/WEEK[16]	APPROXIMATE COST/YEAR	APPROXIMATE COST/TON
AREA 1	43.39	2256.25	5.42	4.91	26.63	$4,194.27	$218,101.82	$96.67
AREA 2	79.09	4112.5	9.89	4.91	48.54	$7,644.95	$397,537.38	$96.67
AREA 3	135.91	7067.5	16.99	4.91	83.42	$13,138.16	$683,184.30	$96.67
AREA 4	18.38	955.5	2.30	4.91	11.28	$1,776.23	$92,364.00	$96.67
AREA 5A-B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AREA 6A	116.96	6082	14.62	4.91	71.79	$11,306.16	$587,920.33	$96.67
AREA 6B-E	12.10	629.25	1.51	4.91	7.43	$1,169.75	$60,826.84	$96.67
ALL AREAS	410.63	21353	51.33	4.91	252.03	$39,694.25	$2,064,101.09	$96.67

*Additional $45.00/ton charge for trucks discharging commercial waste

Costs for Hauling Recyclable Material

Additional costs for directly hauling recyclable material and green waste from the Grapevine area to the nearest recycling center, such as the Metropolitan Recycling Center in Bakersfield, can be determined. Although it is unknown how much tonnage of recyclable and green waste material will be produced by the Grapevine Project, the rate of collecting waste will be similar to that of collecting residential waste using the 9-ton side-loader Packer trucks. Recyclable material, such as cardboard and paper, is less dense and will not weigh as much as solid waste. This means the 9-ton trucks may collect closer to 7-tons per collection. Thus, the number of trips per week for hauling light recyclable material is determined by dividing the tons per week by 7-ton loads whereas green waste is determined by dividing the tons per week by 9-ton loads. Tables 10 and 11 assume that there will be about 15% of recyclable/green waste material for every ton of waste coming from each planning area (combination of residential and non-residential waste). After factoring in the same collection time of 5.16 hours and an hourly cost of $157.50, the per ton cost for directly hauling light recyclable material is approximately **$116.10** and **$90.30** for directly hauling green waste material.

[16] Approximate cost per week is determined by multiplying the time needed by $157.50 per hour.

TABLE 10 DIRECT HAUL COSTS FOR LIGHTWEIGHT RECYCLABLE MATERIAL BY PLANNING AREA

	WASTE (TPW)	WASTE (TPY)	TRIPS PER WEEK	TIME PER TRIP	TIME NEEDED	COST PER WEEK[17]	COST PER YEAR	COST PER TON
AREA 1	14.0	729.7	2.00	5.16	10.3	$1,629.17	$84,716.85	$116.10
AREA 2	27.7	1438.8	3.95	5.16	20.4	$3,212.42	$167,045.59	$116.10
AREA 3	30.4	1579.9	4.34	5.16	22.4	$3,527.52	$183,431.26	$116.10
AREA 4	16.8	875.3	2.40	5.16	12.4	$1,954.25	$101,621.11	$116.10
AREA 5A-B	12.1	631.4	1.73	5.16	9.0	$1,409.82	$73,310.69	$116.10
AREA 6A	22.1	1148.1	3.15	5.16	16.3	$2,563.24	$133,288.64	$116.10
6B-E	1.8	94.4	0.26	5.16	-	-	-	-
ALL AREAS	125.7	6535.1	17.95	5.16	92.6	$14,590.89	$758,726.27	$116.10

TABLE 11 DIRECT HAUL COSTS FOR GREEN WASTE MATERIAL BY PLANNING AREA

	WASTE (TPW)	WASTE (TPY)	TRIPS PER WEEK	TIME PER TRIP	TIME NEEDED	COST PER WEEK[18]	COST PER YEAR	COST PER TON
AREA 1	14.0	729.7	1.56	5.16	8.05	$ 1,267.13	$ 65,890.88	$ 90.30
AREA 2	27.7	1438.8	3.07	5.16	15.86	$ 2,498.55	$ 129,924.34	$ 90.30
AREA 3	30.4	1579.9	3.38	5.16	17.42	$ 2,743.63	$ 142,668.76	$ 90.30
AREA 4	16.8	875.3	1.87	5.16	9.65	$ 1,519.97	$ 79,038.64	$ 90.30
AREA 5A-B	12.1	631.4	1.35	5.16	6.96	$ 1,096.53	$ 57,019.42	$ 90.30
AREA 6A	22.1	1148.1	2.45	5.16	12.66	$ 1,993.63	$ 103,668.94	$ 90.30
6B-E	1.8	94.4	0.20	5.16	1.04	$ 163.91	$ 8,523.19	$ 90.30
ALL AREAS	125.7	6535.1	13.96	5.16	72.05	$ 11,348.47	$ 590,120.43	$ 90.30

[17] Approximate cost per week is determined by multiplying the time needed by $157.50 per hour.
[18] Approximate cost per week is determined by multiplying the time needed by $157.50 per hour.

2.3 Costs for Transfer Haul

Transfer haul costs include transfer station costs (the cost to build, own, and operate a transfer station), costs charged by private collection vehicles to collect waste/recyclables, and costs for transferring waste/recyclables from the transfer station to the landfill.

Transfer Station Size, Design, & Operations

There are several factors that will influence the cost to build, own, and operate a transfer station. Ultimately, these costs can be divided between capital costs and annual costs. Capital costs are the upfront costs it will take to build a transfer station and equip the facility. Depending on the design and size of the facility, these costs might include a ramp and retaining wall, an enclosed building, fencing around the property, decomposed granite or other all-weather surface material, transfer trailers or haulers, and landscaping. Annual costs are the costs it takes to maintain the facility's operation each year. These costs will include staffing of the transfer station for daily operations. These costs will also include expenditures for materials and equipment that will need to be replaced over time.

Early consideration of a transfer station's size, overall design, and method of handling waste will help anticipate costs as well as basic advantages/disadvantages. There are several examples of transfer stations currently in operation throughout Kern County. The McFarland-Delano Transfer Station, depicted in Figure 4, allows for easy screening of waste due to the trucks dumping directly onto the floor. The tradeoff to directly dumping waste onto the floor is that it requires ample floor space for trucks to pull forward when discharging their loads. It also requires separate unloading stalls for commercial packer trucks and residential vehicles. More floor space costs more money. Also, heavy equipment such as a Loader or Dozer will be necessary to transfer waste into a hauler vehicle (See Figure 5).

Directly dumping waste into a hauler vehicle reduces the need for additional floor space since there is no need for stockpiling on the ground. Figure 6 shows a dump truck at the Lebec Transfer Station dumping its load into a bin beneath a retaining wall. Although the use of this method reduces the need for a large building footprint, the design must be able to accommodate packer trucks and residential vehicles. Also, unless an empty haul vehicle or bin is available to receive waste, the transfer station must halt operations and wait for space to become available for the trucks to discharge their loads. This can cause a queue of vehicles to pile up quickly during peak dumping periods.

Figure 4: Multiple self-haulers dumping waste onto the tipping floor at the McFarland-Delano Transfer Station.
Source: http://www.kerncountywaste.com/landfills-transfer-stations-bin-sites/transfer-stations/mcfarland-delano

Figure 5: Commercial waste truck pulling out of a Transfer Station.
Source: http://sogmpa.web.unc.edu/2011/07/24/the-story-of-trash/

Figure 6: Truck dumping waste at Lebec Transfer Station.

Source: http://www.kerncountywaste.com/landfills-transfer-stations-bin-sites/transfer-stations/lebec

Estimated Size of a Transfer Station

The study done by the EPA, Office of Solid Waste, has a suggested formula for determining the size of a tipping floor for a transfer facility and can be a good starting point for facilitating discussions for an overall design. The EPA suggests that initial tipping floor space that would be required for a transfer station facility can be estimated by beginning with a base area of 4,000 square feet and adding 20 square feet for every ton of waste received in a day[19]. As an example, for a facility receiving 50 tons of waste per day, a tipping floor space of 5,000 square feet would be required (i.e., 4,000 sq ft + (50 TPD x 20 sq ft) = 5,000 sq ft). Using the projected total waste of 93.9 tons/week coming from Planning Area One, the facility's tipping floor would need to be approximately 4,268.3 sq ft in size (4,000 sq ft + (93.55/7days x 20 sq ft) = 4,268.3 sq ft). Later expansion of the facility's tipping floor would be necessary as each Phase of the Grapevine Project is built. Table 12 shows an estimated 838 tons of residential and non-residential waste generated each week once the Grapevine Project is complete. Based on the study's formula for determining tipping floor space, a facility receiving waste for all Planning Areas would need to have approximately 6,393.80 sq ft for the tipping floor alone (837.83 tons per week / 7 days = 119.69 tons per day; 4,000 sq ft + (119.69 x 20 sq ft) = 6,393.80 sq ft).

[19] This approach assumes that waste will be temporarily piled 6 feet high.

TABLE 12 WASTE PER WEEK BY PLANNING AREA

	RESIDENTIAL WASTE (TPW)	NON-RESIDENTIAL WASTE (TPW)	COMBINED (TPW)
AREA 1	50.16	43.39	93.55
AREA 2	105.38	79.09	184.46
AREA 3	66.64	135.91	202.56
AREA 4	93.84	18.38	112.22
AREA 5A-B	80.95	0.00	80.95
AREA 6A	30.22	116.96	147.19
6B-E	0.00	12.10	12.10
ALL AREAS	427.20	410.63	837.83

The Lebec Transfer Station does not utilize a tipping floor as part of its design. Instead, waste is directly discharged from a Packer truck into a bin beneath a retaining wall. Figure 7, which shows an aerial view of the Transfer Station, indicates that the area for discharging waste is approximately 9,000 sq ft in size, which includes the area for the bins receiving the waste. Additional land is necessary for storing the metal bins for transfer and for allowing appropriate turn radii for trucks. In view of this, a more representative size of that facility is 46,500 sq ft[20].

Figure 7: Lebec Transfer Station.
Source: Google Earth. Image date 4/17/2013.

[20] Other areas of the facility, including but not limited to the gate entrance, access roads and temporary storage sites, were not included in the calculation.

Chuck Magee with the KCWMD was consulted with at various times for his knowledge of waste management practices in Kern County. Magee indicated that future development of the Grapevine Project would benefit from implementing mandatory curbside recycling programs such as the green waste and blue bin recycling. Implementation of curbside recycling allows for direct diversion of materials. These materials can be taken to a transfer station temporarily and later be hauled to the nearest recycling center using large hauler trailers. Since recyclable material is less dense than regular refuse, the 21-ton trailers will weigh closer to 10.5 tons. Green/compost material can also be transferred using 21-ton hauler trailers, and is similar in weight to regular refuse. Recyclable material is usually taken directly to a Material Recovery Facility (MRF). An example of this type of facility is the Metropolitan Recycling Center (MRC) located in Bakersfield. There are currently no tipping fees at the MRC, as this facility is not operated by the KCWMD.

Using transfer haul for recyclable material will require a future transfer facility be large enough to accommodate various stockpiles including, but not limited to, residential waste, green/compost material, and cardboard/paper and other recyclables. Other materials that require stockpiles if accepted at the facility, includes white goods (refrigerators, stoves, washers and dryers, etc.), bulk items (i.e. furniture), and tires. The facility must also accommodate multiple unloading stalls for both the packer trucks and residential self-haulers. Figure 8 shows the McFarland-Delano Transfer Station with various areas where waste is handled on site.

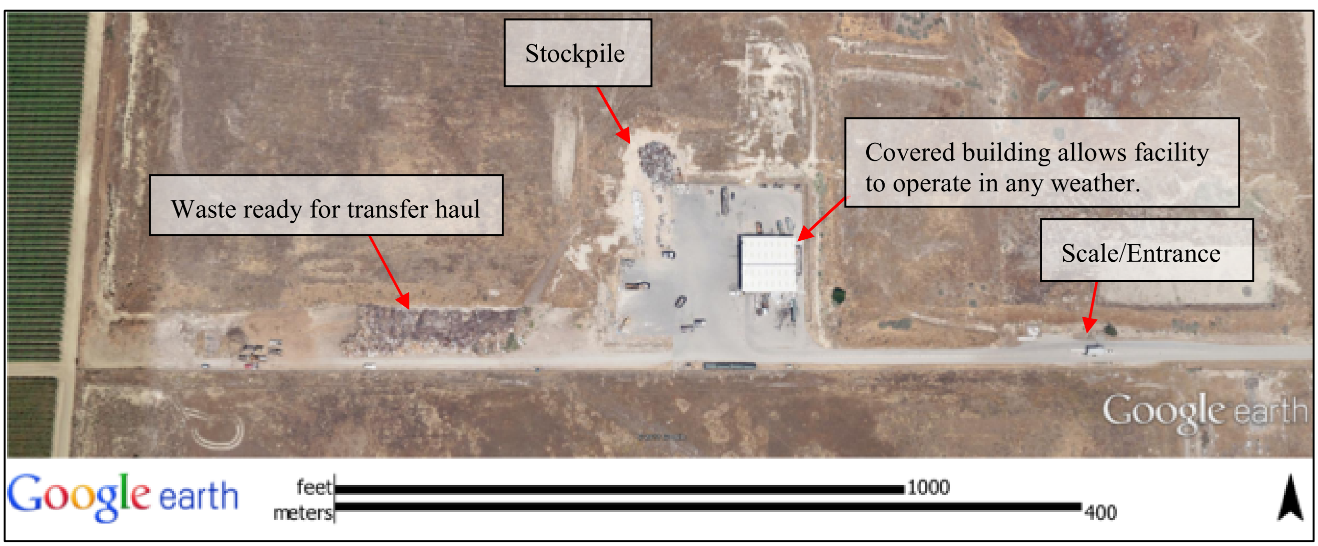


Figure 8: McFarland-Delano Transfer Station.
Source: Google Earth. Image date 8/27/2012.

Transfer Station Costs (Approximate)

Table 13 shows approximate capital costs for a transfer station that emphasizes direct dumping into a transfer trailer[21]. Assuming a minimum of 46,500 sq ft of paved surface in addition to equipment costs, the cost of a transfer facility is over $400,000.00. Even though transfer station costs can vary based on market factors, it is important to discuss the potential amortization schedule for financing a large project such as one that would result from the construction of a transfer station for the Grapevine Project.

TABLE 13 TRANSFER STATION CAPITAL COSTS

ITEM	APPROX. COST
PAVEMENT (46,500 SQ FT @ $5/SQ FT	$232,500
OFFICE EQUIPMENT	$2,000
RAMP AND RETAINING WALL	$20,000
LEGAL & ENGINEERING FEES	$ -
BACKHOE	$25,000
SEMITRACTOR	$50,000
OPEN TOP TRAILER (2 @ $47,000 EACH)	$94,000
TOTAL	**$423,500+**

Annual payments will vary for a loan of $423,500+ based on the length of repayment, how much of a down payment is made, and the original loan amount to be repaid. As an example for the Grapevine Project, estimated monthly payments of $3,054.00 can be determined using the minimum suggested loan of $423,500.00 shown in Table 11, along with a 20% down payment, over a 15 year fixed rate[22]. With an annual payment of $36,648.00, the per ton cost for a Transfer Station can be determined similar to how direct haul costs was derived. In Section 2.1 of this report, the annual tonnage for Planning Area One was approximately 4,882.8 tons per year for both residential and non-residential waste. By dividing the annual tonnage of this area by the annual payments for a transfer station, per ton costs would be approximately **$7.51 per ton** ($36,648/4,882.8 tons = $7.51/ton). This cost can change depending on any number of factors influencing the loan repayment scenario provided. Taking this initial cost per ton of $7.51 and adding it to the annual costs of maintaining a transfer facility ($25/ton) the estimated cost of

[21] Table 11 has been adapted from the following study, Solid Waste Transfer Stations for Rural Oklahoma, AGEC-881, Accessed December 2013, Available online at http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Version-6109/AGEC-881web%20color.pdf. The approximate costs could vary substantially from the study and serve as an estimate only.

[22] Estimated monthly payment calculated using http://www.amortization-calc.com/, with a 3.802% APR, 20% down payment, 15 year fixed term. The lender for this example was Cornerstone Mortgage, Inc. and was randomly chosen for this exercise.

building and operating a Transfer Station is **$32.51/ton**[23]. This cost is applied in addition to collection and transfer costs which are described in the following section[24].

Collection and Transfer Costs

Additional costs for Transfer Haul include charges for collecting waste using collection vehicles and again for transporting waste using large hauler trailers. The cost of collecting waste from the Grapevine area is determined using the same factors used for determining direct haul, however the distance traveled is less since collection vehicles would be driving from collection route to a nearby Transfer Station approximately 5-6 miles away.

Tables 14 and 15 show the costs per ton for initial collection of residential and non-residential waste. The hourly rate of $157.50 applies to these collection costs just as they did for Direct Haul. Table 16 shows the cost per ton for transporting waste from the Transfer Station to the Bena Landfill and also has an hourly rate of $157.50. The tipping fee that is applied to processing non-residential waste at the Transfer Station is a one-time fee and would not be applied a second time. Overall, the costs for utilizing transfer haul is **$114.82** for residential waste ($67.31 collection cost + $14.93 transfer cost + $32.51 transfer station cost = $114.82) and **$163.12** for non-residential waste ($70.68 collection cost + $45.00 tipping fee + $14.93 transfer cost + $32.51 transfer station cost = $163.12).

Costs for processing recyclable material through transfer haul must also take into account collection and transfer costs. Collection costs will be based on the time it takes to collect material and take it to a transfer center using Packer Body collection vehicles. Material going into blue-bin receptacles is typically much lighter than regular refuse and other recyclable material such as green waste. Because of the weight difference, a 9-ton Packer truck will realistically collect closer to 7-tons of material before heading to the Transfer Station. The same is true when it comes to transporting lightweight material using the 21-ton transfer trailers. A transfer trailer will get an average of 10.5-tons of material before heading to a recycling center. Since green waste material has similar massing to that of refuse, the 9-ton payload for Packer trucks and 21-ton payload for transfer trailers apply to the cost per ton. Both lightweight recyclables and green waste material can be accepted at the MRC in Bakersfield, CA.

Tables 17 and 18 show the cost per ton for hauling lightweight recyclable material to a Transfer Station and from a Transfer Station to the MRC. Overall, it costs approximately **$143.14** to utilize transfer haul for managing lightweight recyclables ($80.78 collection cost + $29.85 transfer cost + $32.51 transfer station cost = $143.14).

[23] Personal communication with Chuck Magee from the KCWMD has provided an estimated annual cost of $25.00 per ton. This is the cost that would occur each year to maintain basic operations of a transfer station.
[24] Personal communication with Chuck Magee from the KCWMD. The Transfer Station cost of $32.51 is added to collection/transfer costs for a) residential waste, b) non-residential waste, and c) recyclable material.

Tables 19 and 20 show the cost per ton for hauling green waste material to a Transfer Station and from a Transfer Station to the Metropolitan Recycling Center. Overall, it costs approximately **$110.27** to utilize transfer haul for managing green waste material ($62.83 collection cost + $14.93 transfer cost + $32.51 transfer station cost = $110.27).

TABLE 14 COST FOR HAULING RESIDENTIAL WASTE TO TRANSFER STATION

	WASTE (TPW)	WASTE (TPY)	TRIPS PER WEEK[25]	TIME PER TRIP[26]	TOTAL TIME NEEDED	COST PER WEEK	COST PER YEAR	COST PER TON
AREA 1	50.2	2,608.3	5.57	3.85	21.5	$3,379.56	$175,736.96	$67.38
AREA 2	105.4	5,479.6	11.71	3.85	45.1	$7,099.71	$369,184.82	$67.38
AREA 3	66.6	3,465.4	7.40	3.85	28.5	$4,490.09	$233,484.45	$67.38
AREA 4	93.8	4,879.8	10.43	3.85	40.1	$6,322.58	$328,774.05	$67.38
AREA 5A-B	81.0	4,209.6	8.99	3.85	34.6	$5,454.30	$283,623.74	$67.38
AREA 6A	30.2	1,571.7	3.36	3.85	12.9	$2,036.37	$105,891.19	$67.38
6B-E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ALL AREAS	427.2	22,214.4	47.47	3.85	182.7	$28,782.60	$1,496,695.20	$67.38

TABLE 15 COST FOR HAULING NON-RESIDENTIAL WASTE TO TRANSFER STATION

	WASTE (TPW)	WASTE (TPY)	TRIPS PER WEEK[27]	TIME PER TRIP[28]	TOTAL TIME NEEDED	COST PER WEEK	COST PER YEAR	COST PER TON
AREA 1	43.39	2,256.25	5.42	3.59	19.47	$3,066.68	$159,467.52	$70.68
AREA 2	79.09	4,112.5	9.89	3.59	35.49	$5,589.69	$290,663.79	$70.68
AREA 3	135.91	7,067.5	16.99	3.59	60.99	$9,606.11	$499,517.65	$70.68
AREA 4	18.38	955.5	2.30	3.59	8.25	$1,298.71	$67,532.95	$70.68
AREA 5A-B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AREA 6A	116.96	6,082	14.62	3.59	52.49	$8,266.62	$429,864.36	$70.68
6B-E	12.10	629.25	1.51	3.59	5.43	$855.27	$44,474.21	$70.68
ALL AREAS	410.63	21,353	51.33	3.59	184.27	$29,022.88	$1,509,190.00	$70.68

[25] The number of trips needed per week is determined by dividing the total weekly tons by 9-ton payload of transfer trailer.
[26] The time per trip was estimated using typical collection times and was verified by Ray Scott of Price Environmental. An additional 0.5 hours is added for travel to and from Transfer Station.
[27] The number of trips needed per week is determined by dividing the total weekly tons by 8-ton payload of transfer trailer.
[28] The time per trip was estimated using typical collection times and was verified by Ray Scott of Price Environmental. An additional 0.5 hours is added for travel to and from Transfer Station.

TABLE 16 COST FOR HAULING COMBINED WASTE FROM TRANSFER STATION TO LANDFILL

	WASTE (TPW)	WASTE (TPY)	TRIPS PER WEEK[29]	TIME PER TRIP[30]	TOTAL TIME NEEDED	COST PER WEEK	COST PER YEAR	COST PER TON
AREA 1	93.55	4,864.59	4.45	1.99	8.86	$1,396.23	$72,604.02	$14.93
AREA 2	184.46	9,592.05	8.78	1.99	17.48	$2,753.10	$143,161.38	$14.93
AREA 3	202.56	10,532.95	9.65	1.99	19.19	$3,023.16	$157,204.23	$14.93
AREA 4	112.22	5,835.26	5.34	1.99	10.63	$1,674.83	$87,091.30	$14.93
AREA 5A-B	80.95	4,209.63	3.85	1.99	7.67	$1,208.24	$62,828.71	$14.93
AREA 6A	147.19	7,653.67	7.01	1.99	13.95	$2,196.75	$114,231.01	$14.93
6B-E	12.10	629.25	0.58	1.99	1.15	$180.61	$9,391.56	$14.93
ALL AREAS	837.83	43,567.40	39.90	1.99	79.39	$12,504.68	$650,243.45	$14.93

[29] The number of trips needed per week is determined by dividing the total weekly tons by 21-ton payload of transfer trailer.
[30] Time per trip determined by dividing 68 mile roundtrip distance from Transfer Station to the Bena Landfill by 55 mph, getting 1.24 hours of travel time for one trip. Add additional 0.75 hours for entering and exiting landfill, a conservative number since the trailers will be moving slowly on-site while carrying heavy loads.

TABLE 17 COST FOR HAULING LIGHTWEIGHT RECYCLABLE MATERIAL TO TRANSFER STATION

	RECYCLING (TPW)[31]	RECYCLING (TPY)	TRIPS PER WEEK[32]	TIME PER TRIP[33]	TIME NEEDED	COST PER WEEK	COST PER YEAR	COST PER TON
AREA 1	14.0	729.7	2.00	3.59	7.20	$ 1,133.47	$ 58,940.60	$ 80.78
AREA 2	27.7	1,438.8	3.95	3.59	14.19	$ 2,234.99	$ 116,219.70	$ 80.78
AREA 3	30.4	1,579.9	4.34	3.59	15.58	$ 2,454.23	$ 127,619.81	$ 80.78
AREA 4	16.8	875.3	2.40	3.59	8.63	$ 1,359.64	$ 70,701.51	$ 80.78
AREA 5A-B	12.1	631.4	1.73	3.59	6.23	$ 980.86	$ 51,004.91	$ 80.78
AREA 6A	22.1	1,148.1	3.15	3.59	11.32	$ 1,783.34	$ 92,733.76	$ 80.78
6B-E	1.8	94.4	0.26	3.59	0.93	$ 146.62	$ 7,624.15	$ 80.78
ALL AREAS	125.7	6,535.1	17.95	3.59	64.45	$ 10,151.41	$ 527,873.51	$ 80.78

TABLE 18 COST FOR HAULING LIGHTWEIGHT RECYCLABLE MATERIAL FROM TRANSFER STATION TO METROPOLITAN RECYCLING CENTER

	RECYCLING (TPW)	RECYCLING (TPY)	TRIPS PER WEEK[34]	TIME PER TRIP[35]	TIME NEEDED	COST PER WEEK[36]	COST PER YEAR	COST PER TON
AREA 1	14.03	729.69	1.34	1.99	2.66	$ 418.87	$ 21,781.21	$ 29.85
AREA 2	27.67	1,438.81	2.64	1.99	5.24	$ 825.93	$ 42,948.41	$ 29.85
AREA 3	30.38	1,579.94	2.89	1.99	5.76	$ 906.95	$ 47,161.27	$ 29.85
AREA 4	16.83	875.29	1.60	1.99	3.19	$ 502.45	$ 26,127.39	$ 29.85

[31] TPW factored by assuming 15% of recyclable material can be accounted for every ton of waste coming from each planning area. This is approximate, but actual tonnage will not change the cost per ton.
[32] The number of trips needed per week is determined by dividing the total weekly tons by 7-ton payload of Packer truck (lower payload is result of recyclables having a lower overall density than regular refuse.
[33] The time per trip extrapolated from Table 13 calculations. An additional 0.5 hours is added for travel to and from Transfer Station.
[34] The number of trips needed per week is determined by dividing the total weekly tons by 10.5-ton payload of transfer trailer.
[35] Time per trip determined by dividing 68 mile roundtrip distance from Transfer Station to the Metropolitan Recycling Center in Bakersfield by 55 mph, getting 1.24 hours of travel time for one trip. Add additional 0.75 hours for entering and exiting the recycling facility.
[36] Approximate cost per week is determined by multiplying the time needed by $157.50 per hour.

	RECYCLING (TPW)	RECYCLING (TPY)	TRIPS PER WEEK[34]	TIME PER TRIP[35]	TIME NEEDED	COST PER WEEK[36]	COST PER YEAR	COST PER TON
AREA 5A-B	12.14	631.44	1.16	1.99	2.30	$ 362.47	$ 18,848.61	$ 29.85
AREA 6A	22.08	1,148.05	2.10	1.99	4.18	$ 659.03	$ 34,269.30	$ 29.85
6B-E	1.82	94.39	0.17	1.99	0.34	$ 54.18	$ 2,817.47	$ 29.85
ALL AREAS	125.68	6,535.11	11.97	1.99	23.82	$ 3,751.40	$ 195,073.03	$ 29.85

TABLE 19 COST FOR HAULING GREEN WASTE MATERIAL TO TRANSFER STATION

	GREEN WASTE (TPW)[37]	GREEN WASTE (TPY)	TRIPS PER WEEK[38]	TIME PER TRIP	TIME NEEDED	COST PER WEEK[39]	COST PER YEAR	COST PER TON
AREA 1	14.0	729.7	1.56	3.59	5.60	$ 881.59	$ 45,842.69	$ 62.83
AREA 2	27.7	1,438.8	3.07	3.59	11.04	$ 1,738.33	$ 90,393.10	$ 62.83
AREA 3	30.4	1,579.9	3.38	3.59	12.12	$ 1,908.84	$ 99,259.85	$ 62.83
AREA 4	16.8	875.3	1.87	3.59	6.71	$ 1,057.50	$ 54,990.06	$ 62.83
AREA 5A-B	12.1	631.4	1.35	3.59	4.84	$ 762.89	$ 39,670.49	$ 62.83
AREA 6A	22.1	1,148.1	2.45	3.59	8.81	$ 1,387.04	$ 72,126.26	$ 62.83
6B-E	1.8	94.4	0.20	3.59	0.72	$ 114.04	$ 5,929.89	$ 62.83
ALL AREAS	125.7	6,535.1	13.96	3.59	50.13	$ 7,895.54	$ 410,568.29	$ 62.83

[37] TPW factored by assuming 15% of green waste material can be accounted for every ton of waste coming from each planning area. This is approximate, but actual tonnage will not change the cost per ton.
[38] The number of trips needed per week is determined by dividing the total weekly tons by 9-ton payload of Packer trucks.
[39] Approximate cost per week is determined by multiplying the time needed by $157.50 per hour.

TABLE 20 COST FOR HAULING GREEN WASTE MATERIAL FROM TRANSFER STATION TO METROPOLITAN RECYCLING CENTER

	WASTE (TPW)[40]	WASTE (TPY)	TRIPS PER WEEK[41]	TIME PER TRIP[42]	TIME NEEDED	COST PER WEEK[43]	COST PER YEAR	COST PER TON
AREA 1	14.03	729.69	0.67	1.99	1.33	$ 209.43	$ 10,890.60	$ 14.93
AREA 2	27.67	1,438.81	1.32	1.99	2.62	$ 412.97	$ 21,474.21	$ 14.93
AREA 3	30.38	1,579.94	1.45	1.99	2.88	$ 453.47	$ 23,580.63	$ 14.93
AREA 4	16.83	875.29	0.80	1.99	1.60	$ 251.22	$ 13,063.70	$ 14.93
AREA 5A-B	12.14	631.44	0.58	1.99	1.15	$ 181.24	$ 9,424.31	$ 14.93
AREA 6A	22.08	1,148.05	1.05	1.99	2.09	$ 329.51	$ 17,134.65	$ 14.93
6B-E	1.82	94.39	0.09	1.99	0.17	$ 27.09	$ 1,408.73	$ 14.93
ALL AREAS	125.68	6,535.11	5.98	1.99	11.91	$ 1,875.70	$ 97,536.52	$ 14.93

[40] TPW factored by assuming 15% of green waste material can be accounted for every ton of waste coming from each planning area. This is approximate, but actual tonnage will not change the cost per ton.
[41] The number of trips needed per week is determined by dividing the total weekly tons by 21-ton payload of transfer trailer.
[42] Time per trip determined by dividing 68 mile roundtrip distance from Transfer Station to the Metropolitan Recycling Center in Bakersfield by 55 mph, getting 1.24 hours of travel time for one trip. Add additional 0.75 hours for entering and exiting the recycling facility.
[43] Approximate cost per week is determined by multiplying the time needed by $157.50 per hour.

3.0 Decision Point and Next Steps

This report concludes that direct haul is the most cost effective option when it comes to managing waste generated by the Grapevine Project. Table 21 summarizes the overall costs for both direct and transfer haul.

TABLE 21 COST FOR DIRECT AND TRANSFER HAUL

	DIRECT HAUL COST PER TON	TRANSFER HAUL COST PER TON
RESIDENTIAL	$90.30	$114.82
NON-RESIDENTIAL	$141.67	$163.12
LIGHTWEIGHT RECYCLABLES	$116.10	$143.14
GREEN WASTE RECYCLABLES	$90.30	$110.27

Waste coming from Frazier Park, a community approximately 15 miles to the south of the Grapevine, is for the most part hauled directly to the Bena Landfill[44]. Since the Lebec Transfer Station is too small to receive the volume of waste being collected in the Frazier Park area, Kern County Waste Management subsidizes the cost for the packer trucks to make the nearly 100 mile round-trip drive from Frazier Park area to the landfill.

With the addition of the Grapevine community hauling waste directly to the Bena Landfill, the number of collection trucks will increase considerably, thereby increasing emissions and wear on public roads. Implementing a shared transfer station may help reduce future air and traffic impacts creating a more efficient and economical waste collection system for southwest Kern County, specifically the mountain communities. Now that KCWMD has begun looking into the most cost effective method of hauling waste, it may be worthwhile for the County to look into potential cost savings and economical advantages of a shared transfer facility serving future residents of the Grapevine area and the Frazier Park community.

[44] Personal communication with Chuck Magee.

References

Kern County Waste Management Department. Available online at http://www.kerncountywaste.com/about-waste-management , accessed December 11, 2013.

Magee, Chuck. Personal communication. November 2013 through January 2014.

Marshall, R. & Letterly, S. Personal communication. December 2013.

Scott, Ray. Personal Communication. November 2013 through January 2014.

Sloggett, Gordon, et. al., "Solid Waste Transfer Stations for Rural Oklahoma." OSU Cooperative Extension Fact Sheet No. 881.

Solid Waste Management Services personnel in the Oklahoma State Department of Health. 1992.

United States Environmental Protection Agency. *Transfer Stations.* Last Updated November 14, 2013. Available online at http://www.epa.gov/osw/nonhaz/municipal/transfer.htm, accessed December 16, 2013.

Waste Transfer Stations: A Manual for Decision-Making. (2002). Available online at http://www.epa.gov/osw/nonhaz/municipal/transfer.htm

Yaffe, Harold J. (2001). A model for optimal operation and design of solid waste transfer stations. A Thesis from UC Berkeley, CA.

Appendix X

Environmental Justice Technical Memorandum

Memorandum

Date: August 19, 2015
Project: Grapevine Project
To: Diana Hurlbert, Director of Environmental Planning
From: Jeanne Ogar, Associate Environmental Planner
Subject: Environmental Justice Technical Memorandum

The purpose of this Environmental Justice Technical Memorandum is to provide information regarding the presence or absence of Environmental Justice populations related to the Grapevine Project, and to determine if any disproportionately high and adverse effects would be imposed on these populations.

PROJECT DESCRIPTION

The Grapevine Project encompasses approximately 8,010 acres within the 15,600-acre Grapevine planning area on Tejon Ranch in southwestern Kern County, California. Located approximately 30 miles from the center of Bakersfield, California, Grapevine is planned as a sustainable community intended to leverage and build upon the economic expansion and job growth that has occurred at the adjacent Tejon Ranch Commerce Center (TRCC). Grapevine will attract commercial and industrial tenants and residents from two key market areas – primarily the greater San Joaquin Valley focused on the Bakersfield MSA and secondarily the North Los Angeles Basin. As a large-scale multigenerational master plan, Grapevine will offer a variety of residential products focused on specific market segments including young families, single professionals, mature families, and active-adults.

The Project is currently pursuing entitlements that would allow for the following:

- Approximately 4,778 acres would be developed as a residential community and employment center.
- Approximately 3,232 acres (about 40% of the planning area) would be designated as exclusive agriculture and preserved via conservation easements for mitigation, with grazing and open space as the predominant land uses.
- Six (6) planning areas have been identified and mixed used zoning has been arranged to allow for development in each of a walkable village centers with attached residential product and town center commercial and institutional uses, radiating out to lower density mixed use neighborhoods that include schools, parks and a mix of housing. A network of bicycle and pedestrian trails as well as transit service would connect the community and adjacent TRCC and other regional communities. The new community would include:
    - Up to 14,000 residential units

- o Approximately five (5) million square feet of commercial land uses; composed of square feet of village center commercial in six walkable neighborhoods, office/research and development, freeway oriented commercial and light industrial/warehouse.
- o Other public facilities, including 5 k-8 schools, 1 high school, two fire station, sheriff's substation, transit facility/park-and-ride, and water and wastewater treatment facilities, are also proposed in this community.

REGULATORY SETTING

Executive Over 12898

All projects involving a federal action (funding, permit, or land acquisition) must comply with Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* signed by President Clinton on February 11, 1994. This EO directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law.

Title VI of the Civil Rights Act of 1964

Environmental Justice has its origins with Title VI of the Civil Rights Act of 1964, which states, "No person in the United States shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

All considerations under Title VI of the Civil Rights Act of 1964 and related statutes have been included in this Project. Caltrans' commitment to upholding the mandates of Title VI is demonstrated by its Title VI Policy Statement, signed by the Caltrans Director, which can be found in **Attachment A** to this document.

United States Department of Transportation (USDOT) Order on Environmental Justice

In April 1997, to respond to EO 12989, the USDOT issued the *Order to Address Environmental Justice in Minority Populations and Low-Income Populations* (Order). The Order generally describes the process for incorporating Environmental Justice principles into USDOT programs, policies and activities. The objective of the Order is to ensure that the interests and well-being of minority and low-income populations are considered and addressed during transportation decision making. The Order states that the USDOT will not carry out any programs, policies, or activities that will have a disproportionately high and adverse effect on minority populations or low-income populations unless "further mitigation measures or alternatives that would avoid or reduce the disproportionately high and adverse effect are not practicable."

National Environmental Policy Act

The National Environmental Policy Act (NEPA) is the nation's core environmental statute. NEPA requires that for every "major federal action significantly affecting the quality of the human environment," the responsible federal agency must evaluate the environmental impacts of that action. The USDOT Order identifies NEPA as an existing regulation requiring Environmental Justice to be considered for transportation projects with federal involvement.

METHODOLOGY

This analysis was conducted using the methodology provided in the Federal Highway Administration's (FHWA) *Federal Highway Administration Interim Guidance: Addressing Environmental Justice in Environmental Assessments/Environmental Impact Statements* (FHWA, 2001). In addition, the following guidance documents were also consulted during the preparation of this memorandum:

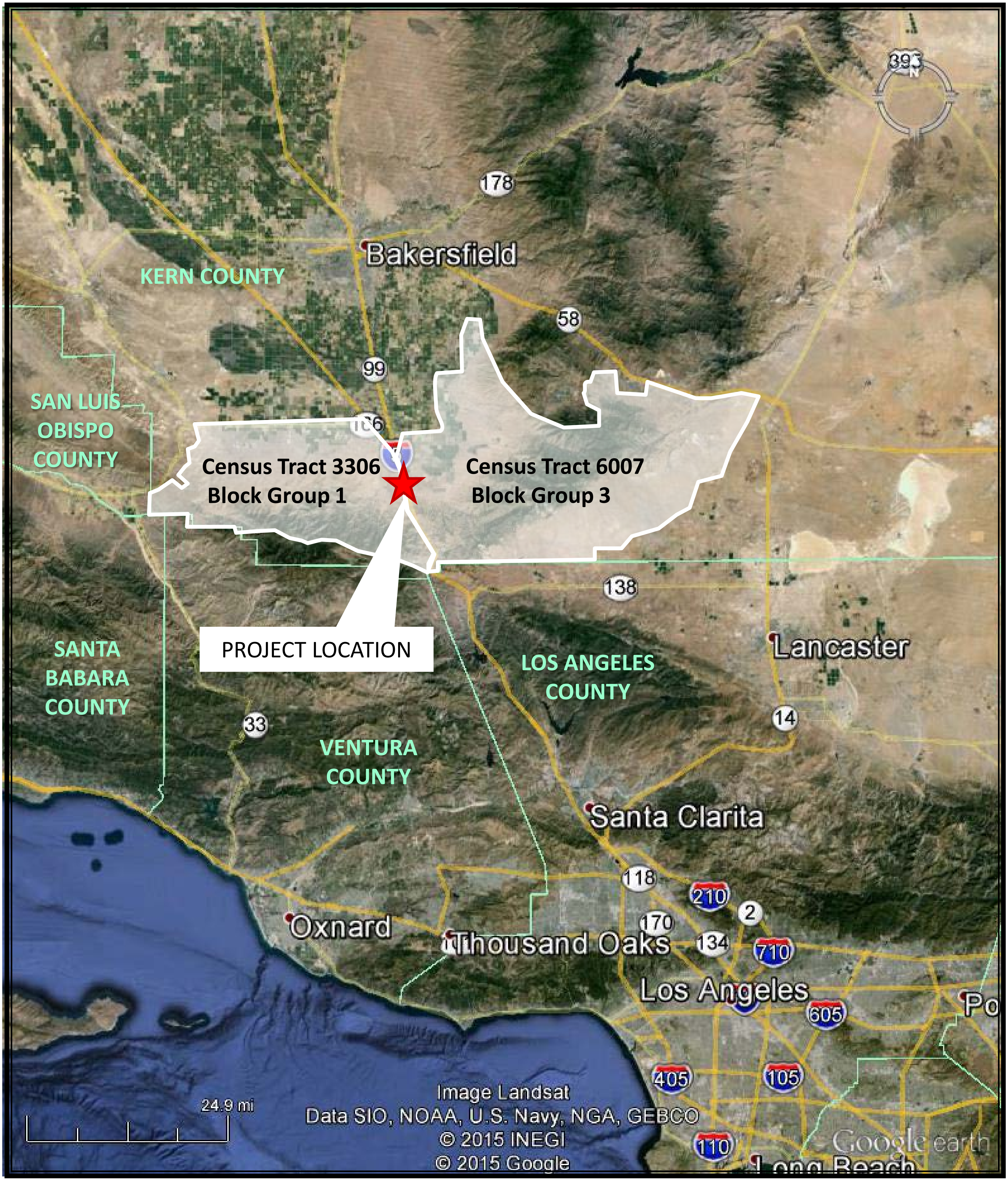
- Caltrans' *Standard Environmental Reference* (SER) (Chapter 25, Environmental Justice) (Caltrans, 2014);
- Caltrans' *Environmental Handbook, Volume 4* (Chapter 8, Title VI and Environmental Justice) (Caltrans, 2011)
- Council on Environmental Quality's (CEQ) *Environmental Justice: Guidance Under the National Environmental Policy Act* (CEQ, 1997)

To identify existing populations in the study area, identifiable groups or clusters of minority and low-income persons were identified in the study area using localized census data from the 2010 United States (U.S.) Census, the 2006-2010 American Community Survey 5-Year Estimates, and the 2009-2013 American Community Survey 5-Year Estimates (U.S. Census Bureau, 2010a; U.S. Census Bureau, 2010b; U.S. Census Bureau, 2010c). The study area identified for the Environmental Justice analysis is Census Tract 3306, Block Group 1; and Census Tract 6007, Block Group 3 (see **Figure 1**, Study Area Map).

For this analysis, minority populations are considered persons who are American Indian and Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian, and Other Pacific Islander. CEQ guidance states that minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater (typically 10 percent higher) than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ, 1997). For this analysis, Kern County has been identified as the appropriate unit of geographic analysis for comparison to the study area.

A low-income population is any readily identifiable group of persons whose median household income is at or below the U.S. Department of Health and Human Services (HHS) poverty guideline, which is $24,250 for a family of four (HHS, 2015).

This page has been intentionally left blank.



TEJON RANCH COMPANY
Building the Legacy

FIGURE 1: STUDY AREA MAP
Grapevine Project

Caltrans

AFFECTED ENVIRONMENT

General Project Setting

The majority of land within, adjacent to, and surrounding the Project area is existing transportation infrastructure (the highway and interchange) and vacant, undeveloped land consisting of open rangeland. The existing interchange includes roadside travel services, such as gas, food, and lodging. There are no residential developments in the immediate vicinity of the Project area, except for one single-family residence approximately 0.4 mile south of the existing interchange that is surrounded by vineyards. The Grapevine Wastewater Treatment Plant is located 0.2 mile northeast of the existing interchange. The nearest communities to the Project area are the unincorporated communities of Lebec (approximate seven miles to the southeast), Frazier Park (approximately eight miles to the southwest), Wheeler Ridge (approximately three miles to the north), and Mettler (approximately eight miles to the north).

The Project area and surroundings are primarily zoned for agricultural uses on the County's zoning maps (Kern County, 1971). Implementation of the Specific Plan would include re-designating the Project area and surrounding areas to allow for residential, commercial, industrial, parks and recreation, educational, public facilities, and resource management uses. The Specific Plan would include development adjacent to and surrounding the Project area of up to 12,000 residences and up to 10,748,400 square feet of commercial development, as well as parks, public and private recreational amenities, schools, public services, helipad(s), a transit center/park and ride, and water and wastewater treatment facilities.

General Demographics of the Study Area

Demographic information for the general population in the study area, including ethnicity, age, mobility, and income level, is provided in **Table 1** below. The study area has a total population of 4,092 people, with a median household income of $47,687 and a median age of 43.2 years. The largest racial group in the study area is White (79.7 percent), and the majority of people in the study area drive to work (88.6 percent).

Minority Populations

As shown in **Table 2**, the largest racial group in the study area and the County is White, comprising 79.7 and 63.3 percent of the populations, respectively. The largest ethnic group within the study area and the County is Hispanic or Latino, comprising 25.4 and 49.2 percent of the population, respectively. There are no minority populations in the study area that exceed 50 percent, or that have concentrations that are meaningfully greater than the County.

Table 1 – Demographic Characteristics of the Study Area

Demographic Characteristic	Census Tract 3306, Block Group 1		Census Tract 6007, Block Group 3		Total Study Area	
Ethnicity/Race	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Total Population	2,173	--	1,919	--	4,092	--
White	1,713	78.8	1,550	80.8	3,263	79.7
Black or African American	16	0.7	18	0.9	34	0.8
American Indian and Alaska Native	60	2.8	23	1.2	83	2.0
Asian	30	1.4	47	2.4	77	1.9
Native Hawaiian and Other Pacific Islander	0	0	2	0.1	2	0.05
Some Other Race	247	11.4	187	9.7	434	10.6
Two or More Races	107	4.9	92	4.8	199	4.9
Hispanic or Latino[1]	589	27.1	452	23.6	1,041	25.4
Median Household Income in the Past 12 Months (in 2013 inflation-adjusted dollars)	$42,308		$53,065		$47,687 (average for block groups)	
Median Age (Years)	42.9		43.4		43.2 (average for block groups)	
Means of Transportation to Work	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Total Workers 16 Years and Over	575	--	541	--	1,116	--
Car, Truck, or Van	572	99.5	417	77.1	989	88.6
Public Transportation	0	0	0	0	0	0
Taxicab	0	0	0	0	0	0
Motorcycle	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0
Walked	0	0	0	0	0	0
Other Means	3	0.5	0	0	3	0.2
Worked From Home	0	0	124	22.9	124	11.1

Source: U.S. Census Bureau, 2010a; 2010b; 2010c

Notes: [1]Hispanic or Latino is considered an ethnicity, rather than a race, in accordance with the guidelines adopted by the White House Office of Management and Budget. As a result, the sum of all categories will exceed 100 percent.

Table 2 – Racial/Ethnic Characteristics

Race/Ethnicity	Study Area		Kern County	
	Number	Percent	Number	Percent
Total Population	4,092	--	839,631	--
White	3,263	79.7	531,609	63.3
Black or African American	34	0.8	55,494	6.7
American Indian and Alaska Native	83	2.0	22,612	2.7
Asian	77	1.9	43,382	5.2
Native Hawaiian and Other Pacific Islander	2	0.05	3,027	0.4
Some Other Race	434	10.6	222,792	26.5
Two or More Races	199	4.9	37,856	4.5
Hispanic or Latino[1]	1,041	25.4	413,033	49.2

Source: U.S. Census Bureau, 2010
Notes: [1]Hispanic or Latino is considered an ethnicity, rather than a race, in accordance with the guidelines adopted by the White House Office of Management and Budget. As a result, the sum of all categories will exceed 100 percent.

Low-Income Populations

The average household median income was calculated for the two block groups in the study area. In 2010, the median household income was reported to be $47,687 in the study area, and $20,312 in the County (U.S. Census Bureau, 2010b). The median income in the study area is higher than the HHS poverty guideline ($24,250 for a family of four) and the median income in the County. Therefore, there are no low-income populations in the study area.

Other Environmental Justice Considerations

Based on historical research, the Tejon Indian Tribe (Tribe) previously occupied the Project area and surroundings until the 1960s. There is a California Historic Landmark (CHL) marker at the existing interchange commemorating the Sebastian Indian Reservation where the Tribe historically resided. The CHL marker is not an historical resource, and the location of the actual Sebastian Indian Reservation is outside of the Project area. Although many members of the Tribe continue to reside in Kern County, only two percent of the study area's population is American Indian and Alaska Native, based on the demographic data (U.S. Census Bureau, 2010b). In addition, the Project area is currently not occupied by residential developments, and the nearest communities are approximately three to eight miles away from the Project area. Therefore, it is unlikely that members of the Tribe currently reside in proximity to the Project area and would be affected by the Project.

While there are currently no residential zones adjacent to the Project area, as designated in the County's General Plan, the Specific Plan proposes to re-zone areas adjacent to the Project area as Village Mixed Use (Kern County, 2014), which would serve as the Village Core and provide a variety of compatible land uses, including neighborhood-serving retail, service-oriented commercial, office, and higher density residential uses (6-72 dwelling units per net acre). In addition, some areas adjacent to the Project area would be re-zoned as Mixed Use, which would include a variety of residential (.2-40 dwelling units per net acre), office, retail, light industrial, warehouse, and other uses that are compatible with adjacent land uses. The Specific Plan would allow for a total of 12,000 dwelling units adjacent to and surrounding the Project area.

The Specific Plan does not state whether affordable housing would be provided as part of the plan; however, the Village Mixed Use zone would allow for higher density residential uses, which are typically a more affordable type of housing than single-family residences. Therefore, while there are currently no low-income populations in the study area based on demographic data, there is potential that low-income populations could re-locate to the study area into high density residential units provided as part of the Specific Plan.

ENVIRONMENTAL CONSEQUENCES

The majority of land adjacent to and surrounding the Project area is vacant, undeveloped land consisting of open rangeland. However, the Project is intended to accommodate planned development within and adjacent to the Project area, as outlined in the Specific Plan. While the demographic data for the study area show that there are no concentrations of existing minority or low-income populations that are meaningfully greater than the County, this demographic data may change after the study area is developed according to the Specific Plan. Therefore, the environmental consequences discussed below address both existing populations in the study area, as well as future populations that could move to the study area after implementation of the Specific Plan.

In accordance with *Federal Highway Administration Interim Guidance: Addressing Environmental Justice in Environmental Assessments/Environmental Impact Statements* (FHWA, 2001), the discussion below first identifies if the Project would result in adverse effects on any populations in the study area after the implementation of avoidance, minimization, or mitigation measures. The effects discussed below are related to human health and environmental effects, including social and economic effects. After the potential for adverse effects is assessed, a discussion is provided to determine whether any adverse effects would be disproportionately high and adverse on minority or low-income populations.

Community Character and Cohesion

The Project area is located within an existing transportation corridor, and the proposed improvements would not be located along a new alignment. Therefore, the proposed interchange improvements and new overcrossings would not divide any communities, but would be expected to improve the connection between communities proposed as part of the Specific Plan. In addition, because the Project is located adjacent to existing transportation infrastructure, the Project would not be expected to adversely affect the social, natural, visual, or cultural characteristics of the area, or result in impacts on the community's sense of belonging, commitment, or attachment to the area. Therefore, no adverse effects on community character or cohesion are expected to result from the Project.

Relocations

The majority of the Project improvements would be located along the existing highway within Caltrans ROW. All of the land adjoining I-5 in the Project area is owned by the Tejon Ranch Company, who would dedicate any additional land required to Caltrans. Therefore, the Project would not require the acquisition of additional right of way (ROW) or relocations of any residences or businesses.

Build Alternatives 1 and 1A would require the relocation of the existing CVEF to accommodate the southbound I-5 on- and off-ramps to the north of the overcrossing. Caltrans and the Tejon Ranch Company would participate in ongoing coordination with the CHP regarding the CVEF relocation to minimize any impacts on CVEF operations. Therefore, no adverse effects from relocations are expected to result from the Project.

Air Quality

The Project area is designated as a nonattainment area for the federal 8-hour ozone (O_3) standard, state 1-hour and 8-hour O_3 standards, state 24-hour and annual particulate matter less than 10 micrometers in diameter (PM_{10}) standards, federal 24-hour and annual particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) standards, and state annual $PM_{2.5}$ standard. Because the Project would replace an existing interchange and would result in improved traffic operations at the new interchange, operation of the Project is not anticipated to result in adverse long-term impacts on air quality. In addition, the CVEF to be relocated under Build Alternatives 1 and 1A would be located adjacent to existing transportation infrastructure (at the I-5/SR-99 interchange), and would replace the existing CVEF; therefore, no additional pollutant emissions above existing conditions are anticipated to result from the CVEF relocation.

Construction of the Project is anticipated to result in short-term increases of criteria air pollutants from fugitive dust emissions during earth moving activities and mobile source emissions from the use of construction equipment and vehicle trips by construction workers to and from the Project area. The Project could also generate mobile source air toxics (MSATs), and could result in potential asbestos concerns associated with demolition of existing structures. The Project would be constructed in compliance with Caltrans' Standard Specifications, Section 14-9 "Air Quality" and Caltrans' specifications for the control of construction-generated emissions. Additional measures may be developed in coordination with the San Joaquin Valley Air Pollution Control District (SJVAPCD) to minimize potential impacts. With implementation of avoidance, minimization, and mitigation measures, and compliance with Caltrans' Standard Specifications, no substantial adverse air quality effects are anticipated to result from the Project.

Noise

Transient residential (motel) and residential land uses (a residence located approximately 0.4 mile south of the existing interchange) located near the Project area may be exposed to higher noise and vibration levels from vehicle traffic during long-term operation of the Project. In addition, planned future residences and other noise-sensitive land uses may be exposed to higher noise and vibration levels from vehicle traffic during long-term Project operation. Abatement measures (typically in the form of soundwalls) may be necessary to comply with county, state, and federal guidelines. In addition, if Project construction involves pile driving, structure demolition, blasting, or other impact-type noises, measures may be needed in the plans and specifications to minimize or eliminate adverse construction noise and vibration impacts on nearby land uses or activities. With the implementation of noise abatement and minimization measures, as required, no substantial adverse effects related to noise are anticipated to result from the Project.

Hazardous Materials and Waste

Former gas stations, a former seepage pit and leach field, and existing crude oil and natural gas wells in the Project area indicate the potential for soil and groundwater contamination in the Project area. A crude oil petroleum release into soil and groundwater at the ExxonMobil Grapevine Pumping Station, located approximately one mile south of the Project area, may have migrated into the Project area. Potential soil and/or groundwater contamination in the Project area could be disturbed during construction and could result in environmental releases and/or exposure of construction workers to hazardous substances. Additional soil and/or groundwater testing would be required to fully assess potential impacts from the Project.

Appropriate measures will be developed after the completion of additional soil and/or groundwater testing to further assess potential impacts. Disposal of hazardous materials during construction would be conducted using proper removal, transport, and disposal measures to prevent a hazardous materials release. Coordination among Caltrans, the Tejon Ranch Company, and the County will be ongoing throughout the Project development process. If required, coordination with appropriate regulatory agencies will be conducted to ensure the remediation of contaminated sites, if determined to be in the Project area. With the implementation of appropriate remediation measures, as required, and proper handling and disposal of hazardous waste and materials, no substantial adverse effects related to hazardous waste and materials are expected to result from the Project.

Water Quality

The Project would include the construction of interchange ramps and above-grade overcrossings in areas that are currently undeveloped. Therefore, the Project would result in an increase in impervious surfaces and changes in topography, which could affect runoff levels in and near the Project area. There is potential that runoff levels and rates could increase as a result of the Project, which could carry additional storm water pollutants into surface waters and groundwater in and near the Project area. The Project would include design features to minimize potential impacts on both surface waters and groundwater, such as retention basins/sumps and storm drainpipes to accommodate potential runoff flows in the Project area. Therefore, no adverse water quality effects are anticipated during Project operation.

Construction impacts from the Project would be minimized through compliance with the National Pollutant Discharge Elimination System (NPDES) General Permit for Discharges from Construction Activities (Construction General Permit), which requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must include erosion and sediment control best management practices (BMP), as well as BMPs that control other potential construction-related pollutants. A Construction Site Monitoring Program that identifies monitoring and sampling requirements during construction is also a required component of the SWPPP. Design and treatment BMPs would include the installation of biofiltration swales and strips, and infiltration devices to capture pollutants in storm water runoff. Construction BMPs would include implementation of erosion control measures, street sweeping and vacuuming, and installation of temporary check dams, hydraulic mulch, cover, fences, concrete washout bins, fiber rolls, drainage inlet protection, and sediment barriers. BMPs would be finalized during final Project design. With the implementation of BMPs and compliance with the NPDES permit, no substantial adverse water quality effects are anticipated to result from Project construction.

Disproportionately High and Adverse Effects

FHWA defines a disproportionately high and adverse effect on minority and low-income populations as an adverse effect that either:

- Is predominately borne by a minority population and/or a low-income population; or
- Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the nonminority population and/or non-low-income population.

The Project would not result in substantial adverse effects on any populations within the study area, including minority and low-income populations. Benefits from the Project, including traffic improvements and greater connections between communities, would be experienced by the general population. Therefore, the Project would not prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority or low-income populations.

Based on the analysis, the Project would not result in disproportionately high and adverse effects on any minority or low-income populations as per EO 12898 regarding Environmental Justice.

Avoidance, Minimization, and/or Mitigation Measures

The following measures would be implemented to avoid, minimize, or mitigate potential effects that could result from the Project. With the implementation of these measures, the Project would not result in substantial adverse effects on any populations within the study area, including minority and low-income populations, and no Environmental Justice effects would result from the Project.

- Utilities – Any disruptions to utility service would be scheduled and coordinated to ensure they would not adversely affect the surrounding community.

- Emergency Services – Coordination with local emergency service providers and communication with the surrounding community would be conducted to minimize traffic impacts during construction.
- Visual/Aesthetics – Landscaping and aesthetic treatments would be required to enhance the aesthetic appearance of the interchange and overcrossings. The Visual Impact Assessment (VIA) would include an analysis of Project impacts and would provide recommendations for visual enhancements to minimize potential impacts.
- Cultural Resources – Measures to avoid impacts on cultural resources would be implemented, and would include implementing a cultural resources monitoring plan, monitoring sensitive areas, providing crew education, delineating environmentally sensitive areas, treating inadvertent discoveries, and identifying human remains if found in the Project area during construction.
- Hydrology and Floodplain – Debris basins and berms would be constructed in accordance with the design manuals developed by Kern County and Los Angeles County.
- Water Quality and Storm Water Runoff – Design and treatment best management practices (BMP) would include the installation of biofiltration swales and strips and infiltration devices to capture pollutants in storm water runoff. Construction BMPs would include implementation of erosion control measures, street sweeping and vacuuming, and installation of temporary check dams, hydraulic mulch, cover, fences, concrete wahsout bins, fiber rolls, drainage inlet protection, and sediment barriers. BMPs would be finalized during final Project design.
- Geology, Soils, Seismic, and Topography – Potential impacts would be minimized by incorporating appropriate Project design features and constructing the Project in conformance with the California Building Code (CBC) and applicable county ordinances, which include the Kern County Grading Ordinance. Temporary erosion control measures and Project design elements to address slope stability, pile driving, soils, seismicity, and topography would be developed and finalized during final Project design.
- Hazardous Waste/Materials – Appropriate environmental commitments would be developed after the completion of additional soil and/or groundwater testing that would be conducted to further assess potential impacts. Disposal of materials from the demolition of the existing CVEF would be conducted using proper removal, transport, and disposal measures to prevent a hazardous materials release.
- Air Quality – The Project would be constructed in compliance with Caltrans' Standard Specifications, Section 14-9 "Air Quality" and Caltrans' specifications for the control of construction-generated emissions. Additional measures may be developed in coordination with the San Joaquin Valley Air Pollution Control District (SJVAPCD) to minimize potential impacts.
- Noise and Vibration – Implementation of abatement measures (typically in the form of soundwalls) may be required to comply with county, state, and federal guidelines. In addition, Project construction would include pile driving, structure demolition, blasting, or other impact-type noises; therefore, measures would be needed in the plans and specifications to minimize or eliminate

adverse construction noise and vibration impacts on nearby land uses or activities. The measures would be based on the results of the Noise Study Report and Noise Abatement Decision Report.

- Biological Environment – Measures to avoid and minimize impacts on jurisdictional features, nesting migratory birds and raptors, special-status species, and bats would be implemented, including BMPs to prevent construction debris and dust from entering waterways, pre-construction surveys, and reduced work areas.

Coordination, Access to Information, and Participation

The Project will undergo environmental review in accordance with the California Environmental Quality Act (CEQA) and NEPA, during which time the public will be afforded an opportunity to provide comments on the Project. During the environmental review process, the County and Caltrans will ensure the full and fair participation of all potentially affected communities in the transportation decision making process.

References

Caltrans. (2011). *Caltrans Environmental Handbook, Volume 4; Chapter 8, Title VI and Environmental Justice.* Retrieved May 14, 2015, from http://www.dot.ca.gov/ser/vol4/downloads/chap_appdx/Ch8_EJ_21102011.pdf

Caltrans. (2014). *Standard Environmental Reference, Chapter 25 - Environmental Justice.* Retrieved May 14, 2015, from CA.gov: http://www.dot.ca.gov/ser/vol1/sec3/community/ch25ej/chap25ej.htm

CEQ. (1997, December 10). *Environmental Justice Guidance Under the National Environmental Policy Act.* Retrieved May 14, 2015, from http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-EJGuidance.pdf

FHWA. (2001, December). *Federal Highway Administration Interim Guidance: Addressing Environmental Justice in Environmental Assessments/Environmental Impact Statements.* Retrieved May 14, 2015, from http://www.dot.ca.gov/ser/downloads/memos/EJ%20checklist%20and%20guidance.pdf

HHS. (2015). *2015 Poverty Guidelines.* Retrieved May 13, 2015, from ASPE.hhs.gov: http://aspe.hhs.gov/poverty/15poverty.cfm

Kern County. (1971, January 18). *Zoning Map 203 and 219.* Retrieved May 19, 2015, from Kern County, CA, Engineering, Surveying, and Permit Services: http://esps.kerndsa.com/maps/zone-maps

Kern County. (2014). *Grapevine Specific and Community Plan (Draft).* Bakersfield: Kern County Planning Department.

U.S. Census Bureau. (2010a). *2006-2010 American Community Survey 5-Year Estimates.* Retrieved May 14, 2015, from American FactFinder: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

U.S. Census Bureau. (2010b). *2010 Census.* Retrieved May 14, 2015, from American Factfinder: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

U.S. Census Bureau. (2010c). *2009-2013 American Community Survey 5-Year Estimates.* Retrieved May 14, 2015, from American FactFinder: http://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

Attachment A

Caltrans Title VI Policy Statement

DEPARTMENT OF TRANSPORTATION
OFFICE OF THE DIRECTOR
P.O. BOX 942873, MS-49
SACRAMENTO, CA 94273-0001
PHONE (916) 654-5266
FAX (916) 654-6608
TTY 711
www.dot.ca.gov

Flex your power!
Be energy efficient!

March 2013

NON-DISCRIMINATION
POLICY STATEMENT

The California Department of Transportation, under Title VI of the Civil Rights Act of 1964 and related statutes, ensures that no person in the State of California shall, on the grounds of race, color, national origin, sex, disability, religion, sexual orientation, or age, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity it administers.

For information or guidance on how to file a complaint based on the grounds of race, color, national origin, sex, disability, religion, sexual orientation, or age, please visit the following web page: http://www.dot.ca.gov/hq/bep/title_vi/t6_violated.htm.

Additionally, if you need this information in an alternate format, such as in Braille or in a language other than English, please contact the California Department of Transportation, Office of Business and Economic Opportunity, 1823 14th Street, MS-79, Sacramento, CA 95811. Telephone: (916) 324-0449, TTY: 711, or via Fax: (916) 324-1949.

MALCOLM DOUGHERTY
Director

Appendix Y

Fire Protection Plan

FIRE PROTECTION PLAN
Grapevine Project

Prepared for:

Tejon Ranchcorp
4436 Lebec Road
Tejon Ranch, California 93243

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
Contact: Michael Huff, Fire Protection Planner

NOVEMBER 2015

Printed on 30% post-consumer recycled material.

TABLE OF CONTENTS

Section **Page No.**

TABLE OF CONTENTS (CONTINUED)

Section **Page No.**

APPENDIX

FIGURES

TABLES

1 INTRODUCTION

1.1 Purpose and Scope

This Fire Protection Plan (FPP) has been prepared for the proposed Grapevine project in unincorporated Kern County, California. The purpose of this FPP is to assess the potential impacts on public safety resulting from wildland fire hazards and the potential impact the project may have on the existing fire protection delivery system. Further, FPPs identify the measures necessary to adequately avoid, minimize, and mitigate impacts. As part of the assessment, this plan has considered the fire risk presented by the site, including property location and topography, geology (soils and slopes), combustible vegetation (fuel types), climatic conditions, fire history, and the proposed land use and configuration. This plan has also analyzed the fire protection delivery system of the Kern County Fire Department in the vicinity of the project.

This FPP addresses basic fire protection features and code requirements that will be implemented at the site and the need for any additional measures based on the site's unique fire environment. This FPP documents various fire protection features that will be provided within the project including structural ignition resistance, infrastructure, fire flow, and fuel modification/management zones.

In summary, the project will comply with 2013 Kern County and California Fire and Building Codes, but proposes certain design exceptions for review by Kern County Fire Department (KCFD) within the context of the overall phase planning at subdivision map stage to ensure that the overall design provides for fire and life safety consistent with KCFD standards. This FPP summarizes important requirements that will protect this project and its essential infrastructure from potential wildfire as well as provide for fire and emergency medical response consistent with Kern County Fire Department (KCFD) standards.

This FPP is consistent with the Kern County Code of Ordinances, specifically Title 17 – Buildings and Construction; Chapter 17.32 – Fire Code. Furthermore, it is consistent with the California Code of Regulations Titles 14 and 24 and State Fire and Building Codes (2013), as applicable. The purpose of this plan is to analyze the project's approach to fire and emergency medical response and ensure it minimizes existing and future potential fire hazards and provides for fire service that is appropriate for the proposed project. Requirements are based on site-specific characteristics and incorporate input from the project landowner's (Tejon Ranchcorp) staff and consultant team.

1.2 Project Description

1.2.1 Tejon Ranch

The proposed Grapevine project is located in the west-central portion of Tejon Ranch (the Ranch). The approximately 270,000-acre Ranch is currently held in private ownership by Tejon Ranchcorp.

The Ranch includes a large portion of the Tehachapi Mountains as well as smaller portions of the San Joaquin and Antelope Valleys. Generally, the Ranch extends along Interstate 5 (I-5) from State Route 138 on the southern side to State Route 58 on the northern side (Figure 1).

1.2.2 Grapevine Project

The 8,010-acre Grapevine project site is entirely within unincorporated Kern County, just south of the junction of I-5 and SR 99. Downtown Bakersfield is approximately 25 miles north of the project. The majority of the project is on the east side of I-5, with a smaller portion located on the west side of I-5. The project site is bisected by the California Aqueduct (Figure 2).

The Grapevine project site lies mainly in the Grapevine and Pastoria Creek U.S. Geological Survey (USGS) 7.5-minute quadrangles. There is one parcel and a portion of two other parcels in the project site that lie entirely within the Mettler USGS 7.5-minute quadrangles. The latitude and longitude of the approximate center of the site is 34°57′9″ N and 118°55′39″ W. The Universal Transverse Mercator (UTM) coordinates for the approximate center are UTM Easting (meters) 323999 and UTM Northing (meters) 3869472 in Zone 11.

1.2.3 Project Overview

The proposed Grapevine project site is within an area identified for development in the Tejon Ranch Land Use and Conservation Agreement (Ranchwide Agreement), a landmark agreement reached in 2008 with leading environmental organizations (including the Sierra Club, Natural Resources Defense Council, California Audubon Society, Endangered Habitats League, and Planning and Conservation League) to permanently preserve over 90% of Tejon Ranch as open space and limit development to designated areas near existing infrastructure such as I-5. The Ranchwide Agreement Grapevine Development Area is 15,644 acres, and the precise boundaries of the 8,010-acre project site may be further adjusted based on the results of the ongoing environmental review and permitting process for the project, but will remain within the Grapevine Planning Area.

The Grapevine project site would include approximately 3,232 acres (about 40% of the site) that would be designated for agriculture (with grazing and open space as the predominant land uses) and approximately 4,778 acres (about 60% of the site) that would be developed as a new residential community and employment center. The community would leverage and build upon the economic expansion and job growth that has occurred at Tejon Ranch Commerce Center, located immediately north of the project on I-5. The Grapevine project would feature a series of compact neighborhoods linked by bicycle and pedestrian trails that provide access to necessary amenities; it also preserves extensive open space and agricultural uses (Figure 3).

SOURCES: McIntosh & Associates (2013); TRC 2013a, 2013b

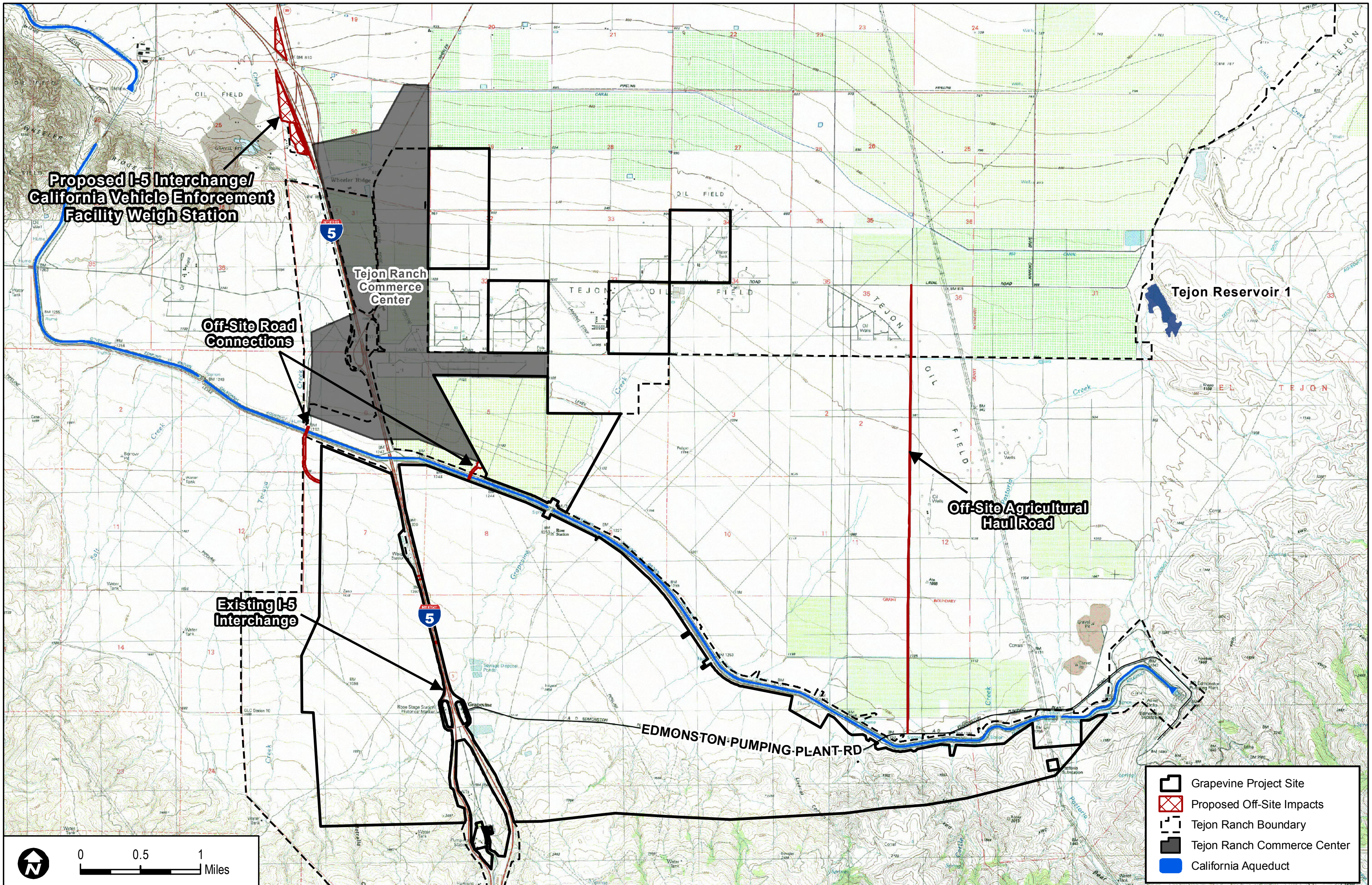
The Grapevine project site (McIntosh & Associates 2013) and Tejon Ranch (2013a) boundaries appear on subsequent figures; the source information will not be provided on subsequent figures.

FIGURE 1

Regional Location

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK



SOURCES: McIntosh & Associates 2014; TRC 2013c

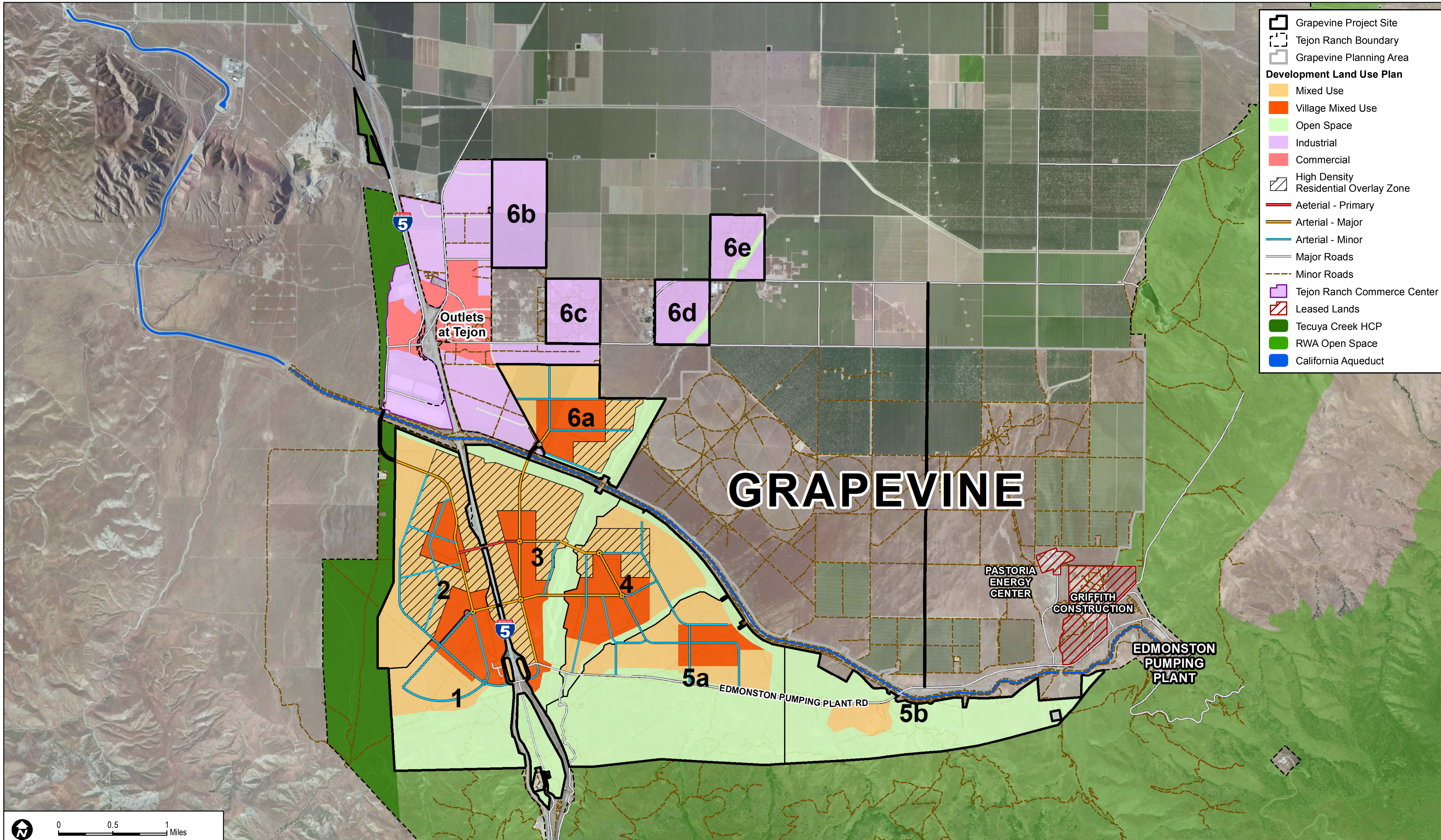
The California aqueduct (TRC 2013c) appears on subsequent figures; the source information will not be provided on subsequent figures.

FIGURE 2

Vicinity Map

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK



SOURCES: McIntosh & Associates 2013; KenKay 2014

FIGURE 3

Grapevine Proposed Land Use and Open Space

INTENTIONALLY LEFT BLANK

The proposed project is designed as a series of conveniently located village centers, each composed of a mix of housing, neighborhood-serving retail and office uses, schools, parks, and community services. Other potential public facilities, including emergency response resources (fire and sheriff facilities), transit facility/park-and-ride, and water and wastewater treatment facilities, are proposed throughout the community. Outside the village cores, the Grapevine project includes a mix of residential uses, office, research and development, regional commercial, freeway-oriented commercial, and light industrial/warehouse uses. The overall development for the entire Grapevine Specific Plan is restricted to a maximum of 12,000 dwelling units and 5,100,000 square feet of commercial and industrial floor area. However, based on the built and permitted commercial/industrial uses at the adjacent TRCC, the proposed project may ultimately support up to 2,000 additional dwelling units. The additional 2,000 units would be authorized only with a commensurate reduction of commercial/industrial square footage based on vehicle trip equivalency ratios, and only to the extent that the additional units would not cause any significant new adverse impacts, or increase the severity of previously identified adverse impacts. This mechanism to provide for a future increase in the number of residential units and correlated reduction in commercial and/or industrial uses is necessary to allow flexibility to respond to market demands and to ensure a jobs–housing balance over time, and would be monitored by Kern County staff.

Access to the project site would be from the Grapevine interchange (to be relocated to the north) and Laval Road at I-5. During later phases of development, the existing Grapevine Road/I-5 interchange may be expanded and relocated to the north, and the existing California Vehicle Enforcement Facility Weigh Station may be relocated to the west side of the junction of I-5 and SR-99, as depicted on Figure 1-5, Proposed Project Footprint. The proposed project would also improve an existing TRC agricultural road east of the Specific Plan Area to provide access for truck traffic currently using Edmonston Pumping Plant Road to travel to properties east of the proposed project. The circulation network within the proposed project is composed of two- and four-lane arterials, collector streets, and local streets organized in a grid pattern. All roads within the proposed project would be public. Water and sewer service will be provided by the Tejon–Castac Water District.

A trails system is proposed that would include a non-vehicular circulation system to provide pedestrian, bicycle, equestrian, and multi-use trails throughout the proposed project, including in open space separated from, but aligned along both Grapevine Creek and a tributary to Cattle Creek, within the southern foothills, and along the open space adjacent to the California Aqueduct, and at other locations throughout the proposed project. Some of these trails would connect to on-street, Class 1 and 2 bike lanes. This trails network would contribute to the recreational experience within the Specific Plan Area while also providing opportunities for alternative means of transportation within the community. The trail system is designed to accentuate the natural and existing features of the proposed project site, thus, some of the trails would be located within the 3,232 acres of designated open space.

1.2.4 Project Construction Scenario

The Specific Plan Area is divided into 11 Plan Areas (1, 2, 3, 4, 5a, 5b, 6a, 6b, 6c, 6d, and 6e), ranging in size from approximately 450 to 1,400 acres. Development would be phased over a period of more than 19 years. The areas that are proposed to remain in open space use are primarily located along the southern portion of the foothills of the Tehachapi Mountains and San Emigdio Mountains, on site in the riparian corridors along Grapevine and a tributary to Cattle Creek, and along the southern edge of the California Aqueduct.

1.2.5 Project Operation Scenario

The project operations are described in the Grapevine Specific and Community Plan, and land uses associated with operations are described in the Grapevine Special Planning District Plan. It is anticipated that the project will include typical ongoing activities of an urban area. Urban areas include a variety of emergencies that will require response from KCFD including medical and fire-related emergencies associated with residential, commercial, and industrial land uses in addition to calls related to the I-5.

2 ENVIRONMENTAL SETTING

2.1 Site Evaluation

Dudek conducted a site evaluation on January 27, 2014. The site inspection included the following:

- A review of the project area Fire Hazard Severity Zones
- An evaluation of the site's topography
- An assessment of the site's fuel and fuel in the conservation areas adjacent the developed areas
- An evaluation of existing infrastructure
- Documentation of existing conditions
- An evaluation of the off-site, adjacent property fuel and topography conditions
- Confirmation of the surrounding land use

Representative site photographs are provided in Appendix A.

2.1.1 Existing Site Fire Hazards

Existing site activities include irrigated agriculture operations, grasslands used for grazing/hunting, oil and gas operations, and overhead utility corridor. These current land uses result in potential ignition sources, albeit at low levels and the lack of urbanized areas currently at the site results in a low overall risk rating. The largest fire hazard on the project site currently is the grasslands that seasonally become susceptible to fire ignition and spread, although they are managed through grazing, as discussed in Section 2.3. The on-site ignition sources that may facilitate fire are generally a low potential risk, except for vehicle related fires that may occur along any of the roadways on or adjacent the project, with I-5 representing the highest potential ignition source due to its high traffic volume.

2.2 Geographic Setting

The Grapevine project site can generally be classified into two geographic areas, including the following: (1) the foothills of the Tehachapi Mountains and San Emigdio Mountains on the southern portion of the site (foothills), which is located in proposed open space, and (2) the San Joaquin Valley floor, which contains (a) riparian areas, all of which would be avoided and is located in proposed open space; and (b) the remainder of the valley floor which is dominated by managed grasslands and agriculture where the majority of development is proposed. Table 1 summarizes the area located in proposed open space by these geographic areas. Directly to the west of the Grapevine project is the approximately 1,150-acre Tecuya Creek Section 7 Preserve which consists of managed grasslands, which will be conserved in perpetuity as required by the conservation easement.

Table 1
Conservation by Geographic Region on Project Site

Region	On-Site Acres	Off-Site Impacts	Acres Conserved	% Conserved
Foothills	1,793	—	1,716	96%
Valley Floor	6,216	77	1,516	24%
Total	**8,010**	**77**	**3,232**	**40%**

2.3 Current Land Use

The majority of the Grapevine project site is characteristic of a landscape that has been used for ranching and hunting for many years. The agricultural uses on the Grapevine project site include almond orchards and wine grapes, as well as several corrals associated with cattle ranching operations. Oil and gas production wells consisting of both active and inactive wells are located throughout portions of the project area, which are operated through mineral leases. Several underground oil and gas pipelines also extend through the project area. Linear utilities and associated utility easements for water, gas, and electricity cross the site. Within the area of the existing Grapevine I-5 interchange, existing commercial uses are served by water, sewer, natural gas, and electricity.

Livestock grazing occurs Ranch-wide on approximately 240,000 acres of the Ranch’s 270,000 acres. A moderate grazing regime is employed, including regular rotation, to manage fire fuel while maintaining appropriate feed type and quality to provide for sustainable use of the property by livestock. Grazing generally occurs from October 1 through April 15. Some years, additional grazing is necessary to control invasive annual grasses based on habitat conditions. Additionally, grazing management recommendations to enhance resource conditions where appropriate to meet conservation goals identified in the Tejon Ranch Conservancy Ranch-wide Management Plan (Tejon Ranch Conservancy 2013) may also affect the level of grazing. Grazing is used strategically for fire control and maintaining/managing sensitive species on portions of the Tejon Ranch. Grazing throughout the winter rainy months ensures that new growth is consumed before annual drying occurs in late spring and summer. The fuel bed remains below 6 inches in height and in a low fire risk condition.

2.4 Fire Hazard Severity Zone

2.4.1 State Responsibility Areas (SRAs) and Fire Hazard Severity Zones

State Responsibility Areas (SRAs) are areas where the State of California is financially responsible for prevention and suppression of wildfires. Incorporated cities or federally owned lands are not included in SRAs (California Fire Prevention Fee 2014) and are instead referred to as either Local Responsibility Areas (LRAs) or Federal Responsibility Areas (FRAs), respectively. LRAs are discussed in more detail in Section 2.4.2.

SRAs occur over an approximately 6,530-acre portion (81%) of the project site. The remainder of the site (19%) is located in Local Responsibility Areas (LRA) provided protection by KCFD.

CAL FIRE conducted a statewide fire hazard severity zone mapping program in the early 2000's and published its SRA Fire Hazard Severity Zone maps in 2007. They also worked with local agencies to map fire hazard severity zones in LRA areas and those maps have been published as of 2012. According to this data, the majority (5,032 acres or 77%) of the SRAs on the project site are designated as moderate fire hazard and are predominately located on the valley floor (Figure 4). This portion of the project site is relatively flat and gently rises in elevation to the foothills in the south. The moderate fire hazard zone ends roughly at the base of the foothills. The vegetation in the moderate fire hazard zone is largely grazed grasslands. Areas designated as moderate fire hazard include terrain and fuels that are not likely to result in aggressive wildfires. Wildfires may occur, but are considered manageable.

The remainder (1,498 acres or 19%) of the SRA on the project site is designated as a high fire hazard area and is largely in the foothills, the majority of which would be conserved in open space. The foothill areas receive the "high" classification due to its steeper slopes (Figure 5), which can increase fire spread rates. The vegetation in the high fire hazard zone also is mostly grazed grasslands with a small of amount of scrub, woodland, savannah, and wetlands. Fires occurring in these areas would be expected to be more aggressive than in the moderate hazard areas, but this vegetation is also grazed and maintained in a low fuel condition. Fires occurring on the slopes would be strongly influenced by the terrain, which slopes up, away from the Grapevine Project, which would tend to produce fires that move away from the project, absent wind influence.

The highest CAL FIRE fire hazard zone category is "very high," and there is no occurrence of this zone within or adjacent the project site.

2.4.2 Local Responsibility Areas (LRAs)

Wildland fire protection in California in incorporated cities, cultivated agriculture lands, and portions of the desert within LRAs are typically provided by city fire departments, fire protection districts, counties, or by CAL FIRE under contract to local government. In Kern County, as in several counties, the County Fire Department is under contract with CAL FIRE and receives funding from the state for fire operations, i.e., CAL FIRE pays KCFD for fire services and provides additional firefighting resources to Kern County for large wildfire events.

The portion of the project site north of the California Aqueduct totals approximately 1,557 acres and is situated within LRA and is classified as "unzoned," indicating there is minimal or no wildland fire hazard. The unzoned LRA primarily consists of irrigated orchards and areas that are currently being used or have been used for oil and gas operations. Unzoned areas present low risk for wildfire ignitions and fire spread.

2.5 Topography

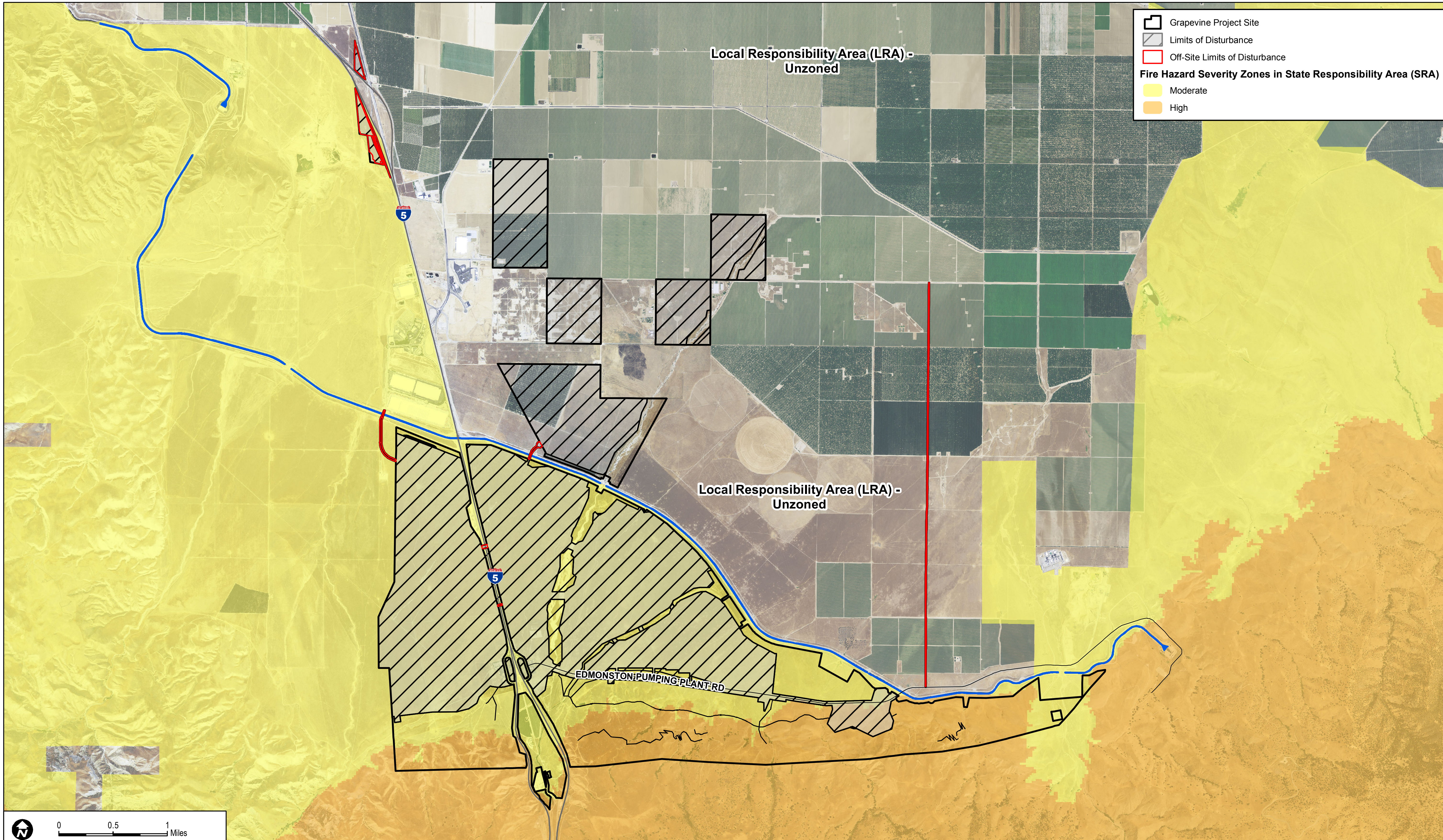
Topography is a site characteristic that influences fire hazard and fire behavior. Typically, fire burns faster and more aggressively on steeper terrain. Flatter terrain generally results in slower moving fires unless high winds and flashy fuels are present.

The majority of the project development will occur in the San Joaquin Valley floor. The lowest elevation portion of the project site in the San Joaquin Valley is approximately 771 feet above mean sea level (amsl), with elevation gradually sloping upwards from north to south. The California Aqueduct bisects the project site and where the aqueduct crosses the I-5, the project site elevation is approximately 1,255 feet amsl. Within the foothills, the elevations rise higher over a shorter distance resulting in steeper slopes to 2,186 feet amsl and are generally north-facing towards the valley floor (Figure 6). While the slopes are steeper on the foothills than on the valley floor, the majority of the foothills (96%) will be conserved in on-site open space while the area being developed occurs on the site's flattest terrain. Slopes that rise away from the valley floor influence wildfire behavior because fire will tend to burn upslope, away from the project.

Grapevine Canyon is a major drainage feature on the landscape and currently contains the I-5 freeway. The foothills of the Tehachapi Mountains are physically separated from the foothills of the San Emigdio Mountains by Grapevine Canyon and the I-5. The Tehachapi foothills are east of I-5 and the foothills of the San Emigdio Mountains are west of I-5. The portions of I-5 adjacent to the Grapevine project site are four lanes on the south- and north-bound sides of the freeway, for a total of eight lanes. This represents a significant fire break/fuel buffer, but is also a significant ignition source due to the many vehicles that travel the route.

2.6 Fuels

Vegetation is referred to as fuel with respect to wildfire. The Grapevine projects site, including virtually all of the areas proposed for development, are characteristic of a landscape that has been used primarily for ranching for many years. The site is dominated by grasslands that have been grazed for decades and are dominated by annual grasses such as bromes (*Bromus* ssp.) and barley (*Hordeum* ssp.) resulting in light, flashy fuels that are quickly consumed and produce lower heat intensity (Btu). A total of 86% of the project site is characterized by this fuel type.



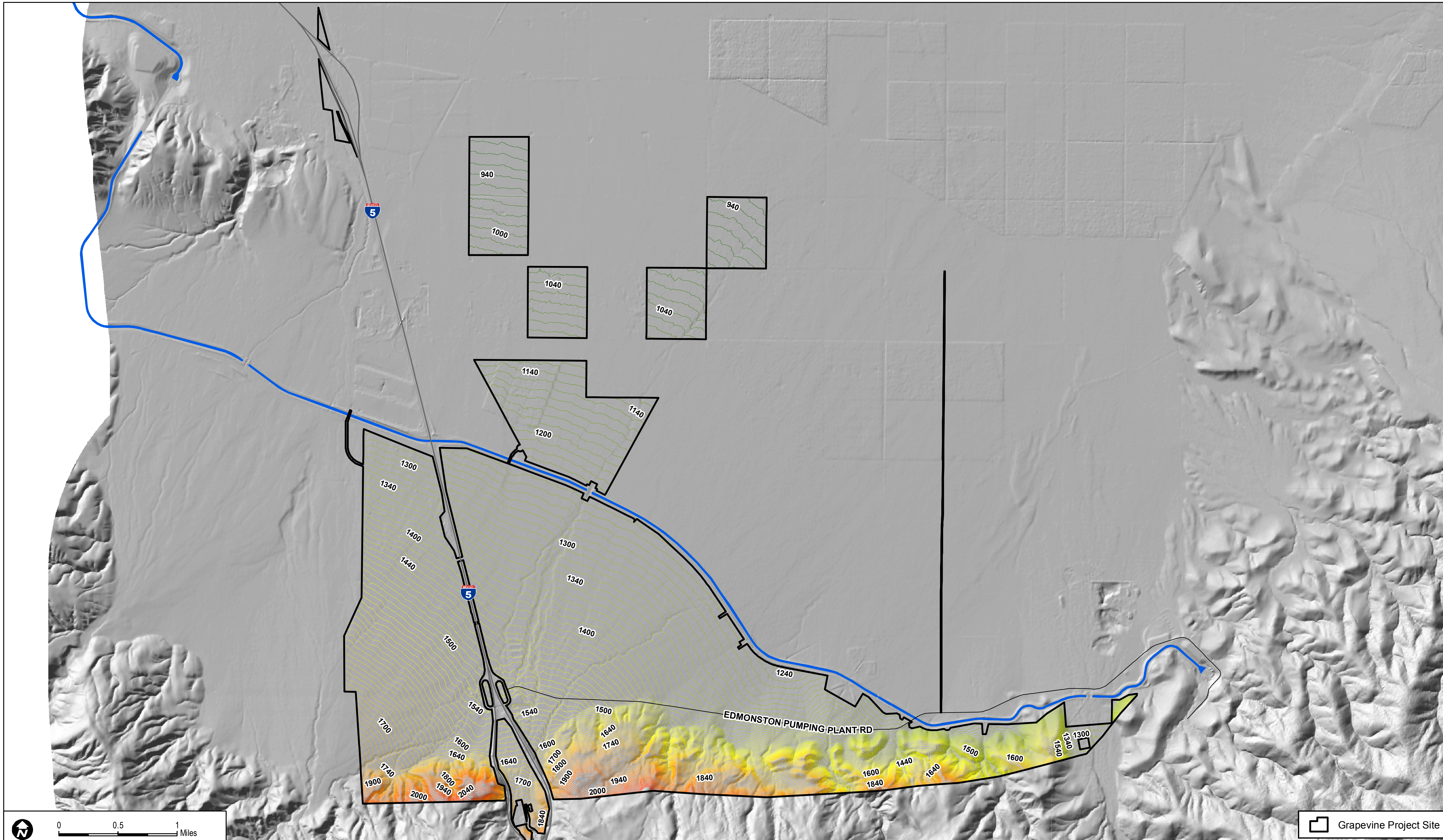
SOURCES: McIntosh & Associates 2013; TRC 2013b; FRAP 2007

FIGURE 4

Fire Hazard Severity Zones

GRAPEVINE PROJECT

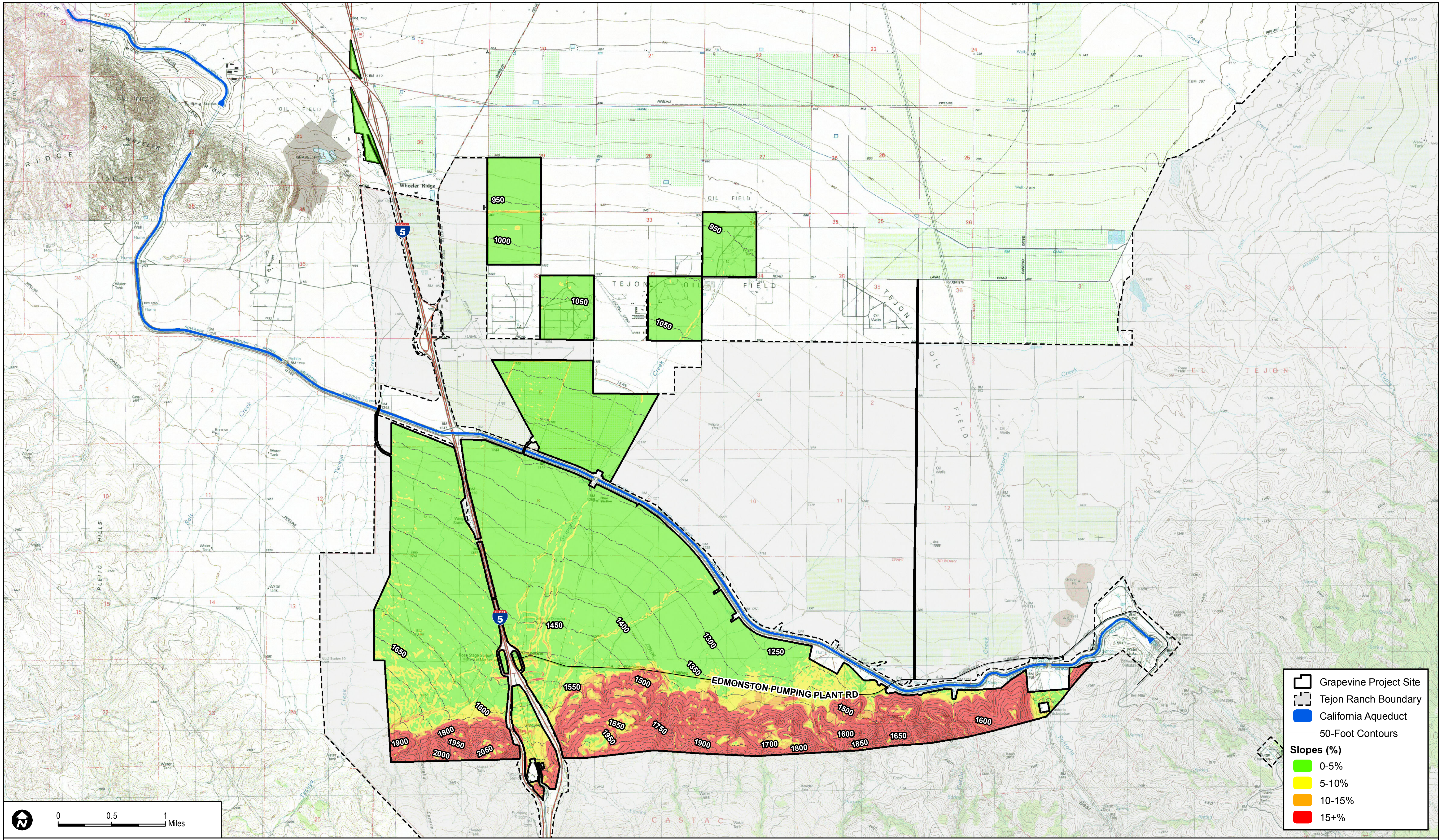
INTENTIONALLY LEFT BLANK



SOURCES: McIntosh 2013; TRC 2013

FIGURE 5
10-Foot Contour Elevation Map

INTENTIONALLY LEFT BLANK



SOURCES: TRC 2014

FIGURE 6
Elevation and Slope

INTENTIONALLY LEFT BLANK

2.6.1 Valley Floor Fuels

The valley floor is dominated by grazed grasslands (84%), irrigated orchards and vineyards (8%), urban and developed areas, including paved roads, commercial areas, and landscaped areas, and roadways and other infrastructure (6%). The remainder of the valley floor consists of unvegetated washes and a very small amount of riparian and scrub vegetation. Based on the land cover types indicated, the grasslands represent the primary fuel available for ignition and fire spread. Unmanaged grasslands can be more susceptible to ignition than other fuel types, including sage scrub, chaparral, and forest because they dry out early and become ready for ignition, form continuous fuel beds, and form fuel beds with a fire-friendly mix of fuel surface area and air/oxygen needed to sustain fire spread. Grass-dominated fuels are more prone to fire ignition and spread, but they produce more manageable fires than shrubland or forest fires which burn hotter and with higher intensity. Also important for fire prevention, grassland fuels are easily modified so that they are less vulnerable to fire ignition and spread through a variety of prescriptions including grazing, tilling and mowing.

2.6.2 Foothill Fuels

The foothills, which will be mostly conserved in opens space, are also dominated by grazed grasslands, but include all of the scrub, wetlands, and savannah on site and a majority of the riparian scrub and woodlands (see Figure 7). Scrub, wetlands, savannah and woodlands fuel types each vary in their susceptibility to ignition and their facilitation of fire spread. Savannah and woodlands typically include a grass dominated understory, so grass fires would be the primary fire carrier in these fuels. Wetlands and riparian scrub are less susceptible to ignitions, but under Red Flag Warning weather (low humidity and high winds for extended periods), these fuel types will burn and they can burn with tall flame lengths, high intensity and moderate to fast spread rates. The occurrence of these fuel types on the project site are sporadic, discontinuous, and would not be expected to be the primary driver of fire on the site. The developed areas are distant from the foothills vegetation areas so there are no direct effects from these fuels on the project.

Table 2, Vegetation on the Grapevine Project Site, provides the acreages of the vegetation/fuel types on the Grapevine project site.

Table 2
Vegetation on the Grapevine Project Site

Generalized Habitat Type	Area (acres)
Grasslands (various grass models)[1]	6,993
Irrigated orchards and vineyards (custom model)	493
Urban/Developed and Roadway Infrastructure (non-combustible)	397
Shrublands/Scrub (Shrub models)	78
Wash (disturbed/non-combustible)	62

Table 2
Vegetation on the Grapevine Project Site

Generalized Habitat Type	Area (acres)
Riparian scrub/wetlands (shrub model)	44
Riparian woodland (Timber/Litter model)	16
Oak savannah (grass model)	5
Total	**8,087**

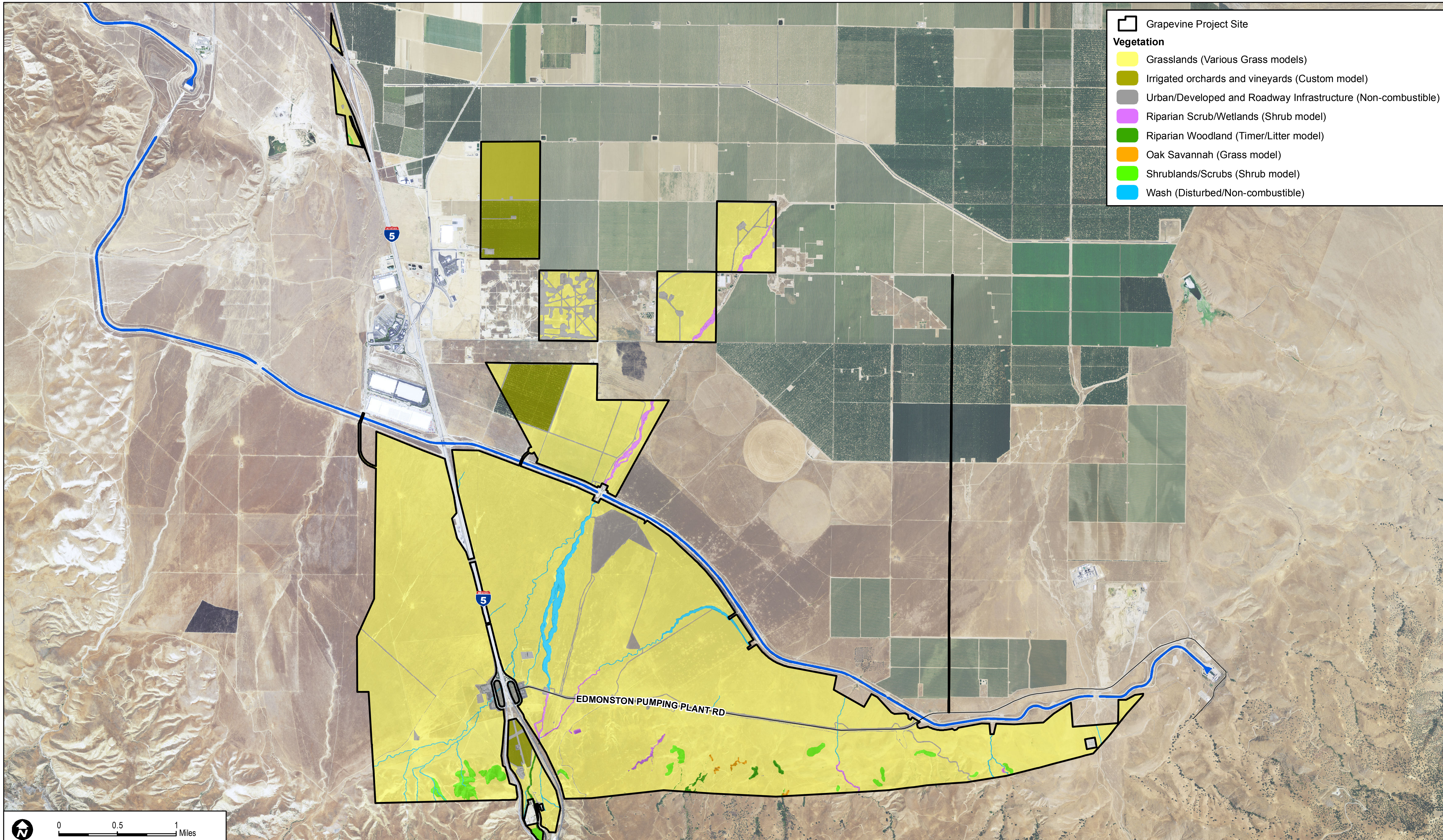
1 99% of the grasslands are non-native annual grasslands that are grazed.

2.7 Fuel Load

Fuel load refers to the accumulation of fuel over time. If the time between burns is short (i.e., fire frequency is high), less fuel is able to build-up and the accumulated material will be comprised primarily of herbaceous plant material and leaf litter. Variations in vegetative cover type and species composition have a direct effect on fire behavior. With respect to species composition, some plant species have increased flammability based on plant physiology (resin content), biological function (flowering, retention of dead plant material), physical structure (leaf size, branching patterns), and overall fuel loading. Annual non-native grasslands that dominate the project site are considered to exhibit higher potential for ignition (if unmaintained) but a lower overall hazard based on their lower flame lengths and heat intensity. Vegetative cover can affect flame length, spread rates, and fire intensity. For example, while fires burning in grasslands may exhibit lower flame lengths and intensity than those burning in sage scrub fuels, fire spread rates in grasslands are often much more rapid than those in other vegetation types. However, the site is maintained through a grazing regime, including regular rotation, to manage and reduce the fuel load on site, resulting in lower fuel load, reduced fuel to air ratio, discontinuous fuels, and lower risk of fire spread.

2.7.1 Vegetation Community Dynamics

The majority of the vegetation on site is grazed annual grasslands indicating that the development-adjacent fuels, if unmaintained, would be capable of frequent (every 2 to 3 years) ignition and fire spread, but would result in lower-intensity fires. If maintenance was not provided in the conservation areas that are dominated by grasslands, biomass and associated fuel loading would increase over time through the process of vegetation community succession. This would then lead to the potential establishment of trees and/or shrubs and a conversion of the area to a native vegetation condition. However, repeated grazing is planned for the area as part of the overall Ranch land management approach which eliminates the possibility that the off-site fuels would convert over time to a higher fuel load, more volatile fuel type that could present a risk to the project.



SOURCES: McIntosh & Associates 2013; TRC 2013b;

FIGURE 7

Vegetation

GRAPEVINE PROJECT

INTENTIONALLY LEFT BLANK

The areas that are not converted to urban landscapes, including areas off-site that are part of the Tejon Ranch, will continue to be managed according to the Tejon Ranch Conservancy Ranch-wide Management Plan (Tejon Ranch Conservancy 2013). That plan includes detailed management actions aimed at managing the various fuel types to reduce the threat of large wildland fires. Amongst the management activities that are implemented and will continue are: managed grazing, strategic mowing along road shoulders, targeted herbicide applications and prescribed burning, where feasible. These methods, but particularly the managed grazing program, have historically reduced the grass fuel loads such that wildfires may occur, but rarely become uncontrollable. This type of fuel management in off-site areas will reduce the potential fire hazard for the Grapevine Project. The project will also provide managed fuel modification zones for perimeter areas that are adjacent to conservation area vegetation/fuels.

2.8 Fire History

Fire history is an important component of a FPP. Fire history information can provide an understanding of fire frequency, fire type, most vulnerable project areas, and significant ignition sources, among other information. Fire frequency, behavior, and ignition sources are important for fire response and planning purposes. One important use for this information is as a tool for pre-planning. It is advantageous to know which areas may have burned recently and therefore may provide a tactical defense position, what type of fire burned on the site, and how a fire may spread.

According to available data from the California Department of Forestry and Fire Protection (CAL FIRE) Fire and Resource Assessment Program (CAL FIRE 2013), several fires have burned in the vicinity of the project site since the beginning of the historical fire data record (Figure 8). Nearly all fires in the project area are ignited by human activity adjacent to roadways (e.g., improperly discarded cigarettes, overheated vehicles, burning metal from brakes or catalytic converter, or vehicular accidents), particularly the I-5 freeway. Fires that were not caused by freeway related sources were also human caused. It appears that naturally caused wildfires (such as from lighting) in the area do occur, especially in the mountainous areas, but very infrequently in the Valley Floor areas. Fires occurring in 1915, 1916, 1920, 1921, 1940, 1941, 1965, 1970, 1974, 1993 (three fires), 1994, 1996, 1998, 1999 (two fires), 2003 (three fires), 2005, 2006 (two fires), 2008 (two fires), 2009 (four fires), 2010 (four fires), 2011 (three fires), and 2012 (six fires), burned within 5 miles of the project site. Nine of these fires burned onto the project site in 1920, 1974, 1993, 1998, 2003, 2009 (two fires) and 2010 (two fires). The 1920 fire (unnamed) burned over 2,385 acres, the 1974 Grapevine Fire burned over 467 acres, the 1993 Tejon Fire burned a total of 873 acres, the 1998 Grapevine Fire burned 485 acres, the 2003 Grapevine Fire burned over 1,800 acres, the 2009 Parkway Fire burned 689 acres, the 2009 Ridge Fire burned 10 acres, and both 2010 Base Fires burned a combined acreage of 150 acres.

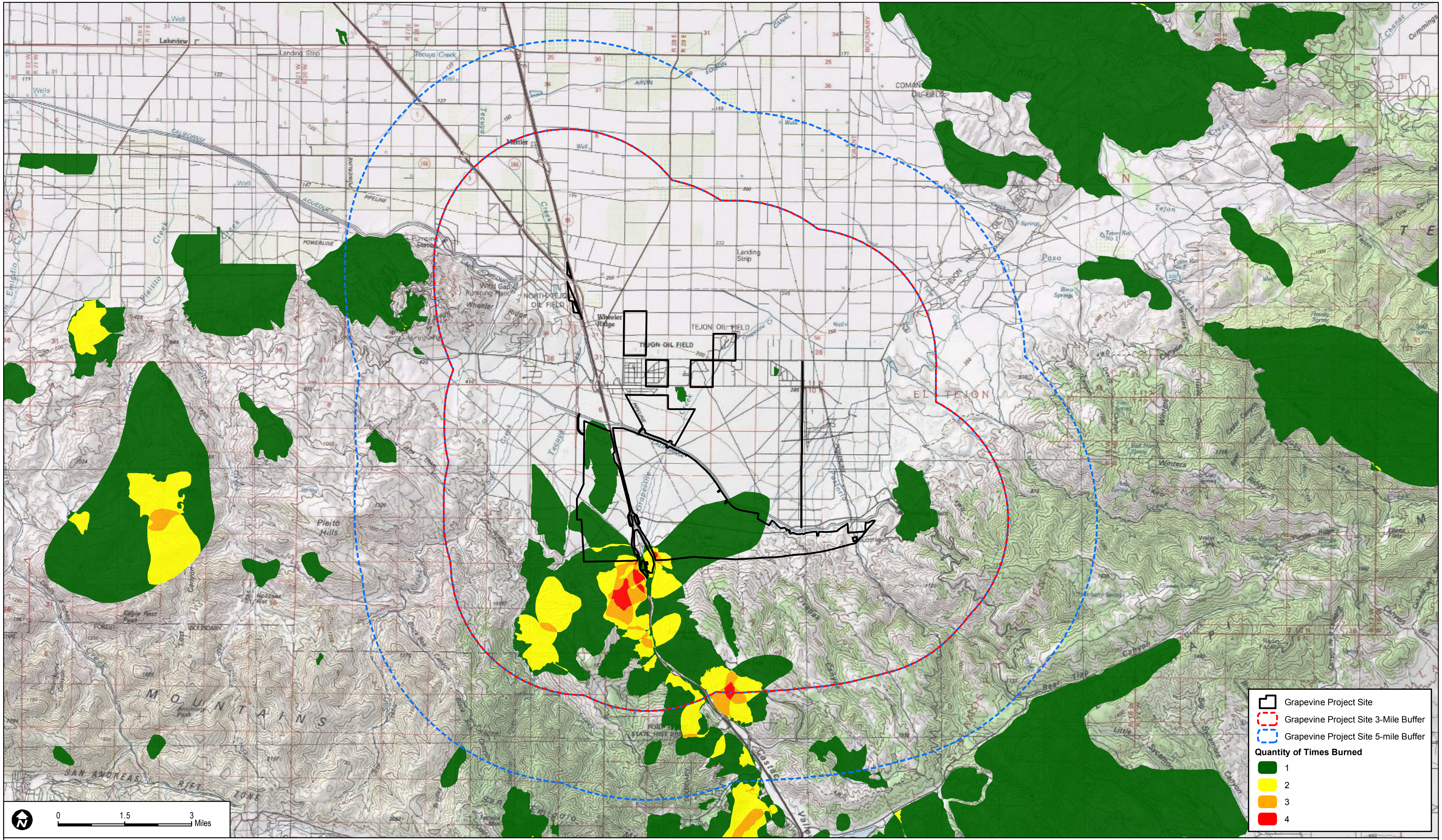
Based on an analysis of this fire history data set, specifically, the years in which the fires burned, the average interval between wildfires burning within a 5-mile radius of the project site (an area where fire occurrence may affect the project site) was calculated to be 2.3 years, with intervals ranging between 0 (multiple fires in the same year) and 24 years. Based on this analysis, the area is expected to be within a 5-mile vicinity of a wildfire approximately every 5 years. Based on fire history, wildfire risk for the project site is associated primarily with vehicle-caused fires along the I-5 corridor. This does not mean that fire will threaten the Grapevine Project every 5 years. It should be noted that the areas that will be converted to developed urban landscapes will remove naturally occurring fuels that would be susceptible to wildfire ignitions and replace it with irrigated landscapes and non-combustible or very ignition resistant surfaces including roads and structures. The project, at build out, will act as a large fuel break where fires occurring within conservation area grass fuels nearby may burn up to the perimeter of the project, but would not have the fuel bed available to continue burning beyond the provided buffers, fuel modification zones and/or perimeter landscaping. Further, the additional firefighting resources that will be provided by the project in an area where there are currently limited fire fighting resources and high potential ignition sources associated with I-5, will provide for faster response times which have been proven to result in containment of fires before they become larger fires that are harder to control.

2.9 Climate

The majority of the project site is located in the San Joaquin Valley, which has a semi-arid climate characterized by long, hot, dry summers and damp, short winters that have a heavy fog layer for weeks at a time. The average high temperature during the summer approaches 96 degrees Fahrenheit (°F), with an annual average of 75.9°F. Low temperatures range from approximately 37°F–68°F, with an annual average low temperature of 51.2°F. The average annual precipitation is 11.68 inches. The majority of the rainfall (precipitation over 1 inch/month) during the year occurs between November and April, the typical rainy season for this region. The summer months are virtually rainless, with average monthly rainfalls ranging from 0.01–0.02 inch/month (WRCC 2013).

From a regional perspective, the fire season is virtually year round, however, it is more likely for large wildfires to occur in mid- to late summer as vegetation begins to dry out after winter and spring rains. The fire season typically is reduced in December, although fire weather may be present year-round (Schroeder and Buck 1970).

Typical wind patterns in the area include warm winds from the north that flow across the Valley Floor and up over the Tehachapi Mountain throughout the daytime hours. Nighttime winds are similar as the warm north winds continue to blow, but near the Grapevine Project site, they shift to an “eddy” type wind that includes north winds and south winds as the warmer air meets cooler mountain drainage winds and are forced back northward.



SOURCES: CA Department of Fire 2012; McIntosh & Associates 2013; TRC 2013b;

FIGURE 8

Fire History Map

INTENTIONALLY LEFT BLANK

Extreme fire weather may occur and may be associated with large Santa Ana wind events. Santa Ana winds occur throughout the Fire Weather Zone 295 which encompasses the Tehachapi Mountains. Especially large Santa Ana events may result in lower humidity and higher winds in the vicinity of the Grapevine Project. These conditions can also occur from localized terrain driven winds and result in higher likelihood of ignitions, more aggressive fire behavior and faster fire spread. Extreme fire weather is typically associated with humidity readings that are less than 15% and winds that are above 25 mph.

INTENTIONALLY LEFT BLANK

3 ANTICIPATED FIRE BEHAVIOR

3.1 Fire Behavior Modeling

The type and intensity of fire that would be expected in the vicinity of the Grapevine project site given characteristic site features such as topography, vegetation, and weather were estimated from fire behavior modeling results at similar sites with flat to gently rolling terrain, grass dominated fuel beds, and potential weather similar to that at the Grapevine Project. The developed portion of the project, which occurs within the flattest areas of the site, will be built out and include very low risk of fire. The wildfire threat will remain on some of the off-site, conservation areas, particularly to the south, southeast, and southwest. Fire behavior projections discussed herein are for these conservation areas that will continue to remain managed grasslands.

To evaluate different scenarios, data for both the typical weather (50th percentile weather and the extreme fire weather (90th percentile weather)) conditions were summarized using the FireFamily Plus software package. Data from the nearest and closest elevation Remote Automated Weather Station, Chuchupate Remote Automated Weather Station (RAWS) in Frazier Park was evaluated from August 1 through October 31 for each year between 1961 and 2006. Further, this data was compared with that derived from the Grapevine Peak RAWS KRN03 RAWS data from 2007. Table 3 provides a detailed description of the input variables used in the BehavePlus calculations.

Table 3
BehavePlus Input Variables

Input Variable	Fire/Weather Scenario	
	Typical Weather (50th percentile)	*Extreme Fire Weather (90th percentile)*
1-hour fuel moisture	4%	2%
10-hour fuel moisture	6%	3%
100-hour fuel moisture	11%	7%
Live herbaceous moisture	60%	30%
Live woody moisture	90%	60%
20-foot wind speed (mph)*	7 mph	25 mph
Wind adjustment factor	0.5	0.5
Canopy height (feet)	6 feet	6 feet
Slope steepness	65%	65%
Ridge–valley elevation difference	500 feet	500 feet
Ridge–valley horizontal difference	770 feet	770 feet
Spotting source location	Ridgetop	Ridgetop

mph = miles per hour
* Wind speed also modeled at 50 mph to evaluate effects of wind gusts during extreme weather scenarios.

Fire Model Output Results

Once the project is built, large areas of vegetated fuels will be converted to ignition resistant or non-combustible surfaces including irrigated landscape, roads, structures, and infrastructure. The grass-dominated landscapes that will be off-site adjacent to some of the developed project will be the fuel that is susceptible to ignitions and fire spread. As shown in Table 4, typical fire behavior for a summer fire within grass fuels on the slope areas of the project, were they unmanaged and allowed to mature and dry out, may result in a fire spreading at a rate of nearly 1 mile per hour (mph), with flame lengths of roughly 8 feet and a fireline intensity value exceeding 530 British thermal units per foot per second (Btu/ft/s). This type of fire spread would not be expected due to the ongoing grazing program. During a typical extreme weather fire with gusty winds and low fuel moisture, fire is expected to be moderately fast, moving at up to 4.6 mph in grass fuels with the flame length values reaching up to 19 feet and fireline intensity values exceeding 3,400 Btu/ft/s. Assuming wind gusts of 50 mph during this time, the spread rate in this fuel type increases to nearly 6 mph with 21-foot flame lengths and fireline intensity values exceeding 4,300 Btu/ft/s (depending on slope value). Areas that include shrubs/scrub vegetation are minimal adjacent the site and the grasses dominate the plant community, resulting in fire behavior that is largely driven by the grass fuels. The riparian woodland areas and orchards have been modeled as timber/litter models with resulting flame lengths and fire spreads ranging from under 2 feet to over 18 feet and from 0.06 to 1.6 mph as the fire burns through the litter layer. The orchards will be removed and converted to urban uses with development of the initial phase, but were modeled to represent the site's existing condition. A crown fire was not assumed in these areas, but if fire were to spread into the tree canopy, it is not dense enough to carry significant fire unless wind were driving the fire and creating significant ember storms.

Note that the northern 20% to 30% of the project site occurs in areas where there are currently minimal or no native fuels (Figure 7); therefore, fire behavior estimation for this portion of the site is not appropriate. Fire would typically not spread throughout these areas. Patchy fire may occur as windblown embers land in receptive fuel sources, which are very limited in occurrence.

Table 4
BehavePlus Fire Behavior Modeling Results

Fuel Model	BehavePlus Output	Summer Fire (50th percentile)	Fall Fire (90th percentile)	Extreme Fall Fire (90th percentile w/ 50 mph wind)
GR2	Surface rate of spread	0.6 mph	4.1 mph	4.2 mph
	Flame length	5.5 feet	14.0 feet	14.1 feet
	Spotting distance	0.1 mile	0.7 mile	1.1 miles
	Fireline intensity	227 Btu/ft/s	1,755 Btu/ft/s	1,791 Btu/ft/s

Table 4
BehavePlus Fire Behavior Modeling Results

Fuel Model	BehavePlus Output	Summer Fire (50th percentile)	Fall Fire (90th percentile)	Extreme Fall Fire (90th percentile w/ 50 mph wind)
GR3	Surface rate of spread	0.8 mph	4.6 mph	5.8 mph
	Flame length	8.1 feet	19.0 feet	21.2 feet
	Spotting distance	0.2 mile	0.8 mile	1.4 miles
	Fireline intensity	530 Btu/ft/s	3,402 Btu/ft/s	4,322 Btu/ft/s
TL2	Surface rate of spread	0.03 mph	0.06 mph	0.06 mph
	Flame length	1.1 feet	1.6 feet	1.6 feet
	Spotting distance	0.0 mile	0.1 mile	0.2 mile
	Fireline intensity	7 Btu/ft/s	16 Btu/ft/s	16 Btu/ft/s
TL3	Surface rate of spread	0.04 mph	0.08 mph	0.08 mph
	Flame length	1.3 feet	2.1 feet	2.1 feet
	Spotting distance	0.1 mile	0.2 mile	0.2 mile
	Fireline intensity	11 Btu/ft/s	30 Btu/ft/s	30 Btu/ft/s
TL9	Surface rate of spread	0.2 mph	0.7 mph	1.6 mph
	Flame length	6.3 feet	12.2 feet	18.0 feet
	Spotting distance	0.2 mile	0.6 mile	1.3 miles
	Fireline intensity	315 Btu/ft/s	1,307 Btu/ft/s	3,040 Btu/ft/s

Note:
mph = miles per hour; Btu/ft/s = British thermal units per foot per second

These modeling results were used as one of several components for determining the type of managed fuel modification area needed to adequately protect perimeter located structures. The managed grasslands within the conservation areas adjacent to the project will extend a few hundred to several hundred feet or more from the perimeter structures. As discussed, these areas will be managed in a low fuel state through grazing and other methods. Given the site, its fire environment, and projected flame lengths adjacent the developed areas, most of the Grapevine Project will not need additional designated fuel modification zone.

Fuel modification zones (also known as vegetation management zones), in which flammable vegetation, continuous fuel beds, and high fire hazard shrubbery are removed, help reduce wildfire risk for structures. Phase 5B is located within a high fire hazard zone. This development area is also closest to the steeper slopes and projected tallest flame lengths. Based on these results, a formal fuel modification zone should be established in this area that is 100 feet wide (from perimeter structures outward toward adjacent conservation areas/off-site fuels). The Kern County standard FMZ or brush management zone is 100 feet, consisting of reduced fuels or a thinning zone that does not necessarily include an irrigated zone. Even though these areas are planned for grazing, a formal FMZ is necessary so that if grazing does not occur in the area for unforeseen reasons, fuel reduction will be accomplished in the 100-foot zone nearest the perimeter structures by the community association or other managing entity.

The remainder of the development occurs in the flatter, moderate fire hazard areas and will also include managed conservation area buffers at the edges. These areas are not anticipated to require any additional fuel modification zones besides the grazed conservation area buffers, which will extend further than 100 feet from perimeter structures. Should the areas in moderate fire hazard severity zones not be grazed for unforeseen circumstances, then an area no less than 30 feet from perimeter structures should be maintained. However, it is anticipated that perimeter structures will include yards, green spaces or other landscaped areas that will perform the role of fuel modification and supplement the buffer areas.

4 EMERGENCY RESPONSE

An important component of an FPP is analysis of the existing fire department response capabilities, which allows a meaningful evaluation of the ability of those capabilities to meet the demands of a proposed project. Where capabilities are inadequate, mitigation measures or project design features are developed and provided in the FPP.

4.1 Response Times

The KCFD has adopted a nationally recognized standard (NFPA 1142/1710) for fire response times. For the Grapevine Project, KCFD has stated that the emergency call response travel time requirement is 4 minutes for the first arriving fire apparatus. Therefore, fire station location and distribution heavily influences whether this response standard is met. In addition to first arriving engine, the weight of the response, i.e., the number of firefighters and the types of apparatus that respond is important, especially when industrial and commercial structures are involved. It is not an adequate response to have one engine on-scene for a typical residential structure fire or a major medical emergency because there are many tasks that need to be completed to conduct a safe fire suppression, fire rescue, or emergency medical response effectively. Internal policies also govern the number of personnel that must be on-site before certain activities can proceed, for example, the two in, two out rule that requires 4 firefighters before entry into an involved structure occurs, or the NFPA standards that indicate the need for 14 personnel for a typical fire in a 2,000-square-foot structure or 5 personnel on site for a major medical emergency (cardiac arrest). It may require three or more engines for these types of emergencies and many more engines and trucks for significant industrial building fires. The closest fire station response times currently in the project area is summarized in Table 5.

Table 5
Current Kern County Fire Department Response Configuration

Fire Station Number	Location	Staffing	Apparatus	Est. Response Time/Miles to Grapevine Area[1]
56	Lebec (western edge of development along I-5)	3	Type I and III engines and patrol	15 minutes/12.5 miles
55	Mettler (on I-5 at Tejon Industrial Center)	6 plus battalion chief and helicopter crew	Type I engine and aerial ladder truck, helicopter	< 8 minutes/<5 miles *Portions of project are within 4 minutes.*
57	Frazier Park	2	Type III engine/squad	20 minutes/18.5 miles
Total	**—**	**11+**	**3 engines; 1 truck; 1 helicopter**	**First responder within 8 minutes; maximum 15 minutes/18.5 miles**

1 Note, response time and mileage is estimated to approximately the middle portion of the project and does not include response to the most remotely located structure. Actual response travel times will be longer than estimated. A more detailed road network model would need to be used for more accurate estimates.

As noted, in Table 5, portions of the Grapevine project are reachable within 4 minutes travel time, to the central portion of the project from existing stations. Large portions of the project are outside the 4 minute travel time, indicating that additional fire resources in the area will be necessary.

4.2 Call Volume

A second measure of the ability of available resources to respond to the project is related to call volume. Call volume is generated by a given population. KCFD has an internal standard of maintain a firefighter to citizen ratio of 1:2,500. This is based on the typical call volume that is generated by this population and helps manage staffing and stations so that work load is balanced and that a high population area does not create slower responses or negative service impacts. The Grapevine Project is a significant development for this area of Kern County. The population in the area is expected to grow by over 35,000 people and include a variety of land uses including nearly 10.7 million square feet of industrial and commercial structures, as discussed in this FPP. A typical population of approximately 35,000 people, in addition to the existing relatively small population of workers that are in the area only during work hours at Tejon Ranch Commercial Center and other existing facilities (Pastoria mine, DWR, etc.) and the high-call volume producing I-5 freeway, will generate a significant call volume that will exceed the ability of existing KCFD resources in the area to provide service meeting their internal standards. Using a call volume per capita formula that averages calls throughout a typical California urban area, the average number of calls per 1,000 persons is approximately 82 calls per year. Therefore, a population of over 35,000 people would be projected to generate nearly 3,000 calls per year, or just over 8 calls per day (includes a wide variety of call types from medical emergencies to hazardous spills). For perspective, busy urban fire stations may run 8 to 10 calls per day while average stations run approximately 5 calls per day. Existing fire stations would not be able to absorb this substantial call volume without negative impacts to their service level, indicating that additional resources will be necessary.

4.3 Grapevine Project Risk and Impact Assessment

The analysis of the current and proposed land uses, the existing and post-project fire environment, and the ability of the KCFD to meet internal response standards results in pertinent findings for determining the overall Grapevine Project risk and impact assessment, as follows:

- There is a low occurrence of wildfire on the Grapevine Project.
- Wildfires occur roughly every 5 years in the vicinity (within 5 miles) of the site.
- The I-5 freeway is a major ignition source and will bisect the project.

- Fires in the off-site fuels will continue to be lower risk, lower intensity grass-fires that have historically burned near the project.
- The project will convert vulnerable vegetation to managed urban landscapes throughout the developed area.
- The type and location of remaining vegetative fuel sources will be at the periphery of some areas of the project (particularly southern development areas).
- There will be ongoing and funded conservation area management and fire hazard reduction activities (grazing, mowing, herbicides, prescribed burning, etc.) within buffer areas adjacent to developed areas.
- The potential for wildfire ignition is considered low to moderate.
- The fire behavior in available fuels is considered low to moderate and manageable.
- The project will generate a calculated 3,000 calls which will be responded to by KCFD.
- The project's size and distribution creates challenges for response travel time standards.
- The KCFD does not currently have necessary response resources in the area for a development this size (although the project will provide fire facilities as it builds out).

The project is not expected to be vulnerable to recurring wildfire ignition and spread in the area because peripheral open space areas include grass fuels that are easily reduced through grazing, which will be a primary component of the active fire management of these areas. However, it may be subject to nearby wildfire, such as from the southerly open space or other off-site areas that include native fuels that could, under worst-case conditions, spread toward the project areas within flashy fuels. Fire is not expected to have readily ignitable fuels in the post-project landscape which includes the yards, parkways, green spaces and fuel modification zones. Persons living, working, and visiting the Grapevine Project will not be subject to elevated risk from fire. Therefore, the fire risk at the Grapevine Project is considered to be low and any potential impacts on public safety will be addressed below a level of significance by the project's fire and building code compliance and fire/life safety features.

With regards to fire response and potential impacts on the existing KCFD and its ability to provide fire protection and emergency medical response, the project presents challenges. Without implementation of project design feature (PDF) Fire-1, the Grapevine Project would have a significant impact because most of the project area cannot be responded to within the 4 minute travel time standard KCFD has stated will be required for the project and the call volume generated by the project will require additional resources. The potential significant impact is reduced below the level of significance by PDF Fire-1.

PDF Fire-1: The project would provide fair-share funding for fire and emergency medical response resources necessary to provide response levels consistent with KCFD's standards for providing fire and life safety. It is anticipated that fire facilities appropriate for the Grapevine Project will be provided by TRC to be staffed and operated by KCFD. Fire facilities would be provided on a phased, as-needed basis over the project's anticipated 19 year build out. In addition, KCFD will review proposed project-provided fire resources in the context of overall phase planning to ensure the overall design provides for fire and life safety.

Fire Safety at the Grapevine Project will consist of a layered approach that includes passive protections (fuel modification, interior sprinklers, ignition resistant construction, etc.) designed to work with little human intervention. The need for active fire protection at this site will be provided by the KCFD, but persons living and working within the Grapevine Project will be expected to actively participate in the overall fire safety plan. It is recommended that the homeowners or other occupants who reside within the project adopt a conservative approach to fire safety. This approach must include maintaining the landscape and structural components according to the appropriate standards and embracing a "Ready, Set, Go" stance on evacuation (IAFC 2011). To ensure that their roles are defined and understood, PDF Fire-2 provides for Home Owner Association initiated requirements and educational information exchange.

PDF Fire-2: Accordingly, the HOA will provide educational information to homeowners specific to the Grapevine Project site, its potential fire and other hazards, and steps they can take to minimize the potential for personal impacts. Additionally, the community Codes, Covenants, and Restrictions will specify homeowner responsibilities for maintaining fire safe landscapes. All homeowners will be subject to fire safe landscapes, but owners of lots directly adjacent to conservation area buffers who are within designated fuel modification areas, in particular, will be required to meet annual fuel reduction/landscape maintenance standards.

5 GRAPEVINE PROJECT FIRE PROTECTION CODE COMPLIANCE

5.1 Buildings, Infrastructure, and Defensible Space

The Kern County Building and Fire Codes govern the building, infrastructure, and defensible space requirements detailed in this FPP. The project will meet applicable codes except several proposed exceptions to road width and dead end road length, subject to Fire Code Official approval, as described in Section 5.1.3. Compliance with these standards will avoid or minimize potentially significant wildfire risks to less than significant levels. The following summaries highlight important fire protection features.

5.1.1 Primary Fire Access

Fire apparatus access roads shall be consistent with the requirements of KCFD Fire Code (Appendix D). Typical fire access roads will include no less than 20 feet wide unobstructed travel lanes (minimum of two 10-foot wide lanes). Exceptions to fire access roads are presented in Section 5.1.3.

5.1.1.1 Entrances

Access gates are not allowed on public roadways (Appendix D103.6.3). Should private roadways be included in the project, gates on private roads will comply with KCFD standards (KCFD Fire Code, Sec 503.5) for electric gates including an emergency key-operated switch overriding all command functions and opening the gate. Gate setbacks from roadway and other code requirements will be required.

5.1.1.2 Dead Ends

All project roads will meet KCFD standards regarding dead-end roads (KCFC 17.32.109, Appendix D, Section 109) and provided turnarounds except as noted in Section 5.1.3.

5.1.1.3 Turning Radius

Turning radius for fire apparatus access roads is 40 feet inside turning radius (KCFC Appendix D, Section 103.3). The project proposes an exception as described in Section 5.1.3.

5.1.1.4 Grade

The project will comply as applicable for public roads (KCFC Appendix D, Section 103.1) and will not exceed 10% road grade. The developed portions of the site are flat and roadways will be well below 10%.

5.1.1.4 Surface

The project will comply with KCFC regarding surface (Appendix D, Section 102.1) as applicable. All fire access and vehicle roadways will be of all-weather construction, and designed and maintained to support the imposed loads of fire apparatus (not less than 75,000 pounds) that may respond, including ladder trucks and Type I and Type III engines. Access roads to active construction areas shall be drivable by fire apparatus prior to the start of combustible construction.

5.1.1.5 Identification

Per the KCFD Fire Code (Section 505.1 and 505.2), identification of structures and roads will comply with the following requirements:

- All structures shall have a permanently posted address, which shall be legible from the street. If it is not legible from the street, an address shall also be posted at street entrance to driveway and shall be visible from both directions of travel. Numbers shall be 4 inches high with 0.5-inch stroke, and located 6–8 feet above ground level. Numbers will contrast with background.

Street identification will include approved permanent signs.

5.1.1.6 Gates

Per the KCFD Fire Code (Section 503.5), automatic gates will comply with the following requirements:

- All automatic gates shall be equipped with a Knox, emergency key-operated switch overriding all command functions and opening the gate(s). Automatic gates accessing through the main entrance and secondary/emergency access roadways shall be equipped with approved emergency traffic control-activating strobe light sensor(s) which will activate the gate from both directions of travel on the approach of emergency apparatus. The automatic gate will have a battery back-up or manual mechanical disconnect in case of a power failure.
- Pole gates or other structures or devices which could obstruct fire access roadways or otherwise hinder emergency operations shall be equipped with an approved, Knox padlock.

5.1.2 Water

Water service for the project is anticipated to be provided by the Tejon–Castac Water District and will be consistent with KCFD requirements (KCFD Fire Code; Appendix B and BB, Tables B105.1 and BB105.1) as indicated in the Grapevine Project's Water Treatment Facility

Engineering Report (EKI 2014). Because the water availability, flow, and residual pressures meet KCFD code requirements, the water system is considered in compliance with firefighting needs, including proposed hydrant locations, as discussed below. KCFD Section 507.3 indicates fire flow requirements for buildings or portions of buildings and facilities shall be determined by the fire code official and shall be computed on the basis of a minimum 20 p.s.i.g. (137.9 kPa) residual operating pressure at the point of lowest pressure of the street main from which the flow is measured. In setting the requirements for fire flow, the fire code official may be guided by the provisions in Appendix B and by the minimum requirements set forth in Table 507.5.7.1, but may require higher standards on the basis of local conditions, exposure, congestion, or construction of the building. The required fire flows are to be provided in addition to the domestic requirements.

5.1.2.1 Hydrants

Hydrants shall be located consistently with KCFC Section 507.5.1–507.5.7 which allows the following exceptions:

- Stretches of roadway serving no structures may eliminate hydrants or include spacing of 1,000 feet between hydrants as approved by the Kern County Fire Department (CFC Table C101.1).
- The required fire flow is based on all structures having approved fire sprinkler systems, with a resulting 50% reduction in the Fire Code Fire Flow requirements consistent with Appendix B of the Adopted 2013 California Building Code.
- A 3-foot clear space (free of ornamental landscaping and retaining walls) shall be maintained around the circumference of all fire hydrants. Hydrants will be in place and serviceable prior to delivery of combustible materials to the site.

5.1.2.2 Fire Sprinklers

All new residential structures will be provided interior fire sprinklers and other structures will receive fire sprinklers to code based on the occupancy type (CFC/KCFC Section 903). Automatic internal fire sprinklers shall be in accordance with National Fire Protection Association (NFPA) standards for the type of occupancy. For this project, it is anticipated that the sprinkler standards established by the National Fire Protection Association (NFPA) and adopted by KCFD will include the NFPA 13, 13-D and 13-R system, depending on the occupancy type. NFPA 13 is an industrial fire protection system, 13-R is required for multi-family residential over two units, and 13-D is the standard single family residence sprinkler system.

5.1.3 Grapevine Project Requested Code Exceptions

The following requested code exceptions will be refined as project planning proceeds and details are available. The exceptions will be reviewed by KCFD within the context of the overall phase planning at the subdivision map stage to ensure that overall design provides the same practical effect as the code for fire and life safety needs.

1. Fire Access.
   a. Street Improvements shall be Type A; however, rights-of-way, widths, and design for streets, alleys, public ways and easements shall conform to the Specific and Special Plans.
   b. Street improvement standards for all streets shall be as stated in the Specific Plan and Special Planning (SP) District Plan.
2. Dead-end Road Length.
   a. The Special Planning (SP) District Plan allows cul-de-sacs to be up to 20% longer with the provision of attic sprinklers and additional fuel modification requirements. The additional provisions of attic sprinklers and additional fuel modification would apply only to a limited number of units (not detailed at the time of this FPP) and would provide additional fire protection from both wildfire and interior structure fires, enabling longer response times from responding fire agencies. This practice has previously been approved within KCFD.
   b. Rowhouses, Townhouses, and Clustered Small lot residences are accessed by alleys or lanes as an integral part of the overall design and to conform to the Specific and Special Plans. The number of alleys or lanes exceeding dead end road lengths and by how much they would exceed allowable limits are not defined at the time of this FPP preparation. These units would be protected by 13-R structure protection fire sprinklers and access via nearby roads would enable fire apparatus access to within 150 feet of all sides of each structure.
   c. Special Plan development is designed in certain areas with lane fronted “Clustered Small Lot” residences with dead end access for general public, but turfblock EVA access for emergency vehicles will be provided. The turfblock will be designed to support the imposed loads of fire apparatus.

3. Turning Radius.
   a. Will be a minimum 30 feet measured on the inside edge of the improved width. The reduction in turning radius may impact the ability of the larger fire apparatus to make necessary turns without interrupting traffic in adjacent lanes and therefore, may not be acceptable to the KCFD upon their review of the project at the subdivision phase.
4. Surface.
   a. Pervious pavement on the outside travel lanes and in areas promoting water quality are proposed. They would be designed to support the imposed load of a fire apparatus (75,000 pounds) consistent with the Fire Code (Appendix D, Section 102.1).

5.1.4 Ignition-Resistant Construction and Fire Protection Systems

All new structures will be constructed to KCFD Fire and Building Code Standards for the type of occupancy. Each of the proposed buildings will comply with the enhanced ignition-resistant construction standards of the 2013 or most current California Building Code (Chapter 7A). These requirements address roofs, eaves, exterior walls, vents, appendages, windows, and doors and result in hardened structures that have been proven to perform at high levels (resist ignition) during the typically short duration of exposure to burning vegetation from wildfires.

There are two primary concerns for structure ignition: (1) radiant and/or convective heat and (2) burning embers (NFPA 2008; Ventura County Fire Protection District 2011; IBHS 2008; and others). Burning embers have been a focus of building code updates for at least the last decade, and new structures in the wildland–urban interface (WUI) built to these codes have proven to be very ignition resistant. Likewise, radiant and convective heat impacts on structures have been minimized through the Chapter 7A exterior fire ratings for walls, windows, and doors. Additionally, provisions for modified fuel areas separating wildland fuels from structures have reduced the number of fuel-related structure losses. As such, most of the primary components of the layered fire protection system provided for the Grapevine project are required by applicable codes but are worth listing because they have been proven effective for minimizing structural vulnerability to wildfire and, with the inclusion of required interior sprinklers (required in the 2010 Building/Fire Code update), extinguishing interior fires, should embers succeed in entering a structure (such as through a window inadvertently left open).

Even though these measures are now required by the latest building and fire codes, at one time, they were used as mitigation measures for buildings in WUI areas, because they were known to reduce structure vulnerability to wildfire. These measures performed so well, they were adopted into the code. The following project features are required for new development in Moderate and

High Fire Hazard Severity Zone areas and form the basis of the system of protection necessary to minimize structural ignitions as well as providing adequate access by emergency responders:

- Application of Chapter 7A, ignition-resistant building requirements
- Minimum 1-hour rated exterior walls and doors
- Multiple-pane glazing with a minimum of one tempered pane, with a fire-resistance rating of not less than 20 minutes when tested according to NFPA 257 or tested to meet the performance requirements of State Fire Marshal Standard 12-7A-2
- Ember-resistant vents (recommend BrandGuard or similar vents)
- Interior fire sprinklers to code for all occupancies
- Modern infrastructure, access roads, and water delivery system.

5.1.5 Defensible Space and Vegetation Management

Fuel Modification

Fuel modification zones are designed to gradually reduce fire intensity and flame lengths from advancing fire by strategically placing thinning zones, restricted vegetation zones, and irrigated zones adjacent to each other on the perimeter of the WUI-exposed structures. Because this project will utilize ignition-resistant construction techniques and materials, the proposed fuel modification areas are anticipated to provide adequate setback from naturally occurring fuels.

Fuel Modification Zone Requirements

Per Kern County Fire Code, 17.32.104, Section 4906, Hazardous Vegetation and Fuel Management, this FPP provides recommendations for fuel modification zones for the Grapevine Project. Based on the site's unique fire environment, which includes reduced fuel loads (primarily grazed grasslands), lower Btu fuels (grasses), and flat terrain for most areas, and includes extensive conservation buffer areas that will function as reduced fuel areas, the proposed fuel modification zones for the perimeter of the project site shall comply with the following recommendations.

<u>High Fire Hazard Severity Zone – Residential Fuel Modification Zones</u>

The residential development proposed in the far southeast (Figure 7) portion of the project area (Phase 5B) is adjacent to the project's steeper terrain (Foothill Area) and within the designated high fire hazard severity zone. Therefore, the structures located on the perimeter edge of this area will require a full 100 feet of fuel modification from the structure outward, toward the conservation area fuels. Since the area will be adjacent to grazed annual grasslands within the conservation area, it is recommended that the fuel modification zone is 100 feet of mowed or grazed grasses. This area would include the first 100 feet from structures outward. If landscaped yards, green spaces or similar areas occur within the 100 feet zone, they must be maintained in a conditions that will not readily transmit fire.

- The fuel modification zones provided for the perimeter exposed structures will be located within the development footprint as opposed to occurring off-site. However, off-site conservation area fuel management will continue under the direction of the Tejon Ranch and will be accomplished by managed grazing. To the extent that the off-site managed grazing can be assured to occur annually prior to May 15th and the area comply with KCFD fuel modification requirements, the need for and the width of on-site fuel modification zone can be reduced, with KCFD concurrence.

Moderate Fire Hazard Severity Zone – Fuel Modification Zones

As depicted in Figure 7, development of the remainder of the project site within the moderate fire hazard severity zone will be located in areas that include flat terrain and adjacent agriculture or other managed landscapes that present low fire risk and do not result in high flame lengths, high fire intensity, or particularly fast fire spread. The low fire hazard for these areas along with the ignition resistance of the proposed structures and the existence of managed buffer areas adjacent development areas enables reductions in the necessary fuel modification areas. Therefore, this FPP recommends that fuel modification zones for these areas include at least 30 feet of fuel modification area (may be mowed non-native grasses, thinned area or irrigated landscaped area including yards, parkways, roads, ornamental agriculture such as orchards and vineyards, etc.). This fuel modification area is applicable for perimeter structures' exposed side that is adjacent conservation areas or off-site fuels. It is anticipated that the landscaped yards, green spaces or other irrigated landscape areas will provide the necessary setback from adjacent fuels and will comprise the 30-foot fuel modification area. These areas, coupled with the grazing of the conservation area fuels, results in a condition where additional modified fuel areas is not necessary.

Local Resource Area Unzoned Designations

Portions of the Grapevine project site are within the Local Resource Area, are unzoned, and will not require formal fuel modification zones. These areas are primarily planned for industrial land uses. These areas do not include wildland fuels and are dominated by agricultural areas and low-fuel landscapes. Landscaping associated with the project improvement building setbacks will provide a buffer around structures considered appropriate for these areas.

5.2 Special Fuel Management Issues

Trees may be planted within community edge areas that abut conservation areas as long as they conform to the requirements of, and are approved by, the KCFD and would not be of a species or distributed such that they would readily transmit fire from conservation areas to urban areas or from urban areas to conservation areas. Roadside tree planting when the road is directly adjacent to a conservation area is acceptable, as long as it meets the following restrictions:

- Crowns of trees located within defensible space shall maintain a minimum horizontal clearance of 10 feet for fire-resistant trees. No non-fire-resistant trees will be allowed.
- Mature trees shall be pruned to remove limbs up to one-third the height of the trees or 6 feet above the ground surface adjacent to the trees, whichever is less.
- Deadwood and litter shall be regularly removed from trees.
- Ornamental trees along roadways at the interface with conservation areas shall be limited to groupings of two to three trees, with canopies for each grouping separated horizontally by 10 feet. This does not apply to irrigated and maintained groves, orchards, or other agricultural crops or any areas outside the fuel modification zones.

5.3 Vegetation Management

All fuel modification areas shall be maintained in perpetuity by the homeowner if private property or by the Property Owners' Association/management company if part of the common area. Per Public Resources Code 4290 and 4291, owners of properties adjacent to wildland fuels are required to maintain fuel modification areas. For the Grapevine Project, adjacent land use in the conservation area is anticipated to provide the fuel modification needed through ongoing fire management activities associated with the Tejon Ranch's resource management objectives. Fire management is an important aspect of this program and fuel reduction in the buffer areas adjacent the project will be primarily accomplished by grazing, although the Ranch's management plan allows for the use of mowing, targeted herbicides, and even prescribed fire, as appropriate. In addition, on-site fuel modification areas will require ongoing maintenance.

- For roadside plantings that are within fuel modification zones, i.e., where a road occurs between the project and the conservation areas, fire-resistant trees can be planted as long as vertical clearance is maintained at street edge. Care should be given to the type of tree selected, so that it will not encroach into the roadway or produce a closed canopy effect.
- Limit planting of large unbroken masses, especially trees and large shrubs within the fuel modification zones. Groups should be two to three trees maximum, with mature foliage of any group separated horizontally by at least 10 feet if planted on a slope

less than 20%, and 20 feet if planted on a slope greater than 20%. This does not apply to groves, orchards, or other irrigated, maintained agriculture operations.

- If shrubs are located underneath a tree's drip line, the lowest tree branch should be at least three times as high as the understory shrubs or 10 feet, whichever is greater.
- Existing trees can be pruned 10 feet away from roof, eave, or exterior siding, depending on the tree's physical or flammable characteristics and the building construction features.
- All tree branches shall be removed within 10 feet of a fireplace chimney or outdoor barbecue.

Pre-Construction Requirements

- Perimeter fuel modification zones around building pads must be implemented and approved by the KCFD prior to combustible materials being brought on site adjacent conservation areas that include flammable vegetation.
- Existing flammable vegetation shall be removed on vacant lots prior to commencement of construction and bringing combustible construction materials on site.
- Dead fuel, ladder fuel (fuel which can spread fire from ground to trees), and downed fuel shall be removed and trees/shrubs shall be properly limbed, pruned, and spaced per this plan.

5.4 Vegetation Management Compliance Schedule

All fuel modification area vegetation management shall be completed annually by May 15 of each year and more often as needed for fire safety, as determined by the KCFD.

INTENTIONALLY LEFT BLANK

6 CONCLUSION

This FPP is submitted in support of an application for project entitlement of the Grapevine Project. The recommendations in this document meet fire safety, building design elements, fuel management/modification, and landscaping requirements and recommendations of the County and are based on a site-specific assessment of the fire environment and its potential fire risk. Where exceptions occur, alternative measures have been proposed and KCFD will review at later stages of planning, including at the subdivision map stage for the exceptions provision of same practical effect with the intent of fire and life safety measures. Fire and building codes and other local, county, and state regulations in effect at the time of each building permit application supersede these recommendations unless the FPP recommendation is more restrictive.

The recommendations provided in this FPP have been designed specifically for the proposed construction of structures on the Grapevine Project site. The project site's fire protection system includes a redundant layering of required protection methods that have been shown through post-fire damage assessments to reduce risk of structural ignition.

Modern infrastructure, fire stations, and other public amenities will be provided along with implementation of the latest ignition-resistant construction methods and materials. Further, interior sprinklers will be provided in all residential structures as well as in other occupancies, to code. Fuel modification will occur on exposed perimeter edges of the project by ongoing fire management practices in the conservation area buffer coupled with on-site maintenance of fuel modification areas that are adjacent to conservation areas that will vary between 30 and 100 feet. Maintenance includes removing all dead and dying materials and maintaining appropriate horizontal and vertical spacing. In addition, plants that establish in or are introduced to the fuel modification zone that are not on the approved plant list will be removed.

Ultimately, it is the intent of this FPP to guide, through code and other project-specific requirements, the construction of structures that are defensible from wildfire and, in turn, do not represent significant threat of an ignition source for the adjacent habitat. It must be noted that during extreme fire conditions, there are no guarantees that a given structure will not burn. Precautions and mitigating actions identified in this FPP are designed to reduce the likelihood that fire would impinge upon the proposed structures. There are no guarantees that fire will not occur in the area or that fire will not damage property or cause harm to persons or their property. Implementation of the required enhanced construction features provided by the applicable codes and the mitigating fuel modification requirements provided in this FPP will accomplish the FPP's goal of assisting firefighters in their efforts to defend these structures and reducing the risk associated with this project's WUI location. For maximum benefit, the developer, contractors, engineers, and architects are responsible for proper implementation of the concepts and recommendations set forth in this FPP. Homeowners are responsible for maintaining their structures and lots as required by this FPP, the applicable fire code, and the KCFD.

Although the proposed development and landscape will be significantly improved in terms of ignition resistance, it should not be considered a shelter-in-place community. It is recommended that the homeowners or other occupants who may reside within the project adopt a conservative approach to fire safety. This approach must include maintaining the landscape and structural components according to the appropriate standards and embracing a “Ready, Set, Go” stance on evacuation (IAFC 2011). Accordingly, occupants should evacuate the area as soon as they receive notice to evacuate, or sooner, if they feel threatened by wildfire or structure fire in a nearby residence. Fire is a dynamic and somewhat unpredictable occurrence and it is important for residents to educate themselves on practices that will improve their home survivability and their personal safety.

The project is located within an area that is considered to include wildfire hazards, but these hazards are tempered by the types of fuels and the flat to gently sloping terrain in which it is proposed, as evidenced by the Moderate and High Fire Hazard Severity Zone designations and lack of any Very High Fire Hazard Severity Zone. The potential fire hazard is addressed by the project through a layered approach to fire safety that includes: 1) meeting the applicable Kern County Fire and Building Codes for ignition resistant structures including fire sprinklers in all residences and other occupancies to code, or providing alternative materials/methods for approval by KCFD, 2) fire access and water availability, 3) implementing PDF Fire-1 providing fair share funding to ensure that KCFD can provide firefighting and life safety resources necessary for fire and medical emergencies that will be generated by the project, 4) providing managed fuel modification areas at the perimeter of the project where it abuts conservation areas, 5) continued fuel management of adjacent conservation areas through ongoing grazing to maintain lower fuel heights and densities, and 6) providing community outreach for fire safety and emergency evacuation procedures by promoting the “Ready, Set, Go!” model. Therefore, the fire safety impact associated with the project is considered less than significant.

7 REFERENCES

CAL FIRE (California Department of Forestry and Fire). 2007. Fire and Resource Assessment Program.

CAL FIRE. 2013. Fire and Resource Assessment Program. http://frap.cdf.ca.gov/data/frapgismaps/select.asp?theme=5.

Dudek. 2013. *2013 Supplemental Jurisdictional Delineation Report for Tejon Ranch, Grapevine Study Area*.

Dudek. n.d. *Biological Resources Technical Report for the Grapevine Project.*

Dudek and Hunt Research. 2009. *Fire Protection Plan for the Tejon Mountain Village*.

EKI. 2014. Water Treatment Facility Engineering Report. Prepared by Erler and Kalinowski, Inc. July 2014. 17 pp.

IAFC (International Association of Fire Chiefs). 2011. "Ready, Set, Go" [Website]. http://wildlandfirersg.org/.

IBHS (Institute for Business and Home Safety). 2008. *Megafires: The Case for Mitigation*.

McIntosh & Associates. 2013. "Specific Plan Boundary GIS Data" [Shapefiles]. Received from McIntosh & Associates on July 25, 2013.

NFPA (National Fire Protection Association). 2008. NFPA 1144: Standard for Reducing Structure Ignition Hazards from Wildland Fire. Technical Committee on Forest and Rural Fire Protection. Issued by the Standards Council on June 4, 2007, with an effective date of June 24, 2007. Approved as an American National Standard on June 24, 2007.

Schroeder, M.J., and C.C. Buck. 1970. *Fire Weather: A Guide for Application of Meteorological Information to Forest Fire Control Operations*. USFS Agriculture Handbook 360.

TRC (Tejon Ranch Company). 2013a. "Tejon Ranch Boundary GIS Data" [Shapefiles]. Received from TRC on October 15, 2013.

TRC. 2013b. "Tejon Ranch Infrastructure GIS Data" [Shapefiles]. Received from TRC on February 12, 2013.

USDA (U.S. Department of Agriculture). 2012. NIAP Imagery.

USGS (U.S. Geological Survey). n.d. 7.5-Minute Series Grapevine, Mettler, Pastoria Creek, and Tejon Hills Quadrangles. http://nationalmap.gov/ustopo/index.html.

WRCC (Western Regional Climate Center). 2013. Western U.S. climate data summaries – Bakersfield, California. http://www.wrcc.dri.edu/summary/bfl.ca.html.

Wright, H.E., Jr., and M.L. Heinselman. 1973. "Introduction: The Ecological Role of Fire in Natural Conifer Forests of Western and Northern America." *Quaternary Research* 3(3): 319–328.

APPENDIX A

Grapevine Project Fire Assessment Photograph Log

Grapevine Project

Photograph Log

Photos 1 through 3. From the southern area of the Project toward the Foothills/undeveloped portion of the project.

Photos 4 through 6. Southern portion of the project toward undeveloped foothills. Note grazed fuels throughout.

Photo 7 (right). View to the north in the south-central portion of the project toward development area.

Photos 8 and 9 (below). View toward the southeast and southwest at undeveloped foothills.

Photos 10 through 12. Views of flat project area that will be developed. Note grazed fuels and disturbed/bare soil dominates.

Photos 13 through 15. View of various foothill areas that will not be developed and of the development area from the southwest portion of project.

Photos 16 through 18. View of flat, development area with grasslands, orchard, and existing utility corridor.

Photos 19 through 21. View of oil extraction operation, orchard and smaller distribution line within the area planned for development.

Photos 22 through 24. View of typical development area terrain, fuels and existing land uses.

Appendix Z

Fiscal and Economic Analysis

FISCAL AND ECONOMIC ANALYSIS

Grapevine Project

Prepared for:

Tejon Ranchcorp
4436 Lebec Road
Tejon Ranch, California 93243

Prepared by:

Stanley R. Hoffman Associates

11661 San Vicente Boulevard, Suite 306
Los Angeles, California 90049
Contact: Stan Hoffman

AUGUST 2015

Grapevine Project
Fiscal and Economic Analysis

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

Tables **Page No**

Figures

Grapevine Project
Fiscal and Economic Analysis

1.0 INTRODUCTION

1.1 Purpose and Scope

This Fiscal and Economic Analysis has been prepared for the proposed Grapevine project in unincorporated Kern County, California. The purpose of the Fiscal and Economic Analysis is to project the fiscal ability of the proposed development to cover the public service operations and maintenance costs provided by the Kern County General Fund and other relevant funds. The analysis is based on the current *County of Kern Fiscal Year 2015-2016 Recommended Budget* and the residential and non-residential land uses included in the proposed plan. The Grapevine project site is divided into six planning areas ranging in size from approximately 450 to 1,400 acres. The fiscal impacts are projected for each of the six planning areas after buildout and for the total Grapevine project after buildout. Fiscal impacts are projected in constant 2015 dollars, with no adjustment for future inflation.

1.2 Project Description

1.2.1 Project Location

The proposed Grapevine project is located in the west-central portion of Tejon Ranch (the Ranch). The approximately 270,000-acre Ranch is currently held in private ownership by Tejon Ranchcorp. The Ranch includes a large portion of the Tehachapi Mountains as well as smaller portions of the San Joaquin and Antelope Valleys. Generally, the Ranch extends from State Route 58 (SR 58) on the north to SR 138 on the south (see Figure 1 at end of report).

The 8,010-acre Grapevine project site is entirely within unincorporated Kern County, just south of the junction of I-5 and SR 99. Downtown Bakersfield is approximately 25 miles north of the project. The majority of the project is on the east side of I-5, but a smaller portion lies on the west side of I-5. The project site is bisected by the California Aqueduct (see Figure 2 at end of report).

The Grapevine project site lies mainly in the Grapevine and Pastoria Creek U.S. Geological Survey (USGS) 7.5-minute quadrangles. There is one parcel and a portion of two other parcels in the project site that lie entirely within the Mettler USGS 7.5-minute quadrangles. The latitude and longitude of the approximate center of the site is 34°57′9″ N and 118°55′39″ W. The Universal Transverse Mercator (UTM) coordinates for the approximate center are UTM Easting (meters) 323999 and UTM Northing (meters) 3869472 in Zone 11.

1.2.2 Project Overview

The 8,010-acre project site is within the 15,644-acre Grapevine Planning Area identified in the Tejon Ranch Land Use and Conservation Agreement, a landmark agreement reached in 2008 with leading environmental organizations (including the Sierra Club, Natural Resources Defense Council, California Audubon Society, Endangered Habitats League, and Planning and Conservation League) to permanently preserve over 90% of Tejon Ranch as open space and limit development to designated areas near existing infrastructure such as I-5. The precise boundaries of the 8,010-acre project site may be further adjusted based on the results of the ongoing environmental review and permitting process for the project, but would remain within the Grapevine Planning Area.

The Grapevine project site includes approximately 8,010 acres, of which approximately 3,232 acres (or about 40%) would be designated for agriculture (with grazing and open space as the predominant land uses) and approximately 4,778 acres (about 60%) would be developed as a new residential community and employment center. The community would leverage and build upon the economic expansion and job growth that has occurred at Tejon Ranch Commerce Center (Figure 2), located immediately north of the project on I-5. The Grapevine project would feature a series of compact neighborhoods linked by bicycle and pedestrian trails that provide convenient access to grocery and drugstores, professional services, schools, and parks. The project site is located along I-5, at the gateway to the Central Valley, and is immediately adjacent to the extensive open space that was conserved in the Tejon Ranch Land Use and Conservation Agreement.

The project, which would include up to 12,000 residential units and about 5.10 million square feet of commercial land uses, is designed as a series of conveniently located village centers, each composed of a mix of housing, neighborhood-serving retail and office uses, schools, parks, and community services. Outside the village cores, the Grapevine project includes a mix of residential uses, office, research and development, regional commercial, freeway-oriented commercial and light industrial/warehouse uses. Other potential public facilities, including a fire station, sheriff substation, transit facility/park-and-ride, and water and wastewater treatment facilities are proposed throughout the community.

Access to the project site would be from the existing Grapevine interchange (eventually to be relocated slightly to the north) and Laval Road at I-5. The circulation network is composed of two- and four-lane arterials, collector streets, and local streets organized in a grid pattern. All roads within the project site would be public. Multipurpose trails are proposed along Grapevine Creek, Cattle Creek, the southern foothills, and the open space adjacent to the California Aqueduct and at other locations throughout the project site. Some of these trails would connect to on-street, Class 2 bike lanes. Water and sewer service would be provided by the Tejon–Castac Water District.

1.2.3 Project Construction Scenario

The project site is divided into six planning areas ranging in size from approximately 450 to 1,400 acres. Development would be phased over a period of 19+ years, starting with the development of Planning Area 6 and continuing with the balance of the planning areas in the following order of 2, 1, 3, 4, and 5. Buildout of each phase is projected to take approximately 2 to 4 years (Phase 1: 2 years;

Phase 2: 4 years; Phase 3: 3 years; Phase 4: 4 years; Phase 5: 4 years), with the first phase proposed to commence in 2016. The portions of the site that are proposed to remain in exclusive agriculture/open space are primarily located along the southern edge of the California Aqueduct, along the southern portion of the project site at the foothills of the Tehachapi Mountains, and along Grapevine and Cattle Creeks.

1.2.4 Project Operation Scenario

The project operations are described in the Grapevine Specific and Community Plan, and land uses associated with operations are described in the Grapevine Special Planning District Plan. The residential and commercial land uses for the fiscal analysis of the Grapevine project are included in Section 2 of this Fiscal and Economic Analysis.

2.0 DEVELOPMENT DESCRIPTION

This chapter presents land use description for the fiscal analysis for the Grapevine project. A summary of the Grapevine project is first presented, followed by the detailed descriptions of the planning areas within the proposed Grapevine project.

2.1 Total Grapevine Project

2.1.1 Residential Housing Units, Population and Valuation after Buildout

Panel A of Table 2-1 presents the residential development summary after buildout of the Grapevine project.

Housing Units – Total Grapevine Project

Total housing units are estimated at 12,000 for the Grapevine project after buildout. Of this total, 8,410 housing units, or 70 percent of the total units, are planned as single family detached units and 3,590 are planned as multi-family attached units.

Population – Total Grapevine Project

The estimated buildout population for the Grapevine project is 38,400 based on the current California Department of Finance (DOF) January 1, 2015 persons per household estimate of 3.2 for total Kern County. This persons per household estimate is used for projecting the Grapevine project's population rather than the DOF's County average of 3.1 for unincorporated areas because the proposed development includes a mix of urban uses and agriculture (with grazing and open space as the predominant land uses).

Residential Valuation – Total Grapevine Project

Total residential valuation for Grapevine project is estimated at about $3.49 billion after buildout, which results in an overall average value of $290,000 per unit for the proposed plan. The estimated residential pricing is based on the average value per single family detached unit of $332,000 and the average value per multi-family attached unit of $195,000. Single family detached valuation represents about 80 percent of the total residential valuation after buildout. Appendix Table A-1 presents the calculation of the average value by unit type based on pricing information from Real Estate Economics.

Table 2-1
Estimated Population, Employment, and Valuation after Buildout: Total Project
(In Constant 2015 Dollars)

A. RESIDENTIAL DEVELOPMENT

Product Type	Buildout Units	Persons per Unit [1]	Projected Population	Average Price [2]	Total Valuation
Single Family Detached	8,410	3.2	26,912	$332,000	$2,792,120,000
Multi-Family Attached	3,590	3.2	11,488	$195,000	$700,050,000
Residential Total	**12,000**	**3.2**	**38,400**	**$290,000**	**$3,492,170,000**

B. NON-RESIDENTIAL DEVELOPMENT

Category	Buildout Square Feet	Square Feet per Employee	Projected Employment	Average Value per Square Foot	Total Valuation
Lodging	116,000	387	300	$200	$23,200,000
Commercial Retail					
Village Center Commercial	450,000	500	900	$250	$112,500,000
Freeway Oriented Commercial	409,000	500	820	$250	$102,250,000
Regional Commercial	225,000	500	450	$250	$56,250,000
Commercial Total	1,084,000		2,170		$271,000,000
Office/R&D					
Village Center Office	350,000	250	1,400	$230	$80,500,000
Medical Office	300,000	750	400	$230	$69,000,000
Office/R&D	1,800,000	500	3,600	$230	$414,000,000
Total Office/R&D	2,450,000		5,400		$563,500,000
Light Industrial/Warehouse	1,100,000	1,500	730	$70	$77,000,000
Community College [3]	350,000	3,000	120	n/a	n/a
Total Non-Residential	**5,100,000**		**8,720**		**$934,700,000**

C. TOTAL VALUATION					**$4,426,870,000**

Note: 1. Based on discussion with County staff, project population is projected at the California Department of Finance (DOF) persons per household estimate of 3.2 for Kern County.
2. Average prices per unit are rounded to the nearest 1,000.
3. The proposed community college is assumed to be exempt from property tax.

Sources: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*
Tejon Ranch Company
Real Estate Economics
Fehr and Peers

2.1.2 Non-Residential Square Feet, Employment and Valuation after Buildout

Panel B of Table 2-1 summarizes the estimated non-residential square feet, projected employment, and non-residential assessed valuation of the total Grapevine project after buildout.

Non-Residential Square Feet – Total Grapevine Project

As shown in Panel B of Table 2-1, the Grapevine project would have a total of about 5.10 million square feet of non-residential square feet after buildout. A total of 116,000 square feet are planned for 300 lodging rooms. Total commercial retail square feet of about 1.08 million square feet includes village center commercial (450,000 square feet), freeway oriented retail (409,000 square feet), and regional commercial (225,000 square feet). Office/R&D uses account for about 2.45 million square feet with 350,000 square feet of this total as village center office, medical office square feet of 300,000 and the remaining 1.80 million square feet as Office/R&D. Light industrial/warehouse uses are planned for 1.10 million square feet. The project also includes 350,000 square feet for a community college campus.

Employment – Total Grapevine Project

Private sector and community college employment is estimated at 8,720 for the total Grapevine project after buildout. This estimate is based on the following square feet per employee assumptions:

- Lodging 387 square feet per employee
- Commercial Retail 500 square feet per employee
- Village Center Office 250 square feet per employee
- Medical Office 750 square feet per employee
- Office/R&D 500 square feet per employee
- Light Industrial/Warehouse 1,500 square feet per employee
- Community College 3,000 square feet per employee

Village center office, medical office and office/R&D jobs are projected at 5,400 and represent about 62 percent of the total projected jobs after buildout. About 25 percent of the total projected employment is commercial retail jobs, projected at 2,170 after buildout. The remaining 1,130 jobs are projected for the light industrial/warehouse, community college and lodging jobs.

Non-Residential Assessed Valuation – Total Grapevine Project

As shown in Panel B of Table 2-1, total non-residential valuation for the Grapevine project is projected at about $931.20 million after buildout. Based on discussion with the project team, projected non-residential assessed valuation is based on the following values per square foot by type of land use:

- Lodging $200 per square foot
- Commercial Retail $250 per square foot
- Office/R&D $230 per square foot
- Light Industrial/Warehouse $70 per square foot

Office/R&D valuation is projected at $563.50 million and represents about 61 percent of the total projected non-residential valuation after buildout. About 29 percent of the total projected valuation is for commercial retail valuation, projected at about $271.00 million. The remaining valuation is projected for light industrial/warehouse and lodging. Valuation is not projected for the community college which is assumed to be exempt from property tax.

2.1.3 Total Valuation after Buildout

As shown in Panel C of Table 2-1, total valuation, in Constant 2015 dollars, for the fiscal analysis after buildout of the Grapevine project is estimated at about $4.42 billion based on the projected residential valuation of $3.49 billion and the projected non-residential valuation of about $934.70 million.

2.1.4 Transient Occupancy Tax and Sales and Use Tax after Buildout

Transient Occupancy Tax – Total Grapevine Project

As shown in Panel A of Table 2-2, transient occupancy tax is projected at $459,900 after buildout of 300 lodging rooms included in the Grapevine project. This projection is based on a transient occupancy tax of 6 percent of lodging room receipts. Total lodging room receipts for the Grapevine project are projected at about $7.67 million after buildout. Room receipts are projected based on an average room rate of $100 and an average occupancy rate of 70 percent. While the current average room rate for the traveler-oriented is $90 per night, a room rate of $100 per night is assumed to account for more community oriented lodging planned for the project.

On-Site Taxable Sales – Total Grapevine Project

As shown in Panel C of Table 2-2, on-site taxable sales for the total Grapevine project after buildout are estimated at about $441.90 million.

Commercial Retail. Retail taxable sales are based on discussion with the Tejon Ranch Company planning staff.

Table 2-2
Estimated Transient Occupancy Tax and Taxable Sales after Buildout: Total Project
(In Constant 2015 Dollars)

A. LODGING

Land Use	Room Rate [1]	Square Feet	Total Rooms	Occupancy Rate	Annual Room Receipts	Annual Occupancy Tax (@ 6%)
Lodging	$100	116,000	300	70%	$7,665,000	**$459,900**

B. OTHER NON-RESIDENTIAL

Land Use	Taxable Sales Per Square Foot [2]	Square Feet	Annual Taxable Sales
Commercial Retail			
Village Center Commercial	$200	450,000	$90,000,000
Freeway Oriented Commercial	$600	409,000	$245,400,000
Regional Commercial	$400	225,000	$90,000,000
Commercial Total		1,084,000	$425,400,000
Office/R&D			
Village Center Office	$0	350,000	$0
Medical Office	$0	300,000	$0
Office/R&D	$0	1,800,000	$0
Total Office/R&D		2,450,000	$0
Light Industrial/Warehouse	$15	1,100,000	$16,500,000
Community College	$0	350,000	$0
C. TOTAL NON-RESIDENTIAL		**5,100,000**	**$441,900,000**

Note: 1. While current traveler-oriented lodging room rates in Grapevine average $90 per night, the room rate of $100 per night is assumed to represent more community oriented hotel rooms planned for the project.
2. Taxable sales per square foot factors are based on discussion with the project team and their retail market studies. Village Center commercial represents goods and services at neighborhood centers with grocery stores, drug stores and other local serving uses. Freeway oriented commercial includes services, amenities, and accommodations to visitors and through-traffic, such as hotel gift shops, restaurants, service stations, truck stops, and fast-food restaurants. Regional commercial includes concentrated large-scale retail establishments, such as "big box" commercial centers and outlet centers. Light industrial/warehouse includes unobtrusive industrial activities that can locate in close proximity to residential and commercial uses, such as assembling, warehouses, light manufacturing, storage and wholesale businesses.

Sources: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*
Tejon Ranch Commerce Center, *Retail Market Analysis, The Outlets at Tejon Ranch, Tejon Ranch, California, October 2010* , prepared by Schuler Consulting
Tejon Ranch Company

- Village center commercial annual taxable sales are projected at $200 per square foot and represent goods and services at neighborhood centers with grocery stores, drug stores and other local serving establishments.

- Freeway oriented commercial annual taxable sales are projected at $600 per square foot and include services, amenities and accommodations to visitors and through-traffic, such as gift shops, restaurants, service stations, truck stops, and fast-food establishments.
- Regional commercial includes concentrated large-scale retail establishments, such as “big box” commercial center and outlet centers. Taxable sales for these uses are projected annually at $400 per square foot.

Office/R&D. Taxable sales are not projected for village center office, medical office and office/R&D.

Light Industrial/Warehouse. Taxable sales are projected at $15 per square foot for light industrial/warehouse uses based on the fiscal consultant’s experience with similar projects.

Community College. Taxable sales are not projected for the community college.

2.1.5 Publicly Maintained Parks and Roads after Buildout

The fiscal analysis projects revenues and costs for only the publicly maintained parks and roads included in the Grapevine project, as summarized in Table 2-3.

Table 2-3
Parks and Roads after Buildout

Parks and Roads after Buildout	Acres	Lineal Feet	Lineal Miles [1]
PARKS	132	n/a	n/a
ROADS			
Arterials and Collectors	308	126,996	24
Local Streets			
Large Parcel Commercial	82	50,061	9
Interior Network	659	382,356	72
Total Local Streets	742	432,417	81
Total Roads	1,050	559,413	106

Note: 1. Lineal miles are rounded.

Source: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*
KenKay Associates, *Road Network Estimation, Grapevine at Tejon Ranch, June 24, 2015*

Parks – Total Grapevine Project

Based on information from the project team, a total of 132 acres of public parks would be included in the project after buildout.

Roads – Total Grapevine Project

The publicly maintained road network for buildout of the total Grapevine project is estimated at 559,413 lineal feet (or about 106 lineal miles) of arterials, collectors and local streets.

Arterials and Collectors. Arterials and collector roads are estimated at 308 acres and 126,996 lineal feet, or about 24 lineal miles, after buildout of the project.

Local Streets. Total local streets are estimated at 742 acres and 432,417 lineal feet, or about 82 lineal miles. Local streets include large parcel commercial streets and interior residential streets.

2.2 Planning Areas

The project construction scenario includes six planning areas ranging in size from approximately 450 to 1,400 acres. Development would be phased over a period of 19+ years, starting with the development of Planning Area 6 and continuing with the balance of the planning areas in the following order of 2, 1, 3, 4, and 5. The buildout summary of each planning area is presented in this section. Detailed development descriptions by planning areas are included in Appendix A.

2.2.1 Residential Housing Units, Population and Valuation - Planning Areas

The residential development after buildout of the total the Grapevine project is shown in Panel A of Table 2-4. The residential development by planning areas is presented in Panel B of Table 2-4. The detailed descriptions of the units, population and residential valuation by planning areas are presented in Appendix Table A-2.

Housing Units – Planning Areas

As shown in Panel A of Table 2-4, Grapevine project includes a mix of 12,000 homes, with 70 percent of the total units planned as varying densities of single family detached units and the remaining units planned as multi-family attached units.

As shown in Panel B of Table 2-4, residential development starts with 1,335 units in Planning Area 6a. Residential development continues with the balance of the planning areas in the order of 2, 1, 3, 4, and 5. No residential development is planned for Planning Areas 6b through 6e.

The largest number of units is planned for Planning Area 2 with 2,760 units or 23 percent of the total 12,000 project units. Planning Area 1 would include 1,480 units, or about 12 percent of the total project units. About 16 percent of the total project units, or 1,910 units, would be in Planning Area 3. Planning Area 4 would include 2,420 units, or about 20 percent of the total project units, and

Table 2-4
Estimated Units, Population, and Residential Valuation after Buildout: Planning Areas
(In Constant 2015 Dollars)

A. Residential Buildout

Description	Housing Units	Population Total	Population per Unit [1]	Valuation Total	Valuation per Unit [2]
Single Family Detached	8,410	26,912	3.2	$2,792,120,000	$332,000
Multi-Family Attached	3,590	11,488	3.2	$700,050,000	$195,000
Total Residential	12,000	38,400	3.2	$3,492,170,000	$290,000

B. Residential Development by Planning Area

Planning Area	Housing Units	Population	Valuation
6a	1,335	4,272	$340,470,000
2	2,760	8,832	$782,060,000
1	1,480	4,736	$459,850,000
3	1,910	6,112	$534,110,000
4	2,420	7,744	$725,350,000
5a	2,060	6,592	$638,710,000
5b	35	112	$11,620,000
6b	0	0	$0
6c	0	0	$0
6d	0	0	$0
6e	0	0	$0
Total	12,000	38,400	$3,492,170,000

Note: 1. Based on discussion with County staff, project population is projected at the California Department of Finance (DOF) persons per household estimate of 3.2 for Kern County.
2. Average prices per unit are rounded to the nearest 1,000.

Source: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*

Planning Area 5 would include 17 percent (2,060 units) of the total 12,000 project units. The remaining units are planned for Planning Area 5b (35 units).

Population – Planning Areas

Total population after buildout is projected at 38,400, based on the County's average persons per unit of 3.2. The estimated population by planning area is determined by the number of housing units in each planning area, as shown in Panel B of Table 2-4.

Residential Valuation – Planning Areas

Total residential valuation for Grapevine project is estimated at about $3.49 billion after buildout. Panel B of Table 2-4 presents the estimated valuation by Planning Area, which is projected according to the value per unit by product type and planning area provided by the project developer, as shown in Appendix Table A-2.

2.2.2 Non-Residential Square Feet, Employment and Valuation - Planning Areas

Panel A of Table 2-5 summarizes the estimated non-residential square feet, projected employment, and valuation after buildout of the Grapevine project. Panel B of Table 2-5 presents the non-residential development by planning areas after buildout.

Non-Residential Square Feet – Planning Areas

As shown in Panel A of Table 2-5, the Grapevine project would have a total of about 5.10 million square feet of non-residential square feet after buildout. As shown in Panel B of Table 2-5, the largest amount of non-residential square feet (1.82 million) is planned for Planning Area 6a followed by Planning Area 3 (1.36 million square feet) and Planning Area 2 (1.26 million square feet). Planning Area 1 would include 450,000 square feet of non-residential uses followed by 120,000 square feet in Planning Area 4. Planning Area 6b would contain 50,000 square feet of non-residential uses, and Planning Area 5a would include 40,000 square feet. Non-residential development is not planned for Planning Areas 5b, 6c, 6d and 6e. The non-residential square feet by specific type of use by planning area is presented in Appendix Table A-3.

Employment – Planning Areas

Total employment for Grapevine project is projected at 8,720 after buildout, as shown in Panel A of Table 2-5. About 41 percent of the total projected employment is office/R&D jobs, projected at 3,600 after buildout. Village Center office jobs are projected at 1,400 and represent about 16 percent of the total projected jobs after buildout. The remaining jobs are projected for commercial retail, light industrial/warehouse and lodging uses.

As shown in Panel B of Table 2-5, the largest amount of jobs (2,904 jobs) are projected for Planning Area 3 followed by Planning Area 2 (2,586 jobs) and Planning Area 6a (1,790 jobs). Jobs for Planning Area 1 are projected at 950, followed by 345 jobs for Planning Area 4 and 115 jobs for Planning Area 5a. The remaining 30 jobs are projected for Planning Area 6b. The estimation of employment by job type for each planning area is presented in Appendix Table A-4.

Table 2-5
Estimated Employment and Non-Residential Valuation after Buildout: Planning Areas
(In Constant 2015 Dollars)

A. Non-Residential Buildout

Description	Square Feet	Employment Total	Employment Square Feet per Employee	Valuation Total	Valuation per Square Foot
Lodging	116,000	300	387	$23,200,000	$200
Village Center Commercial	450,000	900	500	$112,500,000	$250
Freeway Oriented Commercial	409,000	820	499	$102,250,000	$250
Regional Commercial	225,000	450	500	$56,250,000	$250
Village Center Office	350,000	1,400	250	$80,500,000	$230
Medical Office	300,000	400	750	$69,000,000	$230
Office/R&D	1,800,000	3,600	500	$414,000,000	$230
Light Industrial/Warehouse	1,100,000	730	1,507	$77,000,000	$70
Community College	350,000	120	2,917	$0	$0
Total Non-Residential	5,100,000	8,720		$934,700,000	

B. Non-Residential by Planning Area

Planning Area	Square Feet	Employment	Valuation
6a	1,820,000	1,790	$171,780,000
2	1,260,000	2,586	$294,140,000
1	450,000	950	$104,060,000
3	1,360,000	2,904	$322,620,000
4	120,000	345	$28,950,000
5a	40,000	115	$9,650,000
5b	0	0	$0
6b	50,000	30	$3,500,000
6c	0	0	$0
6d	0	0	$0
6e	0	0	$0
Total	5,100,000	8,720	$934,700,000

Source: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*

Non-Residential Valuation – Planning Areas

As shown in Panel A of Table 2-5, total non-residential valuation for the Grapevine project is projected at about $934.70 million after buildout. Non-residential value is projected according to the value per square foot by land use type and planning area provided by the project developer, as shown in Appendix Table A-4.

As shown in Panel B of Table 2-5, the largest non-residential valuation is projected for Planning Area 3 ($322.62 million), followed by Planning Area 2, 6a, 1, 4, 5a and 6b. Non-residential valuation is not projected for Planning Areas 5b, 6c, 6d and 6e, because non-residential uses are not planned for these areas.

2.2.3 Transient Occupancy Tax and Sales and Use Tax – Planning Areas

Transient Occupancy Tax – Planning Areas

As shown in Panel A of Table 2-6, transient occupancy tax is projected at $459,900 after buildout of 300 lodging rooms included in the Grapevine project. This projection is based on a transient occupancy tax of 6 percent of lodging room receipts. Total lodging room receipts for the Grapevine project are projected at about $7.67 million after buildout. Room receipts are projected based on an average room rate of $100 and an average occupancy rate of 70 percent. While the current average room rate for the traveler-oriented rooms is $90 per night, a room rate of $100 per night is assumed to account for more community oriented lodging planned for the project.

As shown in Panel B of Table 2-6, because lodging for the Grapevine project is evenly divided between Planning Areas 2 and 3, half the total transient occupancy tax, or $229,950 is projected for Planning Area 2 and the remaining half ($229,950) is projected for Planning Area 3.

On-Site Taxable Sales – Planning Areas

As shown in Panel A of Table 2-6, on-site taxable sales for the total Grapevine project after buildout are estimated at about $441.90 million. Taxable sales are projected based on the following taxable sales per square foot by type of land use:

- Village Center Commercial — $200 per square foot
- Freeway Oriented Commercial — $600 per square foot
- Regional Commercial — $400 per square foot
- Office/R&D — $0 per square foot
- Light Industrial/Warehouse — $15 per square foot

As shown in Panel B of Table 2-6, over sixty percent of the total projected on-site taxable sales for the Grapevine project, or $276.00 million, are projected for Planning Area 3 which includes most of the freeway oriented commercial retail land uses. The detailed on-site taxable sales by land use by planning area are presented in Appendix Table A-5.

Table 2-6

Estimated Transient Occupancy Tax and Taxable Sales after Buildout: Planning Areas

(In Constant 2015 Dollars)

A. Non-Residential Buildout

Description	Square Feet	Annual Transient Occupancy Tax: Lodging Room Receipts	Annual Transient Occupancy Tax: Annual Occupancy Tax (@ 6%)	Taxable Sales: Total	Taxable Sales: per Square Foot
Lodging [1]	116,000	$7,665,000	$459,900	$0	$0
Village Center Commercial	450,000			$90,000,000	$200
Freeway Oriented Commercial	409,000			$245,400,000	$600
Regional Commercial	225,000			$90,000,000	$400
Village Center Office	350,000			$0	$0
Medical Office	300,000			$0	$0
Office/R&D	1,800,000			$0	$0
Light Industrial/Warehouse	1,100,000			$16,500,000	$15
Community College	350,000			$0	$0
Total Non-Residential	5,100,000	$7,665,000		$441,900,000	

B. Non-Residential by Planning Area

Planning Area	Square Feet	Lodging Room Receipts	Transient Occupancy Tax	Taxable Sales
6a	1,820,000	$0	$0	$32,550,000
2	1,260,000	$3,832,500	$229,950	$109,000,000
1	450,000	$0	$0	$5,600,000
3	1,360,000	$3,832,500	$229,950	$276,000,000
4	120,000	$0	$0	$13,500,000
5a	40,000	$0	$0	$4,500,000
5b	0	$0	$0	$0
6b	50,000	$0	$0	$750,000
6c	0	$0	$0	$0
6d	0	$0	$0	$0
6e	0	$0	$0	$0
Total	5,100,000	$7,665,000	$459,900	$441,900,000

Note: 1. Taxable sales generated by lodging are captured as part of the freeway oriented commercial taxable sales.

Source: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*

2.2.4 Publicly Maintained Parks and Roads – Planning Areas

The fiscal analysis projects costs for only the publicly maintained parks and roads included in the Grapevine project, as presented in Table 2-7.

Parks – Planning Areas

Based on information from the project team, a total of 132 acres of public parks would be included in the project after buildout. As shown in Panel B of Table 2-7, Planning Area 2 and Planning Area 4 would have 58 acres of parks. Five acres of parks are planned for each of Planning Areas 6a, 3, and 5a.

Table 2-7
Parks and Roads by Planning Areas

A. Parks and Roads after Buildout	Acres	Lineal Feet	Lineal Miles
PARKS	132	n/a	n/a
ROADS			
Arterials and Collectors	308	126,996	24
Local Streets			
Large Parcel Commercial	82	50,061	9
Interior Network	659	382,356	72
Total Local Streets	742	432,417	82
Total Roads	1,050	559,413	106

B. Parks and Roads by Planning Ares [1]	Acres	Lineal Feet	Lineal Miles
Parks			
6a	5	n/a	n/a
2	58	n/a	n/a
1	0	n/a	n/a
3	5	n/a	n/a
4	58	n/a	n/a
5a	5	n/a	n/a
5b	0	n/a	n/a
6b, 6c, 6d, and 6e	0	n/a	n/a
Total Parks	132	n/a	n/a
Arterials and Collectors			
6a	30	14,491	3
2	61	30,074	6
1	32	16,452	3
3	56	20,348	4
4	61	19,849	4
5a	51	21,010	4
5b	10	4,773	1
6b, 6c, 6d, and 6e	7	0	0
Total Arterials and Collectors	308	126,996	24
Local Streets - Large Parcel Commercial			
6a	21	13,055	2
2	6	3,380	1
1	8	4,962	1
3	20	12,350	2
4	0	0	0
5a	0	0	0
5b	0	0	0
6b	27	16,314	3
6c, 6d, and 6e	0	0	0
Total Local Streets - Large Parcel Commercial	82	50,061	9
Local Streets - Interior Network			
6a	56	32,594	6
2	144	83,446	16
1	87	50,293	10
3	95	54,808	10
4	136	78,939	15
5a	119	69,075	13
5b	23	13,201	3
6b, 6c, 6d, and 6e	0	0	0
Total Local Streets - Interior Network	659	382,356	72

Sources: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*
Ken Kay Associates, *Road Network Estimation, Grapevine at Tejon Ranch, June 24, 2015*

Roads – Planning Areas

As shown in Panel A of Table 2-7, the publicly maintained roads for buildout of the total Grapevine project are estimated at 1,050 acres and 559,413 lineal feet, or about 106 lineal miles of arterials, collectors and local streets.

Arterials and Collectors. Arterials and collector roads are estimated at 308 acres, with 126,996 lineal feet, or 24 lineal miles after buildout of the project. As shown in Panel B of Table 2-7, about 25 percent of the total arterials and collectors are located in Planning Area 2. No arterials and collectors are planned for Planning Areas 6b, 6c, 6d, and 6e. About 75 percent of the remaining arterial and collectors are located in Planning Areas 1, 3, 4, 5a, 5b and 6a.

Local Streets. Total local streets are at estimated 432,417 lineal feet, or about 82 lineal miles. Of the total local streets, 50,061 lineal feet (about 9 lineal miles) are for large parcel commercial development in Planning Areas 6a, 1, 2, 3 and 6b, as shown in Panel B of Table 2-7. Interior residential streets are estimated at 382,356 lineal feet, or about 72 lineal miles, after buildout. About 90 percent of the total interior residential streets are located in Planning Areas 1 through 5a, with the remaining interior residential streets located in Planning Areas 5b and 6a. No publicly maintained interior residential streets are included in Planning Areas 6b, 6c, 6d, and 6e.

3.0 FISCAL ANALYSIS

This chapter presents the projected fiscal impacts to the County General Fund, the County Road Fund, and the County Fire Department for the Grapevine project after buildout and for each of the planning areas after buildout. The projected fiscal impacts for the total Grapevine project are first presented, followed by the fiscal projections of the proposed Grapevine project planning areas. Fiscal impacts are projected in Constant 2015 dollar, with no adjustment for future inflation.

3.1 Total Grapevine Project

3.1.1 County General Fund Fiscal Impacts after Buildout

Table 3-1 presents the projected recurring revenues and costs to the Kern County General Fund for the total Grapevine project after buildout. A projected net annual recurring surplus of about $3.08 million is projected for the General Fund from the Grapevine project based on projected total recurring revenues of about $25.70 million and total projected recurring costs of about $22.62 million after buildout.

General Fund Recurring Revenues

As shown in Table 3-1, projected General Fund revenues include property tax; property tax in lieu of vehicle license fees (VLF); property transfer tax; on-site sales and use tax; transient occupancy tax; countywide cost allocation plan reimbursement, franchise fees, hazardous waste facilities tax, all other discretionary funds, State and Federal Aid, and interest on deposits and investments.

Residential property tax is projected at about $7.39 million (all projections are in Constant 2015 dollars) after buildout and represents about 28.7 percent of total projected recurring revenues. Non-residential property tax is projected at about $1.98 million and 7.7 percent of total projected revenues after buildout. Property tax in-lieu of vehicle license fees are projected at $5.80 million and 22.6 percent of total projected revenues. Sales and use tax is projected at about $4.94 million after buildout and 19.2 percent of total projected revenues after buildout. These four property tax revenues and sales and use tax account for about 78.2 percent of the revenues projected for the total the Grapevine project after buildout.

General Fund Recurring Costs

Table 3-1 also presents recurring costs to the County General Fund after buildout. Ongoing recurring costs to the County General Fund include a combination of municipal-type costs and countywide costs. Municipal-type costs represent about 29.1 percent of total projected General Fund costs and include local law enforcement services provided by the Sheriff-Coroner and animal care services.

Table 3-1
Total Grapevine Project: General Fund Fiscal Impacts after Buildout
(In Constant 2015 Dollars)

Category	Total Project	Percent of Total
General Fund Revenues		
Property Tax - Residential	$7,388,881	28.7%
Property Tax - Commercial	1,977,678	7.7%
Property Tax In-Lieu Vehicle License Fees (VLF)	5,803,627	22.6%
Real Property Transfer Tax	307,311	1.2%
Sales and Use Tax	4,940,442	19.2%
Transient Occupancy Tax	459,900	1.8%
Countywide Cost Allocation Plan Reimbursement	1,253,594	4.9%
Franchise Fees	944,104	3.7%
Hazardous Waste Facilities Tax	157,351	0.6%
All Other Discretionary Funds	805,240	3.1%
State and Federal Aid	1,028,547	4.0%
Interest on Deposits and Investments	635,982	2.5%
Total Revenues	**$25,702,657**	100.0%
General Fund Expenditures		
Municipal-Type Costs:		
Sheriff-Coroner Local Law Enforcement - Patrol	$6,286,038	27.8%
Animal Control	297,745	1.3%
Subtotal Municipal-Type Costs	$6,583,783	29.1%
Net Countywide Costs:		
General Government	$3,324,525	14.7%
Public Protection (including detention and courts)	6,131,120	27.1%
Public Ways and Facilities: Pubic Works-Public Ways	254,789	1.1%
Public Ways and Facilities: Airports	11,243	0.0%
Health and Sanitation Services	1,908,054	8.4%
Public Assistance	1,610,274	7.1%
Education	350,729	1.6%
Recreation and Cultural Services	475,098	2.1%
Debt Service	433,439	1.9%
Contingencies and Reserves	1,534,642	6.8%
Subtotal Net Countywide Costs	$16,033,914	70.9%
Total Expenditures	**$22,617,697**	100.0%
General Fund Surplus	**$3,084,960**	
General Fund Revenue to Cost Ratio	**1.14**	

Countywide costs include services provided to all residents of the County and represent about 70.9 percent of total projected recurring costs.

3.1.2 County Road Fund Fiscal Impacts after Buildout

The projected recurring revenues and costs to the Kern County Road Fund for the total Grapevine project after buildout are presented in Table 3-2. A projected net annual recurring surplus of $313,228 is projected for the Road Fund from the Grapevine project based on projected total recurring revenues of about $1.37 million and total projected recurring costs of about $1.06 million after buildout.

Table 3-2
Total Grapevine Project: County Road Fund Fiscal Impacts after Buildout
(In Constant 2015 Dollars)

Category	Total Project	Percent of Total
Recurring Revenues		
State gasoline tax:		
Section 2103	$485,523	35.4%
Section 2104	$262,651	19.2%
Section 2105	$241,152	17.6%
Section 2106	$126,653	9.2%
Subtotal State Gasoline Tax	$1,115,979	81.4%
General Fund contribution	254,789	18.6%
Total Recurring Revenues	$1,370,769	100.0%
Recurring Costs	$1,057,541	
Net Recurring Surplus	**$313,228**	
Road Fund Revenue to Cost Ratio	**1.30**	

Sources: County of Kern, *Fiscal Year 2014-2015 Recommended Budget,* page 352
State Controller's Office, *Highway User Tax - Counties, FY 2013-14 Total Payments*
KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, 7/18/2014*
KenKay Associates, *Road Network Estimation, Grapevine at Tejon Ranch, 1/06/2014*

Road Fund Recurring Revenues

Based on the Kern County budget, local streets are primarily maintained with State gasoline tax and the General Fund contribution to the Road Department. As shown in Table 3-2, of the total recurring revenues projected to the County Road Fund of about $1.32 million, State gasoline tax is projected at $1.12 million after buildout and the estimated General Fund contribution to the Road Fund is projected at $254,789 after buildout for the Grapevine project. The General Fund contribution is projected based on the current pro rata allocation to the Road Fund. The revenue factors for projecting the Road Fund revenues are presented in Section 5.3.1 of this report.

General Fund Recurring Costs

As also shown in Table 3-2, projected recurring costs to the County Road Fund after buildout are projected at about $1.06 million. This projected cost is based on a cost of $10,000 per lineal mile, as presented in Section 5.3.2 of this report and the 106 lineal miles estimated for the Grapevine project after buildout.

3.1.3 County Fire Department Fiscal Impacts after Buildout

As shown in Table 3-3, a recurring surplus of about $935,761 is projected to the County Fire Department after buildout of the Grapevine Project. The projected surplus is based on recurring revenues of about $4.96 million and recurring costs of about $4.02 million.

Table 3-3
Total Grapevine Project: County Fire Department Fiscal Impacts after Buildout
(In Constant 2015 Dollars)

Category	Total Project
Recurring Revenues	
Property Tax	$4,956,361
Recurring Costs [1]	
Station 1	$2,412,360
Station 2	$1,608,240
Total Recurring Costs	$4,020,600
Recurring Surplus	**$935,761**
Fire Department Revenue to Cost Ratio	**1.23**

Note: 1. Projected costs represent the share of each station allocated to the Grapevine Project as provided by the County Fire Department.

Fire Department Recurring Revenues

Recurring revenues to the Fire Department include property tax, which is projected at about $4.96 after buildout for the Grapevine project, as shown in Table 3-3. Property tax is projected at 11.20 percent of the basic one percent property tax levy on the assessed valuation of the Grapevine project.

Fire Department Recurring Costs

As also shown in Table 3-3, projected recurring costs to the County Fire Department after buildout are projected at about $4.02 million. The projected recurring fire costs are based on the average cost per County fire station from the County Budget and the share of two new fire stations that would be allocated to the Grapevine project, as provided by the County Fire Department.

3.2 Planning Areas

3.2.1 County General Fund – Planning Areas

Table 3-4 summarizes the projected surplus or deficit to the Kern County General Fund by the Grapevine project planning areas starting with the Planning Area 6a and continuing with the balance of the planning areas (2, 1, 3, 4, 5a, 5b, 6b, 6c, 6d and 6e) in order of planned development. In addition to the projected impacts for each Planning Area, the cumulative projected impact is also shown in Table 3-4. On a cumulative basis, a recurring surplus is projected throughout the development period for the Grapevine project. The detailed recurring revenues and costs to the Kern County General Fund by the Grapevine project planning areas are presented in Table 3-5.

Table 3-4
Planning Areas: Summary of County General Fund Fiscal Impacts after Buildout
(In Constant 2015 Dollars)

	General Fund Projected Surplus or (Deficit)	
Planning Area	Incremental	Cumulative
6a	($435)	($435)
2	$1,005,830	$1,005,395
1	($147,256)	$858,138
3	$3,235,300	$4,093,438
4	($538,467)	$3,554,971
5a	($478,423)	$3,076,548
5b	($6,417)	$3,070,132
6b	$14,828	$3,084,960
6c	$0	$3,084,960
6d	$0	$3,084,960
6e	$0	$3,084,960

Table 3-5 (page 1 of 2)
County General Fund: Incremental and Cumulative Fiscal Impacts by Planning Area
(In Constant 2015 Dollars)

Category	Planning Areas (PAs) after Buildout					
	PA 6a	PA 2	PA 1	PA 3	PA 4	PA 5a
General Fund Revenues						
Property Tax - Residential	$720,381	$1,654,716	$972,970	$1,130,093	$1,534,726	$1,351,410
Property Tax - Commercial	363,459	622,354	220,175	682,613	61,254	20,418
Property Tax In-Lieu Vehicle License Fees (VLF)	671,560	1,410,898	739,286	1,123,173	988,887	850,000
Real Property Transfer Tax	29,961	68,821	40,467	47,002	63,831	56,206
Sales and Use Tax	363,909	1,218,620	62,608	3,085,680	150,930	50,310
Transient Occupancy Tax	0	229,950	0	229,950	0	0
Countywide Cost Allocation Plan Reimbursement	153,087	297,972	152,525	224,724	229,318	192,236
Franchise Fees	115,293	224,408	114,869	169,244	172,704	144,776
Hazardous Waste Facilities Tax	19,215	37,401	19,145	28,207	28,784	24,129
All Other Discretionary Funds	98,335	191,401	97,974	144,350	147,301	123,482
State and Federal Aid	114,426	236,566	126,854	163,710	207,424	176,567
Interest on Deposits and Investments	67,225	157,129	64,618	178,331	90,961	75,849
Total Revenues	**$2,716,852**	**$6,350,235**	**$2,611,491**	**$7,207,077**	**$3,676,120**	**$3,065,383**
Cumulative Revenues	***$2,716,852***	***$9,067,087***	***$11,678,578***	***$18,885,655***	***$22,561,775***	***$25,627,159***
General Fund Expenditures						
Municipal-Type Costs:						
Sheriff-Coroner Local Law Enforcement - Patrol	$758,440	$1,487,638	$766,231	$1,109,843	$1,165,762	$979,459
Animal Control	33,124	68,481	36,722	47,391	60,045	51,113
Subtotal Municipal-Type Costs	*$791,565*	*$1,556,120*	*$802,953*	*$1,157,235*	*$1,225,807*	*$1,030,572*
Net Countywide Costs:						
General Government	$410,128	$793,150	$403,862	$603,624	$601,012	$502,828
Public Protection (including detention and courts)	756,698	1,462,974	744,754	1,113,832	1,107,811	926,753
Public Ways and Facilities: Public Works	31,432	60,787	30,952	46,261	46,061	38,536
Public Ways and Facilities: Airports	1,387	2,682	1,366	2,041	2,033	1,701
Health and Sanitation Services	212,271	438,852	235,327	303,699	384,791	327,549
Public Assistance	179,143	370,363	198,600	256,302	324,739	276,430
Education	39,019	80,668	43,257	55,824	70,730	60,209
Recreation and Cultural Services	52,855	109,273	58,595	75,620	95,811	81,558
Debt Service	53,471	103,408	52,654	78,698	78,358	65,557
Contingencies and Reserves	189,320	366,128	186,428	278,640	277,435	232,112
Subtotal Net Countywide Costs	*$1,925,723*	*$3,788,285*	*$1,955,794*	*$2,814,542*	*$2,988,780*	*$2,513,234*
Incremental Expenditures	**$2,717,287**	**$5,344,405**	**$2,758,747**	**$3,971,777**	**$4,214,587**	**$3,543,806**
Cumulative Expenditures	***$2,717,287***	***$8,061,692***	***$10,820,440***	***$14,792,217***	***$19,006,804***	***$22,550,610***
Incremental General Fund Surplus or (Deficit)	**($435)**	**$1,005,830**	**($147,256)**	**$3,235,300**	**($538,467)**	**($478,423)**
Cumulative General Fund Surplus	***($435)***	***$1,005,395***	***$858,138***	***$4,093,438***	***$3,554,971***	***$3,076,548***
Cumulative General Fund Revenue to Cost Ratio	***1.00***	***1.12***	***1.08***	***1.28***	***1.19***	***1.14***

Table 3-5 (page 2 of 2)
County General Fund: Incremental and Cumulative Fiscal Impacts by Planning Area
(In Constant 2015 Dollars)

Category	Planning Areas (PAs) after Buildout					Total	Percent
	PA 5b	PA 6b	PA 6c	PA 6d	PA 6e	Project	of Total
General Fund Revenues							
Property Tax - Residential	$24,586	$0	$0	$0	$0	$7,388,881	28.7%
Property Tax - Commercial	0	7,405	0	0	0	1,977,678	7.7%
Property Tax In-Lieu Vehicle License Fees (VLF)	15,234	4,589	0	0	0	5,803,627	22.6%
Real Property Transfer Tax	1,023	0	0	0	0	307,311	1.2%
Sales and Use Tax	0	8,385	0	0	0	4,940,442	19.2%
Transient Occupancy Tax	0	0	0	0	0	459,900	1.8%
Countywide Cost Allocation Plan Reimbursement	3,234	499	0	0	0	1,253,594	4.9%
Franchise Fees	2,435	375	0	0	0	944,104	3.7%
Hazardous Waste Facilities Tax	406	63	0	0	0	157,351	0.6%
All Other Discretionary Funds	2,077	320	0	0	0	805,240	3.1%
State and Federal Aid	3,000	0	0	0	0	1,028,547	4.0%
Interest on Deposits and Investments	1,319	549	0	0	0	635,982	2.5%
Total Revenues	**$53,314**	**$22,185**	**$0**	**$0**	**$0**	**$25,702,657**	100.0%
Cumulative Revenues	***$25,680,473***	***$25,702,657***	***$25,702,657***	***$25,702,657***	***$25,702,657***		
General Fund Expenditures							
Municipal-Type Costs:							
Sheriff-Coroner Local Law Enforcement - Patrol	$16,500	$2,163	$0	$0	$0	$6,286,038	27.8%
Animal Control	868	0	0	0	0	297,745	1.3%
Subtotal Municipal-Type Costs	*$17,369*	*$2,163*	*$0*	*$0*	*$0*	*$6,583,783*	*29.1%*
Net Countywide Costs:							
General Government	$8,447	$1,474	$0	$0	$0	$3,324,525	14.7%
Public Protection (including detention and courts)	15,568	2,730	0	0	0	6,131,120	27.1%
Public Ways and Facilities: Public Works	647	113	0	0	0	254,789	1.1%
Public Ways and Facilities: Airports	29	5	0	0	0	11,243	0.0%
Health and Sanitation Services	5,565	0	0	0	0	1,908,054	8.4%
Public Assistance	4,697	0	0	0	0	1,610,274	7.1%
Education	1,023	0	0	0	0	350,729	1.6%
Recreation and Cultural Services	1,386	0	0	0	0	475,098	2.1%
Debt Service	1,101	192	0	0	0	433,439	1.9%
Contingencies and Reserves	3,899	680	0	0	0	1,534,642	6.8%
Subtotal Net Countywide Costs	*$42,362*	*$5,194*	*$0*	*$0*	*$0*	*$16,033,914*	*70.9%*
Incremental Expenditures	**$59,731**	**$7,357**	**$0**	**$0**	**$0**	**$22,617,697**	100.0%
Cumulative Expenditures	***$22,610,341***	***$22,617,698***	***$22,617,698***	***$22,617,698***	***$22,617,698***		
Incremental General Fund Surplus or (Deficit)	**($6,417)**	**$14,828**	**$0**	**$0**	**$0**	**$3,084,960**	
Cumulative General Fund Surplus	***3,070,132***	***$3,084,960***	***$3,084,960***	***$3,084,960***	***$3,084,960***		
Cumulative General Fund Revenue to Cost Ratio	***1.14***	***1.14***	***1.14***	***1.14***	***1.14***	***1.14***	

3.2.2 County Road Fund – Planning Areas

Table 3-6 summarizes the incremental and cumulative projected deficits to the County Road Fund by the Grapevine project planning areas starting with the Planning Area 6a and continuing with the balance of the planning areas (2, 1, 3, 4, 5a, 5b, 6b, 6c, 6d and 6e) in order of planned development. The detailed recurring revenues and costs to the County Road Fund by the Grapevine project planning areas are presented in Table 3-7. Appendix Table A-9 presents the detailed calculation of Road Fund revenues by planning areas.

Table 3-6
Planning Areas: Summary of County Road Fund Fiscal Impacts after Buildout
(In Constant 2015 Dollars)

Planning Area	Road Fund Projected Surplus or (Deficit)	
	Incremental	Cumulative
6a	$43,595	$43,595
2	$91,607	$135,202
1	$34,509	$169,712
3	$63,817	$233,528
4	$76,455	$309,984
5a	$54,805	$364,789
5b	($25,907)	$338,882
6b	($25,655)	$313,228
6c	$0	$313,228
6d	$0	$313,228
6e	$0	$313,228

Table 3-7
County Road Fund: Incremental and Cumulative Fiscal Impacts by Planning Area
(In Constant 2015 Dollars)

Category	Planning Areas (PAs) after Buildout					
	PA 6a	PA 2	PA 1	PA 3	PA 4	PA 5a
Recurring Revenues						
State gasoline tax:						
Section 2103	$53,480	$110,039	$60,309	$76,876	$95,576	$82,375
Section 2104	$28,931	$59,527	$32,625	$41,587	$51,704	$44,562
Section 2105	$26,828	$55,465	$29,742	$38,383	$48,632	$41,398
Section 2106	$14,655	$30,790	$16,133	$24,511	$21,581	$18,550
Total State Gasoline Tax	**$123,894**	**$255,821**	**$138,809**	**$181,358**	**$217,493**	**$186,885**
General Fund contribution	**$31,432**	**$60,787**	**$30,952**	**$46,261**	**$46,061**	**$38,536**
Incremental Revenues	**$155,326**	**$316,607**	**$169,761**	**$227,620**	**$263,554**	**$225,421**
Cumulative Revenues	***$155,326***	***$471,933***	***$641,694***	***$869,314***	***$1,132,868***	***$1,358,289***
Recurring Costs						
Incremental Costs	**$111,731**	**$225,000**	**$135,252**	**$163,803**	**$187,099**	**$170,616**
Cumulative Costs	***$111,731***	***$336,731***	***$471,983***	***$635,785***	***$822,884***	***$993,500***
Incremental Road Fund Surplus or (Deficit)	**$43,595**	**$91,607**	**$34,509**	**$63,817**	**$76,455**	**$54,805**
Cumulative Road Fund Surplus	***$43,595***	***$135,202***	***$169,712***	***$233,528***	***$309,984***	***$364,789***
Cumulative Road Fund Revenue to Cost Ratio	***1.39***	***1.40***	***1.36***	***1.37***	***1.38***	***1.37***

Category	Planning Areas (PAs) after Buildout					Total Project	Percent of Total
	PA 5b	PA 6b	PA 6c	PA 6d	PA 6e		
Recurring Revenues							
State gasoline tax:							
Section 2103	$4,187	$2,682	$0	$0	$0	$485,523	35.4%
Section 2104	$2,265	$1,451	$0	$0	$0	262,651	19.2%
Section 2105	$703	$0	$0	$0	$0	$241,152	17.6%
Section 2106	$332	$100	$0	$0	$0	$126,653	9.2%
Total State Gasoline Tax	**$7,488**	**$4,232**	**$0**	**$0**	**$0**	**$1,115,979**	**81.4%**
General Fund contribution	**$647**	**$113**	**$0**	**$0**	**$0**	**$254,789**	**18.6%**
Incremental Revenues	**$8,135**	**$4,345**	**$0**	**$0**	**$0**		
Cumulative Revenues	***$1,366,424***	***$1,370,769***	***$1,370,769***	***$1,370,769***	***$1,370,769***	***$1,370,769***	***100.0%***
Recurring Costs							
Incremental Costs	**$34,042**	**$30,000**	**$0**	**$0**	**$0**		
Cumulative Costs	***$1,027,541***	***$1,057,541***	***$1,057,541***	***$1,057,541***	***$1,057,541***	***$1,057,541***	
Incremental Road Fund Surplus or (Deficit)	**($25,907)**	**($25,655)**	**$0**	**$0**	**$0**		
Cumulative Road Fund Surplus	***$338,882***	***$313,228***	***$313,228***	***$313,228***	***$313,228***	***$313,228***	
Cumulative Road Fund Revenue to Cost Ratio	***1.33***	***1.30***	***1.30***	***1.30***	***1.30***		

Sources: County of Kern, *Fiscal Year 2015-2016 Recommended Budget*
California State Controller's Office, *Highway User Tax - Counties Fiscal Year 2014-2015 Total Payments* , www.sco.ca.gov
California State Controller's Office, *Highway Users Tax -Remittance Advice, Kern County,, July 30, 2015* , www.sco.ca.gov
County of Kern, Auditor Controller-County Clerk, *Tax Rates & Assessed Valuations, 2014-2015*

3.2.3 County Fire Department – Planning Areas

Table 3-8 summarizes the incremental and cumulative projected deficits to the County Fire Department by the Grapevine project planning areas starting with the Planning Area 6a and continuing with the balance of the planning areas (2, 1, 3, 4, 5a, 5b, 6b, 6c, 6d and 6e) in order of planned development. The detailed recurring revenues and costs to the County Road Fund by the Grapevine project planning areas are presented in Table 3-9.

Table 3-8
Planning Areas: Summary of County Fire Department Fiscal Impacts after Buildout [1]
(In Constant 2015 Dollars)

Planning Area	Fire Department Projected Surplus: Incremental	Fire Department Projected Surplus: Cumulative
6a	$87,681	$87,681
2	$252,898	$340,579
1	$141,383	$481,962
3	$247,981	$729,943
4	$100,155	$830,098
5a	$100,676	$930,774
5b	$2,479	$933,252
6b	$2,508	$935,761
6c	$0	$935,761
6d	$0	$935,761
6e	$0	$935,761

Note: 1. The projected surplus is based on the phasing of fire costs on a service population basis and not when a new fire station is actually operating.

Table 3-9
County Fire Department: Incremental and Cumulative Fiscal Impacts by Planning Area
(In Constant 2015 Dollars)

Category	Planning Areas (PAs) after Buildout				
	PA 6a	PA 2	PA 1	PA 3	PA 4
Recurring Revenues					
Incremental Property Tax	$573,519	$1,204,923	$631,358	$959,202	$844,521
Cumulative Revenues	**$573,519**	**$1,778,442**	**$2,409,800**	**$3,369,002**	**$4,213,523**
Recurring Costs					
Incremental Fire Protection Costs [1]	$485,838	$952,025	$489,975	$711,221	$744,366
Cumulative Costs	***$485,838***	***$1,437,863***	***$1,927,838***	***$2,639,059***	***$3,383,425***
Incremental Fire Department Surplus	**$87,681**	**$252,898**	**$141,383**	**$247,981**	**$100,155**
Cumulative Fire Department Surplus	***$87,681***	***$340,579***	***$481,962***	***$729,943***	***$830,098***
Cumulative Fire Department Revenue to Cost Ratio	1.18	1.24	1.25	1.28	1.25

Note: 1. Fire costs are projected on a service population basis and not when a new station is actually operating.

Category	Planning Areas (PAs) after Buildout					
	PA 5a	PA 5b	PA 6b	PA 6c	PA 6d	PA 6e
Recurring Revenues						
Incremental Property Tax	$725,909	$13,010	$3,919	$0	$0	$0
Cumulative Revenues	**$4,939,432**	**$4,952,442**	**$4,956,361**	**$4,956,361**	**$4,956,361**	**$4,956,361**
Recurring Costs						
Incremental Fire Protection Costs [1]	$625,233	$10,531	$1,410	$0	$0	$0
Cumulative Costs	***$4,008,659***	***$4,019,190***	***$4,020,600***	***$4,020,600***	***$4,020,600***	***$4,020,600***
Incremental Fire Department Surplus	**$100,676**	**$2,479**	**$2,508**	**$0**	**$0**	**$0**
Cumulative Fire Department Surplus	***$930,774***	***$933,252***	***$935,761***	***$935,761***	***$935,761***	***$935,761***
Cumulative Fire Department Revenue to Cost Ratio	1.23	1.23	1.23	1.23	1.23	1.23

Note: 1. Fire costs are projected on a service population basis and not when a new station is actually operating.

4.0 CONCLUSION

The purpose of the Fiscal and Economic Analysis is to project the fiscal ability of the proposed development to cover the public service operations and maintenance costs provided by the Kern County General Fund and other relevant funds. Table 4-1 summarizes the net impact to the County General Fund, the County Road Fund and the County Fire Department.

Table 4-1
Summary of Projected Fiscal Impacts: Total Grapevine Project
(In Constant 2015 Dollars)

County Fund or Department	Buildout
COUNTY GENERAL FUND	
Recurring Revenues	$25,702,657
Recurring Costs	$22,617,697
Net Impact	**$3,084,960**
Revenue/Cost Ratio	1.14
COUNTY ROAD FUND	
Recurring Revenues	$1,370,769
Recurring Costs	$1,057,541
Net Impact	**$313,228**
Revenue/Cost Ratio	1.30
COUNTY FIRE DEPARTMENT	
Recurring Property Tax Revenues	$4,956,361
Recurring Costs	$4,020,600
Net Impact	**$935,761**
Revenue/Cost Ratio	1.23

4.1 County General Fund

- The projected revenues to the County General Fund would cover the cost of providing services to the total Grapevine project after buildout with a projected recurring annual surplus of about $3.08 million in 2015 constant dollars.

- On a cumulative basis, assuming development starting with Planning Area 6 and continuing with the balance of the planning areas in order of development, a small deficit of $485 is projected for Planning Area 6 and a recurring surplus is projected to the County General Fund throughout the remaining development period for the Grapevine project.

4.2 County Road Fund

- The projected State gasoline tax and General Fund contributions to the County Road Fund for the Grapevine project would cover the projected road costs after buildout with a projected annual recurring surplus of $313,228 in constant 2015 dollars.

- On a cumulative basis, assuming development starting with Planning Area 6 and continuing with the balance of the planning areas in order of development, a recurring surplus is projected to the County Road Fund for the Grapevine project throughout the development period.

4.3 County Fire Department

- The projected fire property tax to the County Fire Department for the Grapevine project would cover the costs of providing fire protection after buildout with a projected surplus of $935,761.

- On a cumulative basis, assuming that fire costs are phased on a service population basis and that development starts with Planning Area 6 and continuing with the balance of the planning areas in order of development, a recurring surplus is projected to the County Fire Department throughout the development period for the Grapevine project.

4.4 County Library

- The fiscal analysis projects county costs for library services as part of the countywide service costs for education.

- On a cumulative basis, assuming development starting with Planning Area 6 and continuing with the balance of the planning areas in order of development, library costs would be covered by the recurring surplus projected to the County General Fund throughout the development period for the Grapevine project.

5.0 FISCAL ASSUMPTIONS

The revenue and cost assumptions for projecting the fiscal impacts to the County General Fund, the County Road Fund and the County Fire Department for the Grapevine project are presented in this chapter.

General demographic and employment assumptions used for calculating fiscal factors are first presented. The revenue assumptions for projecting recurring revenues are then presented followed by the cost assumptions for projecting recurring costs.

5.1 General Assumptions

Certain County revenue and cost factors are estimated by dividing the 2015-2016 Recommended County budget categories by the population and employment for either the total County or the unincorporated area, as appropriate.

Population

As shown in Table 5-1, California Department of Finance (DOF), *E-5 Population and Housing Estimates for Cities, Counties and State, January 1, 2015* estimates the County's total population at 874,264 and the unincorporated population at 309,050.

Employment

Based on the August 2013 Kern Council of Governments (Kern COG) *SB 375 Modeling Methodology – DRAFT, Version 12,* the total County employment is estimated at 335,593 for 2014 based on an interpolation of the 2005 base estimate of 286,432 jobs and the projected 2035 job estimate of 460,674. Estimates below the total County level are not included in the Kern COG modeling document, however, based on previous detailed Kern COG projections, unincorporated area employment represented about 40 percent of total County employment. Therefore the fiscal analysis estimates 134,237 jobs for the unincorporated area for 2015, or 40 percent of the total County employment.

Service Area Population

Several revenues and costs are impacted by both population and employment growth, such as franchise taxes and certain countywide costs. Therefore, these fiscal factors are estimated by allocating budgeted revenues or costs to both population and employment. For the allocation of these revenues and costs, the employment estimate was weighted at 50 percent to account for the estimated less frequent use of public services by employment versus population.

Table 5-1
Summary of 2014 General Assumptions for Calculating Fiscal Factors

Jurisdiction	Population [1]	Employment [2]	Total
A. Total County	874,264	335,593	1,209,857
Service Area Population (100% Population plus 50% Employment) [3]	874,264	167,797	1,042,061
Share of Total Service Population [4]	*80%*	*20%*	*100%*
B. Unincorporated Area	309,050	134,237	443,287
Service Area Population (100% Population plus 50% Employment) [3]	309,050	67,119	376,169
Share of Total Service Population [4]	*80%*	*20%*	*100%*

Note: 1. Population estimates are from DOF for January 1, 2015.
2. Total Kern County employment is estimated for 2015 based on an interpolation of the job estimates for 2005 (286,432 jobs) and 2035 (460,674 jobs) included in the Kern Council of Governments (Kern COG), *Kern SB 375 Modeling Methodology - DRAFT, Version 12, August 2013* prepared for the Kern COG 2014 Regional Transportation Plan. Job estimates below the County level are not included in the Kern COG modeling document, therefore unincorporated area employment is estimated at 40 percent of total County employment based on previous Kern COG detailed projections.
3. Service area population represents the population plus employment weighted at 50 percent to account for a lower service demand from employment.
4. The shares of population and employment to the total service population are applied to budgeted revenue categories and net County cost categories to estimate the amount of particular revenues or costs that are applicable to population versus employment. The estimated shares are rounded to the nearest tens.

Sources: State of California, Department of Finance, *E-5 Population and Housing Estimates for Cities, Counties and the State - January 1, 2011-2015,* Sacramento, California, May 2015
Kern Council of Governments, *Kern SB 375 Modeling Methodology - DRAFT, Version 12,* August 2013

Total County. As shown in Panel A of Table 5-1, an estimated service area population of 1,042,061 is used to calculate the revenues and costs that apply to both population and employment for the total County. This estimate includes the resident population of 874,264 and the estimated weighted employment of 167,797 (or 50 percent of 335,593). Based on these estimated shares of the total service population, revenues and costs that apply to both population and employment for the total County are allocated 80 percent to population and 20 percent to employment when rounded to the nearest 10s percent.

Unincorporated Area. As shown in Panel B of Table 5-1, the estimated service area population for the unincorporated area is 376,169 based on the population of 309,050 and the weighted employment estimate of 67,119 (or 50 percent of 134,237). Again, based on the rounded estimated shares of the total service population, revenues and costs that apply to both population and employment for the unincorporated area are allocated 80 percent to population and 20 percent to employment.

5.2 County General Fund

5.2.1 County General Fund Revenue Assumptions

Property tax, property tax in lieu of vehicle license fees (VLF), property transfer tax, sales and use tax, transient occupancy tax, and interest on deposits and investments are projected using the case study method. All other revenue factors are projected based on a per capita, per employee, or per service population basis using either the total County or unincorporated portion of the population and employment. The fiscal year 2015-2016 fiscal factors for projecting recurring revenues to the County General Fund from the Grapevine project are presented in Table 5-2.

Property Tax

The projected property tax by planning area for the Grapevine project is presented in Appendix Table A-6. Property tax revenues are estimated based on each County's fund or District's estimated share of the one percent property tax levy for the assessed valuation. The estimated share of property tax for the General Fund or County District is based on the tax rate area (TRA) allocations in which the property is located. The current assessed valuations by assessor parcel number and tax rate area (TRA) are presented in Appendix Table A-7. The property tax allocations to the General Fund and the County Fire Department for each TRA in the Grapevine project are presented in Appendix Table A-8. Based on the information provided by the Auditor/Controller, the average of Grapevine project TRA allocations to the County General fund is currently about 21.16 percent of the basic one percent property tax levy.

Property Tax in Lieu of Vehicle License Fees (VLF)

Cities and Counties began receiving additional property tax revenue to replace vehicle license fee (VLF) revenue that was lowered when the state reduced vehicle license tax in fiscal year 2004-2005. Based on information from the State Controller, property tax in-lieu of VLF is projected to grow in proportion to the change in the County-wide gross assessed valuation (AV) from the prior year. Property tax in-lieu of VLF revenues is in addition to other property tax apportionments.

As shown in Table 5-3, property tax in lieu of VLF revenues is projected at $1,311 per $1.0 million increase in AV Countywide. The projected property tax in lieu of VLF is projected based on this factor. The VLF factor is calculated using fiscal year 2015-2016 AV and VLF because the fiscal year 2015-2016 budget reflects the recent plunge in gas and oil prices in the County. Fiscal year 2015-2016 AV and VLF amounts are more typical of the change in residential and non-residential development. The projected property tax in-lieu of VLF for each planning area is included in Appendix Table A-6.

Table 5-2
General Fund Revenue Assumptions
(In Constant 2015 Dollars)

Revenue Source	FY 2015-2016 Recommended Revenue	Projection Basis [1]	Annual Projection Factor or Amount	
A. COUNTY GENERAL FUND				
Property Taxes	$180,937,354	Assessed Valuation	21.16%	County General Fund allocation of basic 1% levy
Property Tax In-Lieu Vehicle License Fees (VLF)	$96,844,431	Case Study	$1,311	per $1,000,000 assessed valuation
Property Transfer Tax	$2,910,000	Assessed Valuation	8% 5%	residential turnover rate non-residential turnover rate
Sales and Use Tax	$44,337,164	Taxable Sales	1.0% 12.5%	sales tax is 1% of taxable sales; use tax is 12.5% of sales tax
Transient Occupancy Tax	$1,776,250	Lodging Room Receipts	6%	of room receipts
Interest on Deposits and Investments	$9,215,000	Percent of Recurring Revenues	2.5%	of recurring revenues

Revenue Source	FY 2015-2016 Recommended Revenue	Projection Basis	Net Revenue Allocation [2] Budget Share Population	Net Revenue Allocation [2] Budget Share Employment	Service Area Population	Service Area Total Employment	Revenue Factor [3] Per Capita	Revenue Factor [3] Per Employee
Other General Fund Revenues								
			80.0%	20.0%				
Countywide Cost Allocation Plan Reimbursement	$11,153,632	Unincorporated Population and Employment	$8,922,906	$2,230,726	309,050	134,237	$28.87	$16.62
Franchise Fees	$8,400,000	Unincorporated Population and Employment	$6,720,000	$1,680,000	309,050	134,237	$21.74	$12.52
Hazardous Waste Facilities Tax	$1,400,000	Unincorporated Population and Employment	$1,120,000	$280,000	309,050	134,237	$3.62	$2.09
All Other Discretionary Funds	$7,164,480	Unincorporated Population and Employment	$5,731,584	$1,432,896	309,050	134,237	$18.55	$10.67
			100.0%	0.0%				
State and Federal Aid	$8,277,929	Unincorporated Population	$8,277,929	$0.00	309,050	0	$26.79	$0.00
Total General Fund Discretionary-Use Revenue	$372,416,240							

Note: 1. Property tax is projected based on assessed valuation and the tax rate area (TRA) allocation factor of 21.16 percent of the basic one percent property tax to the County General Fund, as shown in Appendix Table A-8. Property tax in-lieu of vehicle license fees (VLF), real property transfer tax, sales and use tax, transient occupancy tax, and interest on deposits and investment are projected on a case study method.
2. Budgeted County revenues are allocated between population and weighted employment based on the shares of population and weighted employment to the combined service area population for the appropriate jurisdiction. The service area population is the population plus the employment at 50 percent, as shown in Table 5-1.
3. Per capita and per employee factors are derived by dividing the allocated costs by either the population or employment for the appropriate jurisdiction.

Sources: County of Kern, *Fiscal Year 2015-2016 Recommended Budget, page 93*
State of California, Department of Finance, *E-5 Population and Housing Estimates for Cities, Counties and the State - January 1, 2011-2015, Sacramento, California, May 2015*
Kern Council of Governments, *Kern SB 375 Modeling Methodology - DRAFT, 07/30/2013 Version 12*

Table 5-3
Estimated Property Tax Vehicle License Fee Factor
(In Constant 2015 Dollars)

Category	Fiscal Year 2004-2005 [1]	Fiscal Year 2014-2015 [2]	Change
A. Nominal Dollars			
Property Tax In Lieu Vehicle License Fees (VLF)	$54,664,497	$107,307,970	$52,643,473
Assessed Valuation (AV)	$45,944,852,855	$87,074,431,966	$41,129,579,111
VLF Increase divided by AV			0.001280
VLF Increase per $1,000,000 increase in AV			$1,280
B. Consumer Price Index (January 2005 and January 2015)	195.40	239.72	1.23
C. Constant Dollars			
Property Tax In Lieu Vehicle License Fees (VLF)	$67,237,331	$107,307,970	$40,070,639
Assessed Valuation (AV)	$56,512,169,012	$87,074,431,966	$30,562,262,954
VLF Increase divided by AV			0.001311
VLF Increase per $1,000,000 increase in AV			**$1,311**

Note: 1. The VLF and AV amounts for Fiscal Year 2004-2005 are from the October 2005 State Controller's Office "Motor Vehicle License Fee Adjustment Amounts".
2. The Fiscal Year 2014-2015 VLF and AV amounts are from the County's Fiscal Year 2015-2016 Recommended Budget. The FY 2015-2016 AV is not used for the calculation of the VLF factor because of the significant decrease in FY 2015-2016 County AV from FY 2014-2015 due to the recent plunge in gas and oil prices. FY 2014-2015 AV and VLF amounts are used to represent a more typical budget year for residential and non-residential change.

Sources: State Controller's Office, Division of Accounting and Reporting, *Revenue and Taxation Code Section 97.70@1(B)(i) Vehicle License Fee Adjustment Amounts, 2004/2005,* October 2005
County of Kern, *Fiscal Year 2015-2016 Recommended Budget, pages 14 and 93*
www.recorder.co.kern.ca.us
Bureau of Labor Statistics (BLS), *Consumer Price Index-All Urban Customers, Los Angeles-Riverside-Orange County, CA*

Property Transfer Tax

Kern County taxes the sales of real property at a rate of $1.10 per $1,000 of property value. Residential property is estimated to change ownership at an average of about 8.0 percent per year. Non-residential property is assumed to change ownership at about half the residential turnover rate, or at 4.0 percent per year.

Sales and Use Tax

Sales tax revenues to the County are projected at one percent of taxable sales. In addition to sales tax revenue, the County receives revenues from use tax, which is levied on shipments into the state and on construction materials for new residential and non-residential development not allocated to a situs location. Use tax is allocated by the State Board of Equalization (BOE) to counties and cities based on each jurisdiction's proportion of countywide and statewide direct taxable sales.

Use tax revenues to the unincorporated area of Kern County are estimated at an additional 12.5 percent of point-of-sale sales tax, as shown in Table 5-4. Calendar Year 2014 sales tax data provided by Hinderliter de Llamas and Associates (HdL) for unincorporated Kern County estimates that $6.15 million of total sales and use tax were made from levies designated as use tax and the remaining $49.12 million of the sales and use tax was point-of-sale sales tax. Therefore, use tax revenues to the unincorporated area of Kern County are estimated at an additional 12.5 percent of point-of-sale sales tax.

Table 5-4
Calculation of Use Tax Factor

Unincorporated Kern County	Amount
Use Tax	
County Pool	$6,106,210
State Pool	42,353
Total Use Tax	$6,148,563
divided by	
Point-of-Sale	$49,121,764
equals	
Use Tax Rate [1]	**12.5%**

Note: 1. The use tax rate is the County Pool plus the State Pool divided by point-of-sale sales tax.

Source: The HdL Companies, *Sales Tax Allocation Totals, Calendar Year 2014*

Transient Occupancy Tax

Transient occupancy tax (TOT) accrues to the County General Fund at the rate of 6.0 percent of gross room receipts.

Interest on Deposits and Investments

As shown in Table 5-2, these revenues for fiscal year 2015-2016 are estimated at 2.5 percent of recurring revenues based on recommended interest revenues of $9.22 million and non-interest recurring revenues of about $363.20 million.

Countywide Cost Allocation Plan Reimbursement

These revenues for fiscal year 2015-2016 are estimated at $11.15 million for the unincorporated area of the County, as shown in Table 5-2. These revenues are allocated 80 percent to population and 20 percent to employment, which represents each component's share to the total combined service area population and employment estimate for the unincorporated area.

These revenues are projected at $28.87 per capita and $16.62 per employee based on the following formulas:

- $11.15 million times 80% divided by 309,050 = $28.87 per capita
- $11.15 million times 20% divided by 134,237 = $16.62 per employee

Franchise Fees

As shown in Table 5-2, these revenues for fiscal year 2015-2016 are estimated at $8.40 million for the unincorporated area of the County. Franchise fees are allocated 80 percent to population and 20 percent to employment, which represents each component's share to the total combined service area population and employment estimate for the unincorporated area.

As shown in Table 5-2, franchise revenues are projected at $21.74 per capita and $12.52 per employee based on the following formulas:

- $8.40 million times 80% divided by 309,050 = $21.74 per capita
- $8.40 million times 20% divided by 134,237 = $12.52 per employee

Hazardous Waste Facilities Tax

This tax for fiscal year 2015-2016 is estimated at $1.40 million for the unincorporated area of the County, and is allocated 80 percent to population and 20 percent to employment, which represents each component's share to the total combined service area population and employment estimate for the unincorporated area.

As shown in Table 5-2, hazardous waste facilities revenues are projected at $3.62 per capita and $2.09 per employee based on the following formulas:

- $1.40 million times 80% divided by 309,050 = $3.62 per capita
- $1.40 million times 20% divided by 134,237 = $2.09 per employee

All Other Discretionary Funds

These revenues for fiscal year 2015-2016 are estimated at $7.16 million for the unincorporated area of the County, as shown in Table 5-2. These revenues are allocated 80 percent to population and 20 percent to employment, which represents each component's share to the total combined service area population and employment estimate for the unincorporated area.

These revenues are projected at $18.55 per capita and $10.67 per employee based on the following formulas:

– $7.16 million times 80% divided by 309,050 = $18.55 per capita
– $7.16 million times 20% divided by 134,237 = $10.67 per employee

State and Federal Aid

As shown in Table 5-2, discretionary revenues from this source are projected using a factor of $26.79 per capita and are determined by dividing the budget amount of $8.28 million by the unincorporated Kern County population of 309,050. These revenues are received annually and include the federal government's payment in lieu of taxes (PILT) program. The County is eligible for revenues from this PILT based on the federal acres of land within the county and the population of the county. Therefore, these revenues will increase with the added project population.

5.2.2 County General Fund Cost Assumptions

The recurring per capita and per employee cost factors for the County General Fund are summarized in Table 5-5. County General Fund costs include the municipal-type costs of police protection and animal control. Countywide costs include services that are provided to all residents of the County whether they live in a City or the unincorporated area of the County. Cost factors are based on the net County costs for Fiscal Year 2015-2016 as presented in Appendix Table B-1.

Sheriff-Coroner – Local Patrol Costs

The County Sheriff Department is responsible for providing local law enforcement protection services to the unincorporated area of Kern County. Total annual Sheriff-Coroner costs of about $119.40 million in the County Budget include countywide public protection costs for jails and detention. Based on discussion with Sheriff-Coroner staff, about half of these costs, or $59.70 million, are assumed for local patrol services.

Local patrol costs are projected at $147.33 per capita and $72.10 per employee. Costs for Sheriff Patrol are projected based on the service area population shown in Appendix Table B-2 and the allocation of the estimated Fiscal Year 2015-2016 costs of about $59.70 million.

– $59.70 million times 83% divided by 336,349 = $147.33 per capita
– $59.50 million times 17% divided by 140,758 = $72.10 per employee

Table 5-5
General Fund Cost Assumptions
(In Constant 2015 Dollars)

	FY 2015-2016	Service Area Case Study						Annual Cost Factors [2]	
	Recommended	Net Cost Allocation [1]				Service Area			
	General Fund	Budget Share		Budget Amount			Total	Per	Per
Cost Category	Net Cost	Population	Employment	Population	Employment	Population	Employment	Capita	Employee
Municipal-Type Costs:									
Sheriff-Coroner Local Patrol [3]	$59,701,983	83%	17%	$49,552,646	$10,149,337	336,349	140,758	$147.33	$72.10
Animal Control	$5,518,332	100%	0%	$5,518,332	$0	711,696	0	$7.75	$0.00
Subtotal Municipal-Type Costs	$65,220,315			$55,070,978	$10,149,337			$155.08	$72.10
Net Countywide Costs:									
General Government	$82,423,035	80%	20%	$65,938,428	$16,484,607	874,264	335,593	$75.42	$49.12
Public Protection (includes only detention and courts) [3]	$152,039,587	80%	20%	$121,631,670	$30,407,917	874,264	335,593	$139.00	$91.00
Public Ways and Facilities:									
Contribution to Public Works-Public Ways	$6,316,848	80%	20%	$5,053,478	$1,263,370	874,264	335,593	$5.78	$3.76
Contribution to Airports	$278,753	80%	20%	$223,002	$55,751	874,264	335,593	$0.26	$0.17
Health and Sanitation	$43,441,216	100%	0%	$43,441,216	$0	874,264	335,593	$49.69	$0.00
Public Assistance	$36,661,572	100%	0%	$36,661,572	$0	874,264	335,593	$41.93	$0.00
Education	$7,985,157	100%	0%	$7,985,157	$0	874,264	335,593	$9.13	$0.00
Recreation and Cultural Services	$10,816,696	100%	0%	$10,816,696	$0	874,264	335,593	$12.37	$0.00
Debt Service	$10,745,998	80%	20%	$8,596,798	$2,149,200	874,264	335,593	$9.83	$6.40
Contingencies and Reserves	$38,047,507	80%	20%	$30,438,006	$7,609,501	874,264	335,593	$34.82	$22.67
Subtotal Net Countywide Costs	$388,756,369			$330,786,023	$57,970,346			$378.23	$173.13
Total County General Fund Costs	$453,976,684			$385,857,001	$68,119,683			$533.31	$245.24

Note: 1. All costs, except animal control, health and sanitation, public assistance, education, and recreation and cultural services are allocated between population and employment based on the shares of population based on the shares of population and weighted employment to the combined population and weighted employment for the appropriate jurisdiction. Costs for animal control, health and sanitation, public assistance, education, and recreation and cultural services are allocated 100 percent to population.

2. Per capita and per employee factors are derived by dividing the allocated costs by the estimated population and the estimated employment for the appropriate jurisdiction.

3. Sheriff-Coroner net county costs as presented in the County budget include local patrol and detention costs which service local jurisdictions as well as County costs for courts and jails which serve the entire County population. Therefore, for purposes of estimating local patrol costs, based on discussion with Sheriff-Coroner Metro Patrol staff, patrol costs for FY 2015-2016 are estimated at 50 percent of the total Sheriff-Coroner net County costs of $119,403,965 and the remaining 50 percent of the FY 2015-2016 Sheriff-Coroner net county costs are allocated to Countywide public protection, as shown in Appendix Table B-1.

Sources: County of Kern, *FY 2015-2016 Recommended Budget*
State of California, Department of Finance, *E-5 Population and Housing Estimates for Cities, Counties and the State - January 1, 2011-2015, Sacramento, California, May 2015*
Kern Council of Governments, *Kern SB 375 Modeling Methodology - DRAFT, 07/30/2013 Version 12*

Animal Control Costs

These costs are projected at $7.75 per capita for the Grapevine project based on net countywide costs of about $5.52 million and the estimated animal control service population of 711,696 for services to the unincorporated area and three contract cities, as shown in Appendix Table B-3.

Countywide Costs

Countywide costs are those that are potentially provided to all residents of Kern County and include general government; public protection, excluding Sheriff-Coroner local law enforcement costs and animal control; public ways and facilities; health and sanitation; public assistance; education, including library; recreation and cultural services; debt service; and contingencies and reserves costs.

General Government. General government services include board of supervisors, administrative office, clerk of the board, special services, auditor-controller, treasurer-tax collector, assessor, information technology, County counsel, human resources, elections, general services, utility payments, construction services, major maintenance, Board of Trade, engineering/surveying/permit services, and minor capital projects. All of these costs are allocated between countywide population and employment.

General government costs are projected at $75.42 per capita and $49.12 per employee based on the total countywide population and employment and allocation of the estimated Fiscal Year 2015-2016 net expenditures of about $82.42 million.

- $82.42 million times 80% divided by 874,264 = $75.42 per capita
- $82.42 million times 20% divided by 335,593 = $49.12 per employee

Public Protection. These countywide costs do not include Sheriff's local law enforcement costs and animal control, which are projected separately as a municipal-type cost in the fiscal analysis. However, the net County costs for non-local law enforcement by the Sheriff-Coroner are included in the other countywide public protection. Other countywide public protection costs are for services such as trial court funding, County clerk, grand jury, indigent defense, district attorney, public defender, forensic sciences, County courts, detention, probation, contribution to fire, agriculture and measurement standards, code compliance, development services, and planning and community development.

As shown in Table 5-5, countywide public protection costs are projected at $139.00 per capita and $91.00 per employee. Cost factors for these costs are projected based on the total countywide population and employment and the allocation of the estimated Fiscal Year 2015-2016 net expenditures of about $152.04 million.

- $152.04 million times 80% divided by 874,264 = $139.00 per capita
- $152.04 million times 20% divided by 335,593 = $91.00 per employee

Public Ways and Facilities. These services include contributions to Public Works – Public Ways and contributions to Airports.

Public Works-Public Ways. These costs are projected at $5.78 per capita and $3.76 per employee based on the total countywide population and employment and the allocation of the estimated Fiscal Year 2015-2016 net expenditures of about $6.60 million.

- $6.32 million times 80% divided by 874,264 = $5.78 per capita
  $6.32 million times 20% divided by 335,593 = $3.79 per employee

Airports. As shown in Table 5-5, contributions to airports are projected at $0.26 per capita and $0.17 per employee based on the total countywide population and employment and the allocation of the estimated Fiscal Year 2015-2016 net expenditures of 278,753.

- $278,753 times 80% divided by 874,264 = $0.26 per capita
- $278,753 times 20% divided by 335,593 = $0.17 per employee

Health and Sanitation. These services include public health, environmental health, contributions to mental health, emergency medical services, contributions to Kern Medical Center (KMC) and California Children Services. Costs for Health and Sanitation services are projected at $49.69 per capita based on the total countywide population of 874,264 and the estimated Fiscal Year 2015-2016 net expenditures of about $43.44 million.

Public Assistance. These services include human services, Veterans Services, aging and adult services. Public assistance services are projected at $41.93 per capita based on the total countywide population of 874,264 and the estimated Fiscal Year 2015-2016 net expenditures of about $36.66 million.

Education. Education services include library and farm and home advisor. Education services are projected at $9.13 per capita based on the total countywide population of 874,264 and the estimated Fiscal Year 2015-2016 net expenditures of about $7.99 million.

Recreation and Cultural Services. This category includes services provided by the Parks and Recreation Department. As shown in Table 5-5, these services are projected at $12.37 per capita based on the total countywide population of 874,264 and the estimated Fiscal Year 2015-2016 net expenditures of about $10.82 million.

Debt Service. These Countywide costs are projected at $9.83 per capita and $6.40 per employee. Cost factors are projected based on the total countywide population and employment and the allocation of the estimated Fiscal Year 2015-2016 net expenditures of about $10.75 million.

- $10.75 million times 80% divided by 874,264 = $9.83 per capita
- $10.75 million times 20% divided by 335,593 = $6.40 per employee

Contingencies and Reserves. These costs include general purpose contingencies, reserve – tax litigation and designated contingencies to human services, Renewbiz, blight remediation, retirement, infrastructure replacement, road improvements, KMC working capital, information technology and jail operations. As shown in Table 5-5, these costs are projected at $34.82 per capita and $22.67 per employee based on the total countywide population and employment and the allocation of the estimated Fiscal Year 2015-2016 net revenues of $38.05 million.

- $38.05 million times 80% divided by 874,264 = $34.82 per capita
- $38.05 million times 20% divided by 335,593 = $22.67 per employee

5.3 County Road Fund

5.3.1 County Road Fund Revenue Assumptions

As shown in Table 5-6, projected Road Fund revenues include state gasoline tax revenues and General Fund contributions to the Road Fund. Based on the current County Budget, local road costs are primarily funded with these two revenue sources.

State Gasoline Tax

State gasoline tax is allocated from the State to the County based on several formulas outlined in the California Streets and Highways code, Section 2103 through Section 2106. Depending on the specific section of the code, these formulas are based on the number of registered vehicles, County maintained road mileage, County population and County assessed valuation. The amounts of allocated State gasoline tax by Section, the number of registered vehicles and County maintained mileage are from the California State Controller's Office Highway User Tax reports. The Countywide population estimate is based on California Department of Finance (DOF) for January 2015. The Kern County assessed valuation is from the County Auditor Controller's office. The number of registered vehicles for the project is estimated based on an assumption of 0.81 vehicles per capita, as shown in Appendix Table B-4.

Section 2103. Annual Section 2103 revenues are apportioned 75 percent based on County registered vehicles and 25 percent based on County maintained mileage. As shown in Table 5-6, based on the apportioned amounts, the County registered vehicles and County maintained mileage, Section 2103 State gas tax revenues are projected at $12.57 per registered vehicle and $893.90 per lineal mile.

Section 2104. The State apportions a fixed amount of annual Section 2104 revenues to the County for Engineering and Administration and Snow Removal. These two fixed revenue amounts are not projected in the fiscal analysis. Of the remaining Section 2104 gas tax revenues, 75 percent are allocated based on County registered vehicles and 25 percent are allocated based on County maintained mileage. As shown in Table 5-6, Section 2104 gas tax revenues are projected at $6.80 per registered vehicle and $483.55 per lineal mile.

Section 2105. The State allocates Section 2105 gas tax revenues based on population. Based on the allocated amount of about $5.49 million and the total County population estimate of 874,264 annual Section 2105 gas tax revenues are projected at $6.28 per capita, as shown in Table 5-6.

Table 5-6
County Road Fund Revenue Assumptions
(In Constant 2015 Dollars)

Revenue Sources	Revenue Amount	Allocation Method	Projection Factor
State Gasoline Tax [1]			
Section 2103:			
75% of Apportionment	$8,935,389	County Registered Vehicles = 710,780	$12.57 per registered vehicle
25% of Apportionment	2,978,463	County Maintained Lineal Mileage = 3,332	$893.90 per lineal mile
Total Section 2103	$11,913,852		
Section 2104:			
Engineering and Administration	$20,004	Total Annual Allocation	not projected
Snow Removal	160,783	Total Annual Allocation	not projected
75% Apportionment of Remainder	4,833,549	County Registered Vehicles = 710,780	$6.80 per registered vehicle
25% Apportionment of Remainder	1,611,183	County Maintained Lineal Mileage = 3,332	$483.55 per lineal mile
Total Section 2104	$6,625,518		
Section 2105	$5,486,087	Countywide population = 874,264	$6.28 per capita
Section 2106:			
Annual Allocation	$9,800	Total Annual Allocation	not projected
Remaining Allocation	1,840,367	Unincorporated Assessed Valuation (AV) = $64,335,962,204	$28.61 per million AV
	$1,850,167		
Total State Gasoline Tax	$25,875,624		
General Fund Contribution [2]	$6,316,848	80% to Countywide population = 874,264	$5.78 per capita
		20% to Countywide employment = 335,593	$3.76 per capita

Note: 1. State gasoline tax amounts are the Fiscal Year 2014-2015 payments to Kern County as included in the State Controllers Report cited below. County registered vehicles and County maintained mileage are for year end 2014, as reported in the State Controller's Office *Highway Users Tax -Remittance Advice* cited below.
2. The General Fund contribution to the Road Department is from the County *Fiscal Year 2015-2016 Recommended Budget* .

Sources: County of Kern, *Fiscal Year 2015-2016 Recommended Budget*
California State Controller's Office, *Highway User Tax - Counties Fiscal Year 2014-2015 Total Payments* , www.sco.ca.gov
California State Controller's Office, *Highway Users Tax -Remittance Advice, Kern County,, July 30, 2015* , www.sco.ca.gov
County of Kern, Auditor Controller-County Clerk, *Tax Rates & Assessed Valuations, 2014-2015*

Section 2106. A fixed amount of annual Section 2106 revenues are apportioned to the County from the State. This fixed revenue amount is not projected in the fiscal analysis. The remaining Section 2106 gas tax revenues are allocated based on the unincorporated area assessed valuation (AV). As shown in Table 5-6, Section 2106 gas tax revenues are projected at $28.61 per million dollars of AV.

General Fund Contributions to Road Fund

As shown in Table 5-6, General Fund contributions to the County Road Fund are projected at $5.78 per capita and $3.76 per employee based on the Budget contribution amount of about $6.32 million, which is allocated 80 percent to population and 20 percent to employment, as was presented in Table 5-5.

5.3.2 County Road Fund Costs

Annual road maintenance costs are projected at an average of $10,000 per lineal mile, as shown in Table 5-7. Based on information in the *Kern County Fiscal Year 2015-2016 Recommended Budget*, annual maintenance of the 3,332 lineal miles of local County roads is primarily funded with State gasoline tax and contributions to the Road Fund from the General Fund.

Payments of State gasoline tax to Kern County for Fiscal Year 2014-2015 are reported at about $25.88 million in the State Controller's Highway User Tax report. Combined with the $6.32 million General Fund contribution to the Road Fund reported in the County Fiscal Year 2015-2016 budget, total annual revenues for maintenance of local roads are estimated at about $32.19 million. When these maintenance revenues are divided by the 3,332 lineal miles of local roads, annual road maintenance costs are estimated at about $10,000 per lineal mile.

Table 5-7
County Road Maintenance Cost Factor
(In Constant 2015 Dollars)

Category	Amount
Annual Revenues for Local Roads [1]	
State Highway Users Tax (Gas Tax)	$25,875,624
General Fund Contributions	6,316,848
Total Revenues for Local Roads	$32,192,472
Road Lineal Miles - County Unincorporated Area	
Lineal Miles	3,332
Average Annual Cost per Lineal Mile [2]	**$10,000**

Note: 1. Road maintenance costs are not identified separately in the County budget. However, the County Budget identifies State gasoline tax and General Fund contributions as the primary sources of road maintenance revenues. Payments of State gasoline in the State Controller's report uses 3,332 County maintained lineal miles as the basis for allocating the Highway Users Tax.
2. Average cost per lineal mile is rounded to the nearest 1,000.

Sources: County of Kern, *Fiscal Year 2015-2016 Recommended Budget,* page 365
California State Controller's Office, *Highway User Tax - Counties Fiscal Year 2014-2015 Total Payments* , www.sco.ca.gov
California State Controller's Office, *Highway Users Tax -2014 January 2014* , www.sco.ca.gov

5.4 County Fire Department

5.4.1 County Fire Department Revenue Assumptions

The fiscal analysis projects property tax for the Grapevine project at 11.20 percent of the basic one percent property tax levy based on the average of the TRA allocations to the County Fire Department for the project site.

5.4.2 County Fire Department Costs

Total fire protection costs for the Grapevine project are projected at about $4.02 million after buildout. These projected costs are based on the average countywide annual operations and maintenance costs per fire station and the share of annual fire station costs allocated to the Grapevine project.

As shown in Panel A of Table 5-8, based on the Fiscal Year 2015-2016 budget of about $147.96 million for the County Fire Department and the 46 fire stations as reported in the budget, the average annual cost per County fire station is estimated at an average of about $3.22 million.

Based on information from County Fire Department staff, two fire stations would be located at the Grapevine project at buildout, with the costs allocated 75 percent to the Grapevine project for the first station and 50 percent to the Grapevine project for the second station. The calculation of the Grapevine's share of the two stations is shown in Panel B of Table 5-8.

As shown in Panel C of Table 5-8, The Grapevine project's share of the total costs of the two fire stations is estimated at about $4.02 million after buildout. For purposes of phasing the costs to the Planning Areas in the project, this total of $4.02 million is divided by the estimated service population estimate of 42,750 for the Grapevine project after buildout, or at about $94.05 per service population.

5.5 County Library

The fiscal analysis projects county costs for library services are included as part of the countywide service costs for education. Therefore, it is not projected as an independent district.

Table 5-8
County Fire Department Costs
(In Constant 2015 Dollars)

Panel A. Average Cost per County Fire Station

Category	Amount
Total Fire Department Budget - FY 2015-2016	$147,958,085
divided by	
Number of County Fire Stations [1]	46
equals	
Average Annual Cost per Fire Station	$3,216,480

Panel B. Grapevine Project's Share of Fire Stations After Buildout [2]

Category	Amount
Station 1	
Total Annual Operations and Maintenance Costs	$3,216,480
times	
Share of Costs Allocated to Grapevine Project	75%
equals	
Grapevine's Share of Station 1 Costs	$2,412,360
Station 2	
Total Annual Operations and Maintenance Costs	$3,216,480
times	
Share of Costs Allocated to Grapevine Project	50%
equals	
Grapevine's Share of Station 1 Costs	$1,608,240

Panel C. Estimated Total Annual Fire Costs for Grapevine Project

Category	Amount
Grapevine 's Share of Fire Station Costs	
Station 1	$2,412,360
Station 2	$1,608,240
Estimated Total Annual Fire Costs for Grapevine Project	**$4,020,600**
divided by	
Grapevine Service Population	
Population	38,400
Employment Weighted at 50 Percent	4,350
Total Estimated Grapevine Service Population	**42,750**
equals	
Grapevine Fire Costs per Service Population	**$94.05**

Note: 1. Based on Kern County budget cited below, there are 46 County fire stations.
2. Based on information provided by the County Fire Department, two fire stations would be located at the Grapevine Project after buildout. However, the stations would serve areas beyond the project boundary. County Fire Department staff estimates that 75 percent of Station 1 and 50 percent of Station 2 would be allocated to the Grapevine Project.

Sources: County of Kern, *Fiscal Year 2015-2016 Recommended Budget,* pages 306 and 311

6.0 REFERENCES

CaliforniaCityFinance.com. January 29, 2014. *Shared Revenue Estimates: State Revenue Allocations to Cities and Counties, Highway Users Tax- Estimates for 2013-2014*.

Bureau of Labor Statistics (BLS). 2014. *Consumer Price Index-All Urban Customers, Los Angeles-Riverside-Orange County, CA, Annual CPI.*

County of Kern. *Fiscal Year 2015-2016 Recommended Budget.*

County of Kern. Teresa Hitchcock, Chief Deputy County Administrative Officer.

Dean Runyon Associates. May, 2013. *California Travel Impacts by County, 1992-2011, 2012 Preliminary State & Regional Estimates,* page 107.

DMB Pacific Ventures LLC. Roberta Marshall, Executive Vice President, Steve Letterly, Vice President.

Dudek. Megan Enright, Project Manager/Biologist. Mark Lathram, Technical Publications Lead. Laurel Porter, Technical Editor.

KenKay Associates. 7/18/2014. *Land Use Summary Program, Grapevine at Tejon Ranch*.

KenKay Associates. 1/06/2014. *Road Network Estimation, Grapevine at Tejon Ranch*.

Kern Council of Governments (Kern COG). August 2013. *Kern SB 375 Modeling Methodology – DRAFT, Version 12.*

Kern County Auditor-Controller’s Office. *Modified Annual Tax Increment Ratios (AF49), FY 2013-2014.*

Kern County Sheriff’s Office. January 2014. Conversation with Lieutenant Dan Edgerle, Metro Patrol Section.

Kern County Treasurer and Tax Collector. *2013-2014 Secured Property Tax Bills.*

Real Estate Economics. “Recommended Residential Pricing”

Schuler Consulting. October 2010. *Tejon Ranch Commerce Center*, *Retail Market Analysis, The Outlets at Tejon Ranch, Tejon Ranch, California.*

State Controller's Office, Division of Accounting and Reporting. October 2005. *Revenue and Taxation Code Section 97.70@1(B)(i) Vehicle License Fee Adjustment Amounts, 2004/2005.*

State of California, Department of Finance (DOF). May, 2014. *E-5 City/County Population and*, *Housing Estimates for Cities, Counties and the State, January 1, 2011-2014*, Sacramento, California.

Tejon Ranch Company. Derek Abbott, Vice President, Community Development and Resource Planning.

Tejon Ranch Company. Grapevine Project Assessor Parcel Numbers and Property Tax Bills.

The HdL Companies, *Sales Tax Allocation Totals, Calendar Year 2013.*

U.S. Census Bureau. 2011. *OnTheMap* Application and LEHD Origin-Destination Employment Statistics.

A PRICING AND DETAILED PLANNING AREA DESCRIPTIONS

Table A-1
Recommended Residential Pricing
(In Constant 2015 Dollars)

Phase	Price per Unit	Number of Annual Sales	Total Valuation
A. START-UP/EARLY			
Cluster/Attached Only			
Courtyard Homes	$220,000	24	$5,280,000
SFD Only			
50' Lots	$260,000	72	$18,720,000
65' Lots	$290,000	60	$17,400,000
75' Lots	$320,000	48	$15,360,000
Ranchettes	$400,000	18	$7,200,000
Start-Up/Early SFD Subtotal		198	$58,680,000
Start-Up/Early SFD Weighted Average			*$296,000*
Start-Up/Early - All Units		222	$63,960,000
Start-Up/Early Weighted Average per Unit			*$288,000*
B. MID			
Cluster/Attached Only			
Live/Work Lofts	$210,000	18	$3,780,000
Townhomes	$200,000	24	$4,800,000
Courtyard Homes	$220,000	36	$7,920,000
MID Cluster/Attached Subtotal		78	$16,500,000
MID Cluster/Attached Weighted Average			*$212,000*
SFD Only			
50' Lots	$260,000	72	$18,720,000
60' Lots	$290,000	60	$17,400,000
65' Lots	$320,000	48	$15,360,000
75' Lots	$360,000	32	$11,520,000
90' Lots	$400,000	32	$12,800,000
Ranchettes	$460,000	18	$8,280,000
Ranch Homes	$540,000	12	$6,480,000
MID SFD Subtotal		274	$90,560,000
MID SFD Weighted Average			*$331,000*
MID - All Units		352	$107,060,000
MID Weighted Average per Unit			*$304,000*
C. MATURE			
Cluster/Attached Only			
Garden Apartments [1]	$150,000	90	$13,500,000
Garden Flats	$180,000	60	$10,800,000
Live/Work Lofts	$210,000	18	$3,780,000
Townhomes	$200,000	24	$4,800,000
Courtyard Homes	$220,000	36	$7,920,000
Village Homes	$240,000	36	$8,640,000
Mature Cluster/Attached Subtotal		264	$49,440,000
Mature Cluster/Attached Weighted Average			*$187,000*
SFD Only			
45' Lots	$260,000	72	$18,720,000
50' Lots	$290,000	80	$23,200,000
65' Lots	$320,000	48	$15,360,000
75' Lots	$360,000	32	$11,520,000
90' Lots	$400,000	32	$12,800,000
100' Lots	$460,000	32	$14,720,000
Ranch Cottages	$340,000	18	$6,120,000
Ranchettes	$500,000	24	$12,000,000
Ranch Homes	$560,000	24	$13,440,000
Mature SFD Subtotal		362	$127,880,000
Mature SFD Weighted Average			*$353,000*
Mature Total - All Units		626	$177,320,000
Mature - All Weighted Average			*$283,000*

All Units		Number of Annual Sales	Total Valuation
ALL Cluster/Attached		366	$71,220,000
ALL Cluster/Attached Weighted Average			***$195,000***
ALL SFD		834	$277,120,000
ALL SFD Weighted Average			***$332,000***
ALL UNITS		1,200	$348,340,000
ALL Weighted Average			***$290,000***

Note: 1. Garden apartment value is calculated based on rent of $1,250 per month with a capitalization rate of 10 percent.

Source: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, 3/26/2014*
Real Estate Economics

Table A-2
Residential Development Descriptions by Planning Areas
(In Constant 2015 Dollars)

Category	Total Acres, Total Units, PPH Factor, Value Factor	Planning Areas 6a	2	1	3	4
RESIDENTIAL DEVELOPMENT						
Acres						
Single Family Detached	2,234	149	455	321	302	472
Multi-Family Attached	359	75	98	23	73	57
Total Residential Acres	2,593	224	553	344	375	529
Units						
Single Family Detached	8,410	585	1,780	1,250	1,180	1,850
Multi-Family Attached	3,590	750	980	230	730	570
Total Units	12,000	1,335	2,760	1,480	1,910	2,420
Population	Persons per Household					
Single Family Detached	3.20	1,872	5,696	4,000	3,776	5,920
Multi-Family Attached	3.20	2,400	3,136	736	2,336	1,824
Total Population		4,272	8,832	4,736	6,112	7,744
Residential Valuation	Valuation per Unit					
Single Family Detached	$332,000	$194,220,000	$590,960,000	$415,000,000	$391,760,000	$614,200,000
Multi-Family Attached	$195,000	$146,250,000	$191,100,000	$44,850,000	$142,350,000	$111,150,000
Total Residential Valuation		$340,470,000	$782,060,000	$459,850,000	$534,110,000	$725,350,000

Category	Total Acres, Total Units, PPH Factor, Value Factor	Planning Areas 5a	5b	6b	6c	6d	6e	Total Grapevine Project
RESIDENTIAL DEVELOPMENT								
Acres								
Single Family Detached	2,234	442	93	0	0	0	0	2,234
Multi-Family Attached	359	33	0	0	0	0	0	359
Total Residential Acres	2,593	475	93	0	0	0	0	2,593
Units								
Single Family Detached	8,410	1,730	35	0	0	0	0	8,410
Multi-Family Attached	3,590	330	0	0	0	0	0	3,590
Total Units	12,000	2,060	35	0	0	0	0	12,000
Population	Persons per Household							
Single Family Detached	3.20	5,536	112	0	0	0	0	26,912
Multi-Family Attached	3.20	1,056	0	0	0	0	0	11,488
Total Population		6,592	112	0	0	0	0	38,400
Residential Valuation	Valuation per Unit							
Single Family Detached	$332,000	$574,360,000	$11,620,000	$0	$0	$0	$0	$2,792,120,000
Multi-Family Attached	$195,000	$64,350,000	$0	$0	$0	$0	$0	$700,050,000
Total Residential Valuation		$638,710,000	$11,620,000	$0	$0	$0	$0	$3,492,170,000

Source: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*

Table A-3 (page 1 of 2)
Commercial Acres and Square Feet by Planning Areas

Category	Total Acres, Acres Square Feet	Planning Areas 6a	2	1	3	4
COMMERCIAL DEVELOPMENT						
Acres						
Village Center (VC):						
VC Retail	59	11	20	33	11	8
VC Office	46	9	15	26	9	7
Total VC Commercial	104	20	35	59	20	15
Office/R&D	204	21	46	68	69	0
Freeway Oriented:						
Freeway	74	0	9	0	63	0
Hotels	14	0	7	0	7	0
Regional	40	0	6	0	36	0
Total Freeway Oriented	128	0	22	0	106	0
Light Industrial/Warehouse:						
Light Industrial/Warehouse	81	81	0	0	0	0
Community College	28	28	0	0	0	0
Total Light Industrial/Warehouse	109	109				
Total Commercial Acres	464	69	103	127	195	15
Square Feet						
Village Center (VC):						
VC Retail	450,000	84,000	152,000	28,000	96,000	67,500
VC Office	350,000	66,000	118,000	22,000	74,000	52,500
Total VC Commercial	800,000	150,000	270,000	50,000	170,000	120,000
Office/R&D:						
Medical Office	300,000	0	300,000	0	0	0
Office/R&D	1,800,000	270,000	480,000	400,000	650,000	0
Office/R&D	2,100,000	270,000	780,000	400,000	650,000	0
Freeway Oriented:						
Freeway	409,000	0	89,000	0	320,000	0
Lodging	116,000	0	58,000	0	58,000	0
Regional	225,000	0	63,000	0	162,000	0
Total Freeway Oriented	750,000	0	210,000	0	540,000	0
Light Industrial/Warehouse:						
Light Industrial/Warehouse	1,100,000	1,050,000	0	0	0	0
Community College	350,000	350,000	0	0	0	0
Total Light Industrial/Warehouse	1,450,000	1,400,000	0	0	0	0
Total Square Feet	5,100,000	1,820,000	1,260,000	450,000	1,360,000	120,000

Table A-3 (page 2 of 2)
Commercial Acres and Square Feet by Planning Areas

Category	Total Acres, Acres Square Feet	Planning Areas						Total Grapevine Project
		5a	5b	6b	6c	6d	6e	
COMMERCIAL DEVELOPMENT								
Acres								
Village Center (VC):								
VC Retail	59	3	0	0	0	0	0	86
VC Office	46	2	0	0	0	0	0	68
Total VC Commercial	104	5	0	0	0	0	0	154
Office/R&D	204	0	0	0	0	0	0	204
Freeway Oriented:								
Freeway	74	0	0	0	0	0	0	72
Hotels	14	0	0	0	0	0	0	14
Regional	40	0	0	0	0	0	0	42
Total Freeway Oriented	128	0	0	0	0	0	0	128
Light Industrial/Warehouse:								
Light Industrial/Warehouse	81	149	75	20	21	0	109	455
Community College	28	0	0	0	0	0	0	28
Total Light Industrial/Warehouse	109							483
Total Commercial Acres	464	5	0	0	0	0	0	514
Square Feet								
Village Center (VC):								
VC Retail	450,000	22,500	0	0	0	0	0	450,000
VC Office	350,000	17,500	0	0	0	0	0	350,000
Total VC Commercial	800,000	40,000	0	0	0	0	0	800,000
Office/R&D:								
Medical Office	300,000	0	0	0	0	0	0	300,000
Office/R&D	1,800,000	0	0	0	0	0	0	1,800,000
Office/R&D	2,100,000	0	0	0	0	0	0	2,100,000
Freeway Oriented:								
Freeway	409,000	0	0	0	0	0	0	409,000
Lodging	116,000	0	0	0	0	0	0	116,000
Regional	225,000	0	0	0	0	0	0	225,000
Total Freeway Oriented	750,000	0	0	0	0	0	0	750,000
Light Industrial/Warehouse:								
Light Industrial/Warehouse	1,100,000	0	0	50,000	0	0	0	1,100,000
Community College	350,000	0	0	0	0	0	0	350,000
Total Light Industrial/Warehouse	1,450,000	0	0	50,000	0	0	0	1,450,000
Total Square Feet	5,100,000	40,000	0	50,000	0	0	0	5,100,000

Source: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*

Table A-4 (page 1 of 2)
Employment and Commercial Valuation by Planning Areas
(In Constant 2015 Dollars)

Category	Employment and Value Factors	Planning Areas 6a	2	1	3	4
COMMERCIAL DEVELOPMENT						
Employment	**Square Feet per Employee**					
Village Center (VC):						
VC Retail	500	170	300	60	190	135
VC Office	250	260	470	90	300	210
Total VC Commercial		430	770	150	490	345
Office/R&D:						
Medical Office	750	0	400	0	0	0
Office/R&D	500	540	960	800	1,300	0
Office/R&D		540	1,360	800	1,300	0
Freeway Oriented:						
Freeway	500	0	180	0	640	0
Lodging	387	0	150	0	150	0
Regional	500	0	126	0	324	0
Total Freeway Oriented		0	456	0	1,114	0
Light Industrial/Warehouse	1,500	700	0	0	0	0
Community College	3,000	120	0	0	0	0
Total		1,790	2,586	950	2,904	345
Commercial Valuation	**Value per Square Foot**					
Village Center (VC):						
VC Retail	$250	$21,000,000	$38,000,000	$7,000,000	$24,000,000	$16,875,000
VC Office	$230	15,180,000	27,140,000	5,060,000	17,020,000	12,075,000
Total VC Commercial		$36,180,000	$65,140,000	$12,060,000	$41,020,000	$28,950,000
Office/R&D:						
Medical Office	$230	$0	$69,000,000	$0	$0	$0
Office/R&D	$230	62,100,000	110,400,000	92,000,000	149,500,000	0
Office/R&D		$62,100,000	$179,400,000	$92,000,000	$149,500,000	$0
Freeway Oriented:						
Freeway	$250	$0	$22,250,000	$0	$80,000,000	$0
Lodging	$200	0	11,600,000	0	11,600,000	0
Regional	$250	0	15,750,000	0	40,500,000	0
Total Freeway Oriented		$0	$49,600,000	$0	$132,100,000	$0
Light Industrial/Warehouse	$70	$73,500,000	$0	$0	$0	$0
Total Commercial Valuation		$171,780,000	$294,140,000	$104,060,000	$322,620,000	$28,950,000

Table A-4 (page 2 of 2)
Employment and Commercial Valuation by Planning Areas
(In Constant 2015 Dollars)

Category	Employment and Value Factors	Planning Areas 5a	5b	6b	6c	6d	6e	Total Grapevine Project
COMMERCIAL DEVELOPMENT								
Employment	Square Feet per Employee							
Village Center (VC):								
VC Retail	500	45	0	0	0	0	0	900
VC Office	250	70	0	0	0	0	0	1,400
Total VC Commercial		115	0	0	0	0	0	2,300
Office/R&D:								
Medical Office	750	0	0	0	0	0	0	400
Office/R&D	500	0	0	0	0	0	0	3,600
Office/R&D		0	0	0	0	0	0	4,000
Freeway Oriented:								
Freeway	500	0	0	0	0	0	0	820
Lodging	387	0	0	0	0	0	0	300
Regional	500	0	0	0	0	0	0	450
Total Freeway Oriented		0	0	0	0	0	0	1,570
Light Industrial/Warehouse	1,500	0	0	30	0	0	0	730
Community College	3,000	0	0	0	0	0	0	120
Total		115	0	30	0	0	0	8,720
Commercial Valuation	Value per Square Foot							
Village Center (VC):								
VC Retail	$250	$5,625,000	$0	$0	$0	$0	$0	$112,500,000
VC Office	$230	4,025,000	0	0	0	0	0	80,500,000
Total VC Commercial		$9,650,000	$0	$0	$0	$0	$0	$193,000,000
Office/R&D:								
Medical Office	$230	$0	$0	$0	$0	$0	$0	$69,000,000
Office/R&D	$230	0	0	0	0	0	0	414,000,000
Office/R&D		$0	$0	$0	$0	$0	$0	$483,000,000
Freeway Oriented:								
Freeway	$250	$0	$0	$0	$0	$0	$0	$102,250,000
Lodging	$200	0	0	0	0	0	0	23,200,000
Regional	$250	0	0	0	0	0	0	56,250,000
Total Freeway Oriented		$0	$0	$0	$0	$0	$0	$181,700,000
Light Industrial/Warehouse	$70	$0	$0	$3,500,000	$0	$0	$0	$77,000,000
Total Commercial Valuation		$9,650,000	$0	$3,500,000	$0	$0	$0	$934,700,000

Source: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*

Grapevine Project
Fiscal and Economic Analysis

Table A-5 (page 1 of 2)
Projected Sales and Use Tax by Planning Areas
(In Constant 2015 Dollars)

Category	Taxable Sales per Square Foot	Planning Areas 6a	2	1	3	4
TOTAL SALES AND USE TAX						
Square Feet						
Village Center (VC):						
VC Retail		84,000	152,000	28,000	96,000	67,500
VC Office		66,000	118,000	22,000	74,000	52,500
Total VC Commercial		150,000	270,000	50,000	170,000	120,000
Office/R&D:						
Medical Office		0	300,000	0	0	0
Office/R&D		270,000	480,000	400,000	650,000	0
Office/R&D		270,000	780,000	400,000	650,000	0
Freeway Oriented:						
Freeway		0	89,000	0	320,000	0
Lodging		0	58,000	0	58,000	0
Regional		0	63,000	0	162,000	0
Total Freeway Oriented		0	210,000	0	540,000	0
Light Industrial/Warehouse		1,050,000	0	0	0	0
Total Square Feet		1,820,000	1,260,000	450,000	1,360,000	120,000
Taxable Sales						
Village Center (VC):						
VC Retail	$200	$16,800,000	$30,400,000	$5,600,000	$19,200,000	$13,500,000
VC Office	$0	0	0	0	0	0
Total VC Commercial		$16,800,000	$30,400,000	$5,600,000	$19,200,000	$13,500,000
Office/R&D:						
Medical Office	$0	$0	$0	$0	$0	$0
Office/R&D	$0	0	0	0	0	0
Office/R&D		$0	$0	$0	$0	$0
Freeway Oriented:						
Freeway	$600	$0	$53,400,000	$0	$192,000,000	$0
Lodging	$0	0	0	0	0	0
Regional	$400	0	25,200,000	0	64,800,000	0
Total Freeway Oriented		$0	$78,600,000	$0	$256,800,000	$0
Light Industrial/Warehouse	$15	$15,750,000	$0	$0	$0	$0
Total Taxable Sales		$32,550,000	$109,000,000	$5,600,000	$276,000,000	$13,500,000
Sales and Use Tax						
Projected Sales Tax @ 1% of Taxable Sales		$325,500	$1,090,000	$56,000	$2,760,000	$135,000
Projected Use Tax @ 11.8% of Sales Tax		38,409	128,620	6,608	325,680	15,930
Total Projected Sales and Use Tax		$363,909	$1,218,620	$62,608	$3,085,680	$150,930

Table A-5 (page 2 of 2)
Projected Sales and Use Tax by Planning Areas
(In Constant 2015 Dollars)

Category	Taxable Sales per Square Foot	Planning Areas 5a	5b	6b	6c	6d	6e	Total Grapevine Project
TOTAL SALES AND USE TAX								
Square Feet								
Village Center (VC):								
VC Retail		22,500	0	0	0	0	0	450,000
VC Office		17,500	0	0	0	0	0	350,000
Total VC Commercial		40,000	0	0	0	0	0	800,000
Office/R&D:								
Medical Office		0	0	0	0	0	0	300,000
Office/R&D		0	0	0	0	0	0	1,800,000
Office/R&D		0	0	0	0	0	0	2,100,000
Freeway Oriented:								
Freeway		0	0	0	0	0	0	409,000
Lodging		0	0	0	0	0	0	116,000
Regional		0	0	0	0	0	0	225,000
Total Freeway Oriented		0	0	0	0	0	0	750,000
Light Industrial/Warehouse		0	0	50,000	0	0	0	1,100,000
Total Square Feet		40,000	0	50,000	0	0	0	5,100,000
Taxable Sales								
Village Center (VC):								
VC Retail	$200	$4,500,000	$0	$0	$0	$0	$0	$90,000,000
VC Office	$0	0	0	0	0	0	0	0
Total VC Commercial		$4,500,000	$0	$0	$0	$0	$0	$90,000,000
Office/R&D:								
Medical Office	$0	$0	$0	$0	$0	$0	$0	$0
Office/R&D	$0	0	0	0	0	0	0	0
Office/R&D		$0	$0	$0	$0	$0	$0	$0
Freeway Oriented:								
Freeway	$600	$0	$0	$0	$0	$0	$0	$245,400,000
Lodging	$0	0	0	0	0	0	0	0
Regional	$400	0	0	0	0	0	0	90,000,000
Total Freeway Oriented		$0	$0	$0	$0	$0	$0	$335,400,000
Light Industrial/Warehouse	$15	$0	$0	$750,000	$0	$0	$0	$16,500,000
Total Taxable Sales		$4,500,000	$0	$750,000	$0	$0	$0	$441,900,000
Sales and Use Tax								
Projected Sales Tax @ 1% of Taxable Sales		$45,000	$0	$7,500	$0	$0	$0	$4,419,000
Projected Use Tax @ 11.8% of Sales Tax		5,310	0	885	0	0	0	521,442
Total Projected Sales and Use Tax		$50,310	$0	$8,385	$0	$0	$0	$4,940,442

Source: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*

Table A-6 (page 1 of 2)
Projected Property Tax and Property Tax in Lieu of VLF by Planning Areas
(In Constant 2015 Dollars)

Category	Property Tax Allocation Factor	Planning Areas 6a	2	1	3	4
TOTAL PROJECTED PROPERTY TAX						
Total Valuation						
Residential		$340,470,000	$782,060,000	$459,850,000	$534,110,000	$725,350,000
Commercial		$171,780,000	$294,140,000	$104,060,000	$322,620,000	$28,950,000
Total Valuation		$512,250,000	$1,076,200,000	$563,910,000	$856,730,000	$754,300,000
times						
Property Tax Levy	1%					
Residential		$3,404,700	$7,820,600	$4,598,500	$5,341,100	$7,253,500
Commercial		$1,717,800	$2,941,400	$1,040,600	$3,226,200	$289,500
Total 1% Property Tax Levy		$5,122,500	$10,762,000	$5,639,100	$8,567,300	$7,543,000
times						
General Fund Allocation	21.16%					
Residential		$720,381	$1,654,716	$972,970	$1,130,093	$1,534,726
Commercial		$363,459	$622,354	$220,175	$682,613	$61,254
Total General Fund		$1,083,840	$2,277,070	$1,193,145	$1,812,706	$1,595,980
County Fire Department	11.20%					
Residential		$381,193	$875,601	$514,852	$597,994	$812,108
Commercial		$192,326	$329,322	$116,506	$361,208	$32,413
Total Fire Department		$573,519	$1,204,923	$631,358	$959,202	$844,521
TOTAL PROPERTY TAX IN LIEU OF VEHICLE LICENSE FEE (VLF)						
Total Valuation		$512,250,000	$1,076,200,000	$563,910,000	$856,730,000	$754,300,000
divided by						
$1,000,000		$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
equals						
Valuation in Millions		$512	$1,076	$564	$857	$754
times						
Property Tax In Lieu VLF Factor		$1,311	$1,311	$1,311	$1,311	$1,311
equals						
Property Tax In Lieu VLF		$671,560	$1,410,898	$739,286	$1,123,173	$988,887

Table A-6 (page 2 of 2)
Projected Property Tax and Property Tax in Lieu of VLF by Planning Areas
(In Constant 2015 Dollars)

Category	Property Tax Allocation Factor	Planning Areas 5a	5b	6b	6c	6d	6e	Total Grapevine Project
TOTAL PROJECTED PROPERTY TAX								
Total Valuation								
Residential		$638,710,000	$11,620,000	$0	$0	$0	$0	$3,492,170,000
Commercial		$9,650,000	$0	$3,500,000	$0	$0	$0	$934,700,000
Total Valuation		$648,360,000	$11,620,000	$3,500,000	$0	$0	$0	$4,426,870,000
times								
Property Tax Levy	1%							
Residential		$6,387,100	$116,200	$0	$0	$0	$0	$34,921,700
Commercial		$96,500	$0	$35,000	$0	$0	$0	$9,347,000
Total 1% Property Tax Levy		$6,483,600	$116,200	$35,000	$0	$0	$0	$44,268,700
times								
General Fund Allocation	21.16%							
Residential		$1,351,410	$24,586	$0	$0	$0	$0	$7,388,881
Commercial		$20,418	$0	$7,405	$0	$0	$0	$1,977,678
Total General Fund		$1,371,828	$24,586	$7,405	$0	$0	$0	$9,366,560
County Fire Department	11.20%							
Residential		$715,105	$13,010	$0	$0	$0	$0	$3,909,863
Commercial		$10,804	$0	$3,919	$0	$0	$0	$1,046,498
Total Fire Department		$725,909	$13,010	$3,919	$0	$0	$0	$4,956,361
TOTAL PROPERTY TAX IN LIEU OF VEHICLE LICENSE FEE (VLF)								
Total Valuation		$648,360,000	$11,620,000	$3,500,000	$0	$0	$0	$4,426,870,000
divided by								
$1,000,000		$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	
equals								
Valuation in Millions		$648	$12	$4	$0	$0	$0	$4,427
times								
Property Tax In Lieu VLF Factor		$1,311	$1,311	$1,311	$1,311	$1,311	$1,311	$1,311
equals								
Property Tax In Lieu VLF		$850,000	$15,234	$4,589	$0	$0	$0	$5,803,627

Source: KenKay Associates, *Land Use Program Summary, Grapevine at Tejon Ranch, June 24, 2015*
Kern County Auditor-Controller's Office, *Modified Annual Tax Increment Ratios (AF49), FY 2014-2015*

Table A-7 (page 1 of 2)
Fiscal Year 2014-2015 Assessed Valuation and Property Tax
(In Constant 2015 Dollars)

A. EXISTING ASSESSED VALUATION

Tax Rate Area	Assessor Parcel Number (APN)	Land Value	Improvement Value	Total Value
054-001	**241-190-25**	**$52,981**	**$0**	**$52,981**
084-030	**241-270-24**	**$275,131**	**$0**	**$275,131**
118-005	**241-240-22**	**$11,967**	**$0**	**$11,967**
118-008	238-390-06	$859,195	$346,698	$1,205,893
118-008	238-390-14	$228,475	$1,257,173	$1,485,648
118-008	238-390-75	$75,658	$0	$75,658
118-008	238-390-76	$2,207	$0	$2,207
118-008	241-350-01	$38,175	$3,260	$41,435
118-008	241-350-02	$18,593	$0	$18,593
118-008	241-350-03	$22,254	$0	$22,254
Subtotal 118-008		**$1,244,557**	**$1,607,131**	**$2,851,688**
118-023	241-240-08	$59,351	$0	$59,351
118-023	241-240-18	$53,365	$0	$53,365
118-023	241-240-20	$21,247	$0	$21,247
118-023	241-250-04	$59,351	$0	$59,351
118-023	241-250-06	$152,898	$11,327	$164,225
118-023	241-250-22	$684,616	$452,120	$1,136,736
Subtotal 118-023		**$1,030,828**	**$463,447**	**$1,494,275**
118-024	241-230-28	$14,703	$0	$14,703
118-024	241-230-34	$133,895	$440,455	$574,350
118-024	241-230-39	$1,484	$0	$1,484
118-024	241-240-14	$1,092	$0	$1,092
118-024	241-240-15	$704	$0	$704
118-024	241-250-01	$439,573	$0	$439,573
118-024	241-250-18	$589,821	$0	$589,821
118-024	241-280-03	$171,201	$0	$171,201
118-024	241-280-04	$199,091	$0	$199,091
118-024	241-280-05	$150,079	$0	$150,079
118-024	241-280-06	$238,905	$0	$238,905
118-024	241-280-08	$212,639	$790,533	$1,003,172
118-024	241-280-10	$199,091	$705,524	$904,615
118-024	241-320-06	$3,647	$0	$3,647
118-024	241-320-07	$9,963	$40,136	$50,099
118-024	241-320-09	$4,123	$121,380	$125,503
118-024	241-320-10	$4,133	$0	$4,133

Table A-7 (page 2 of 2)
Fiscal Year 2013-2014 Assessed Valuation and Property Tax
(In Constant 2015 Dollars)

A. EXISTING ASSESSED VALUATION

Tax Rate Area	Assessor Parcel Number (APN)	Land Value	Improvement Value	Total Value
118-024	241-320-10	$4,133	$0	$4,133
118-024	241-320-11	$2,954	$0	$2,954
118-024	241-320-12	$8,373	$0	$8,373
118-024	241-320-13	$7,458	$0	$7,458
118-024	241-320-14	$14,236	$0	$14,236
118-024	241-320-15	$25,222	$0	$25,222
118-024	241-320-16	$25,857	$0	$25,857
118-024	241-320-17	$8,155	$0	$8,155
118-024	241-320-18	$8,125	$0	$8,125
118-024	241-320-19	$10,805	$0	$10,805
118-024	241-320-20	$8,100	$0	$8,100
118-024	241-320-21	$10,350	$0	$10,350
Subtotal 118-024		**$2,503,779**	**$2,098,028**	**$4,601,807**
118-026	241-370-04	$159,964	$576,903	$736,867
118-026	241-370-05	$170,565	$0	$170,565
118-026	241-370-06	$115,345	$15,409	$130,754
118-026	241-370-07	$185,947	$0	$185,947
118-026	241-370-08	$74,998	$0	$74,998
118-026	241-370-09	$74,636	$0	$74,636
118-026	241-370-14	$19,866	$0	$19,866
118-026	241-370-17	$336,402	$393,536	$729,938
118-026	241-370-18	$24,747	$0	$24,747
118-026	241-380-10	$100,354	$94,132	$194,486
118-026	241-390-01	$14,197	$1,122	$15,319
Subtotal 118-026		**$1,277,021**	**$1,081,102**	**$2,358,123**
	Total	**$6,396,264**	**$5,249,708**	**$11,645,972**

B. ESTIMATION OF TOTAL EXISTING PROPERTY TAX

Total Property Tax @ 1% of Total Assessed Valuation	$116,460
General Fund @ 21.2 Percent of 1% Property Tax	$24,641
Fire Fund @ 11.2 Percent of 1% Property Tax	$13,039

Source: Kern County Treasurer and Tax Collector, *2014-2015 Secured Property Tax Bill*

Table A-8
Tax Rate Area (TRA) Allocations

A. ALL COUNTY FUNDS

Description of Fund	TRA 054-001	TRA 084-030	TRA 118-005	TRA 118-008	TRA 118-023	TRA 118-024	TRA 118-026	Weighted Average [1]
Kern County General Fund	0.194011	0.212947	0.212947	0.211294	0.212947	0.212947	0.209672	0.211584
County Advertising	0.000700	0.000769	0.000769	0.000763	0.000769	0.000738	0.000757	0.000752
Kern County Fire Fund	0.102661	0.112682	0.112682	0.111807	0.112682	0.112682	0.110951	0.111961
South Kern Cemetery	0.004659	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000230
Southwest Hospital	0.000000	0.007785	0.000000	0.000000	0.007785	0.007785	0.007665	0.006565
Westside Health Center	0.000000	0.000000	0.007785	0.000000	0.000000	0.000000	0.000000	0.000103
Bear Mountain Recreation and Park	0.026276	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.001296
Kern Vector Control	0.000000	0.000000	0.000000	0.009548	0.000000	0.000000	0.009475	0.001684
Kern County Water Agency	0.006974	0.007654	0.007654	0.007595	0.007654	0.007654	0.007537	0.007605
Arvin Union School District	0.225774	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.011136
El Tejon Unified School District	0.000000	0.436890	0.000000	0.000000	0.000000	0.000000	0.000000	0.023491
General Shafter School District	0.000000	0.000000	0.215741	0.214066	0.215741	0.215741	0.212426	0.193065
Kern Joint Union High School	0.219538	0.000000	0.221149	0.219432	0.221149	0.221149	0.217750	0.208733
Kern Joint Community College	0.065709	0.072123	0.072123	0.071563	0.072123	0.072123	0.071015	0.071661
Education	0.021296	0.023375	0.023375	0.023195	0.023375	0.023375	0.023018	0.023226
ERAF	0.132402	0.125775	0.125775	0.130737	0.125775	0.125805	0.129734	0.126907
Total	1.000000	1.000000	1.000000	1.000000	1.000001	1.000000	1.000000	1.000000

B. ACRES BY TRA	TRA 054-001	TRA 084-030	TRA 118-005	TRA 118-008	TRA 118-023	TRA 118-024	TRA 118-026	Total
Acres	475	517	127	894	3,124	3,675	809	9,622
Share of Total	4.9%	5.4%	1.3%	9.3%	32.5%	38.2%	8.4%	100.0%

C. COUNTY FUNDS ANALYZED IN THE FISCAL ANALYSIS [2]

Description of Fund	TRA 054-001	TRA 084-030	TRA 118-005	TRA 118-008	TRA 118-023	TRA 118-024	TRA 118-026	Weighted Average [1]
Kern County General Fund	0.194011000	0.212947000	0.212947000	0.211294000	0.212947400	0.212947400	0.209672000	0.211584255
Kern County Fire Fund	0.102661000	0.112682000	0.112682000	0.111807000	0.112682000	0.112682000	0.110951000	0.111960840

Note: 1. The weighted average is based on the acres in each TRA as a share of the total acres.

2. The property tax allocations for the funds analyzed in this report are presented in Panel C of this table.

Source: Kern County Auditor-Controller's Office, *Modified Annual Tax Increment Ratios (AF49), FY 2014-2015*

Table A-9 (page 1 of 2)
Projected Road Fund Revenues by Planning Areas [1]
(In Constant 2015 Dollars)

Category	State Gasoline Tax Factors	Planning Areas 6a	2	1	3	4
A. ASSUMPTIONS FOR PROJECTING ROAD FUND REVENUES						
Population		4,272	8,832	4,736	6,112	7,744
	Vehicles per Capita					
Estimated Registered Vehicles	0.81	3,460	7,154	3,836	4,951	6,273
Estimated Lineal Miles		11	23	14	16	19
Total Valuation		$512,250,000	$1,076,200,000	$563,910,000	$856,730,000	$754,300,000
B. PROJECTED ROAD FUND REVENUES						
Projected State Gasoline Tax						
Section 2103	**Amount per Vehicle**					
	$12.57	$43,492	$89,926	$48,219	$62,234	$78,852
	Amount per Lineal Mile					
	$893.90	$9,988	$20,113	$12,090	$14,642	$16,725
Total Section 2103		**$53,480**	**$110,039**	**$60,309**	**$76,876**	**$95,576**
Section 2104	**Amount per Vehicle**					
	$6.80	$23,528	$48,647	$26,085	$33,667	$42,656
	Amount per Lineal Mile					
	$483.55	$5,403	$10,880	$6,540	$7,921	$9,047
Total Section 2104		**$28,931**	**$59,527**	**$32,625**	**$41,587**	**$51,704**
Section 2105	**Amount per Capita**					
Section 2105	$6.28	**$26,828**	**$55,465**	**$29,742**	**$38,383**	**$48,632**
Section 2106	**Amount per Million AV**					
Section 2106	$28.61	**$14,655**	**$30,790**	**$16,133**	**$24,511**	**$21,581**
Total State Gasoline Tax		**$123,894**	**$255,821**	**$138,809**	**$181,358**	**$217,493**
General Fund Contribution						
	Amount per Capita					
	$5.78	$24,693	$51,051	$27,375	$35,329	$44,762
	Amount per Employee					
	$3.76	$6,739	$9,735	$3,576	$10,932	$1,299
Total General Fund Contribution		**$31,432**	**$60,787**	**$30,952**	**$46,261**	**$46,061**
TOTAL ROAD FUND REVENUES		**$148,587**	**$306,872**	**$166,184**	**$216,687**	**$262,255**

Table A-9 (page 2 of 2)
Projected Road Fund Revenues by Planning Areas
(In Constant 2015 Dollars)

Category	State Gasoline Tax Factors	Planning Areas 5a	5b	6b	6c	6d	6e	Total Grapevine Project
A. ASSUMPTIONS FOR PROJECTING ROAD FUND REVENUES								
Population		6,592	112	0	0	0	0	38,400
	Vehicles per Capita							
Estimated Registered Vehicles	0.81	5,340	91	0	0	0	0	31,105
Estimated Lineal Miles		17	3	3	0	0	0	106
Total Valuation		$648,360,000	$11,620,000	$3,500,000	$0	$0	$0	$4,426,870,000
B. PROJECTED ROAD FUND REVENUES								
Projected State Gasoline Tax								
Section 2103	**Amount per Vehicle**							
	$12.57	$67,124	$1,144	$0	$0	$0	$0	$390,990
	Amount per Lineal Mile							
	$893.90	$15,251	$3,043	$2,682	$0	$0	$0	$94,534
Total Section 2103		**$82,375**	**$4,187**	**$2,682**	**$0**	**$0**	**$0**	**$485,523**
Section 2104	**Amount per Vehicle**							
	$6.80	$36,312	$619	$0	$0	$0	$0	$211,514
	Amount per Lineal Mile							
	$483.55	$8,250	$1,646	$1,451	$0	$0	$0	$51,137
Total Section 2104		**$44,562**	**$2,265**	**$1,451**	**$0**	**$0**	**$0**	**$262,651**
Section 2105	**Amount per Capita**							
Section 2105	$6.28	**$41,398**	**$703**	**$0**	**$0**	**$0**	**$0**	**$241,152**
Section 2106	**Amount per Million AV**							
Section 2106	$28.61	**$18,550**	**$332**	**$100**	**$0**	**$0**	**$0**	**$126,653**
Total State Gasoline Tax		**$186,885**	**$7,488**	**$4,232**	**$0**	**$0**	**$0**	**$1,115,980**
General Fund Contribution								
	Amount per Capita							
	$5.78	$38,104	$647	$0	$0	$0	$0	$221,962
	Amount per Employee							
	$3.76	$433	$0	$113	$0	$0	$0	$32,827
Total General Fund Contribution		**$38,536**	**$647**	**$113**	**$0**	**$0**	**$0**	**$254,789**
TOTAL ROAD FUND REVENUES		**$224,989**	**$8,135**	**$4,232**	**$0**	**$0**	**$0**	**$1,370,769**

Note: 1. The calculation of the factor of 0.81 vehicles per capita is presented in Appendix Table B-4. The calculation of all other factors for projecting Road Fund revenues are included in Table 5-6.

Sources: County of Kern, *Fiscal Year 2015-2016 Recommended Budget*
State of California, Department of Finance, *E-5 Population and Housing Estimates for Cities, Counties and the State - January 1, 2011-2015,* Sacramento, California, May 2015
California State Controller's Office, *Highway User Tax - Counties Fiscal Year 2014-2015 Total Payments* , www.sco.ca.gov
California State Controller's Office, *Highway Users Tax -Remittance Advice, Kern County,, July 30, 2015* , www.sco.ca.gov
County of Kern, Auditor Controller-County Clerk, *Tax Rates & Assessed Valuations, 2014-2015*

B FISCAL ASSUMPTIONS SUPPORTING TABLES

Table B-1 (page 1 of 2)
General Fund Detail of Fiscal Year 2015-2016 Net County Costs
(In Constant 2015 Dollars)

Budget Unit and Department		FY 2015-2016 Recommended Net General Fund Costs
GENERAL GOVERNMENT		
Board of Supervisors - District 1		$588,964
Board of Supervisors - District 2		539,913
Board of Supervisors - District 3		553,785
Board of Supervisors - District 4		595,918
Board of Supervisors - District 5		540,261
Administrative Office		3,967,116
Clerk of The Board		794,593
Special Services		5,625,972
Auditor-Controller		5,694,957
Treasurer-Tax Collector		1,469,088
Assessor		9,160,643
Information Technology Service		10,535,536
County Counsel		5,003,443
Human Resources		2,957,045
Elections		3,619,930
General Services		9,601,051
Utility Payments - Division of General Services		4,419,923
Construction Services - Division of General Services		235,023
General Services - Major Maintenance		13,877,589
Board of Trade		630,956
Engineering, Surveying and Permit Services		2,191,920
Capital Projects		(180,591)
Total General Government		**$82,423,035**
PUBLIC PROTECTION		
Contribution - Trial Court Funding		$8,727,303
County Clerk		87,505
Grand Jury		289,145
Indigent Defense Services		6,220,000
District Attorney		18,409,077
Public Defender		9,832,842
District Attorney - Forensic Sciences		6,459,439
Sheriff-Coroner Courts and Countywide Detention		119,403,965
Probation		34,768,960
Contribution to Fire		0
Agriculture and Measurement Standards		1,970,920
Code Compliance		1,400,975
Development Services Agency		570,709
Planning and Community Development		3,600,730
Animal Control		5,518,332
Total Public Protection		**$217,259,902**
	minus	
Animal Control		**$5,518,332**
	minus	
Sheriff-Coroner Local Protection		**$59,701,983**
	equals	
Other Countywide Public Protection		**$152,039,587**

Table B-1 (page 2 of 2)
General Fund Detail of Fiscal Year 2015-2016 Net County Costs
(In Constant 2015 Dollars)

Budget Unit and Department	FY 2015-2016 Recommended Net General Fund Costs
PUBLIC WAYS AND FACILITIES	
Contribution to Roads	$0
Contribution to Public Works - Public Ways	$6,316,848
Contribution to Airports	278,753
Total Public Ways and Facilities	**$6,595,601**
HEALTH AND SANITATION	
Public Health	$6,382,814
Environmental Health	0
Contribution to Mental Health	1,078,813
Emergency Medical Services	240,506
KMC - County Contribution	35,280,465
California Children Services	458,618
Total Health and Sanitation	**$43,441,216**
PUBLIC ASSISTANCE	
Human Services - County Contribution	$34,451,420
Veterans Service	1,401,516
Aging and Adult - County Contribution	808,636
Total Public Assistance	**$36,661,572**
EDUCATION	
Library	$7,501,706
Farm and Home Advisor	483,451
Total Education	**$7,985,157**
RECREATION AND CULTURAL SERVICES	
Parks and Recreation Department	$10,816,696
Total Recreation and Cultural Services	**$10,816,696**
DEBT SERVICE	
Debt Service - General Fund	$10,745,998
Total Debt Service	**$10,745,998**
CONTINGENCIES AND RESERVES	
General Purpose Contingencies	$7,770,110
Reserve - Tax Litigation	1,045,146
Designated - Human Services	4,000,000
Designated - Renewbiz	1,139,668
Designated - Blight Remediation	328,000
Designated - Retirement	0
Designated - Infrastructure Replacement	2,520,820
Designated - Roads Improvements	400,000
Designated - Lost Hills	125,000
Designated - KMC Working Capital	14,617,058
Designated - Information Technology Projects	0
Designated - Westarz	101,705
Designated - Jail Operations	6,000,000
Total Contingences and Reserves	**$38,047,507**
TOTAL NET GENERAL FUND COST	**$453,976,684**

Source: County of Kern, *FY 2015-2016 Recommended Budget, page 615*

Table B-2
Estimated Sheriff Patrol Service Area Population

Jurisdiction	Sheriff-Coroner Service Area Population [1] Population	Employment	Total
Population and Employment of Service Area			
Maricopa	1,169	238	1,407
Wasco	26,130	6,283	32,413
City Subtotal	27,299	6,521	33,820
Unincorporated Area	309,050	134,237	443,287
Total Service Area	336,349	140,758	**477,107**
Allocation of Population and Employment			
Service Area Population (100% Population plus 50% Employment) [2]	**336,349**	**70,379**	**406,728**
Share of Total Service Population [3]	***83%***	***17%***	

Note: 1. Based on discussion with Metro Patrol staff, the Sheriff-Coroner provides services to the unincorporated area of the County and to the cities of Maricopa and Wasco on a contract basis. Population estimates are from California Department of Finance and employment estimates are Census Bureau LEHD statistics.
2. Service area population represents the population plus employment weighted at 50 percent to account for a lower service demand from employment.
3. The shares of population and employment to the total service population is applied to budgeted revenue categories or net County cost categories to estimate the amount of costs that are applicable to population versus employment. These shares are rounded to the nearest whole percent.

Sources: Kern County Sheriff's Office, Lieutenant Dan Edgerle, Metro Patrol Section
State of California, Department of Finance, *E-5 Population and Housing Estimates for Cities, Counties and the State - January 1, 2011-2015, Sacramento, California, May 2015*
U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics

Table B-3
Estimated Animal Control Service Area Population

Jurisdiction	DOF 2015 Population	Animal Control Service Area Population [1]
Arvin	20,113	20,113
Bakersfield	369,505	369,505
California City	13,165	0
Delano	52,222	0
Maricopa	1,169	0
Mcfarland	14,037	0
Ridgecrest	28,419	0
Shafter	17,970	0
Taft	9,456	0
Tehachapi	13,028	13,028
Wasco	26,130	0
City Subtotal	565,214	402,646
Unincorporated Area	309,050	309,050
Total	874,264	**711,696**

Note: 1. The animal control service area population is based on the description of the jurisdictions served by the Animal Control Department in the County Budget Unit 2760.

Sources: County of Kern, *FY 2015-2016 Recommended Budget*
State of California, Department of Finance, *E-5 Population and Housing Estimates for Cities, Counties and the State - January 1, 2011-2015, Sacramento, California, May 2015*

Table B-4
Factor for Estimating Registered Vehicles

Category	Amount
County Registered Vehicles [1]	710,780
divided by	
Total County Population	874,264
equals	
Average Registered Vehicles per Capita [2]	**0.81**

Note: 1. County registered vehicles are for year end 2013, as reported in the State Controller's Office *Highway Users Tax 2104 -January 2014.*
2. Average registered vehicles per capita is rounded.

Sources: California State Controller's Office, *Highway Users Tax -Remittance Advice, Kern County,, July 30, 2015* , www.sco.ca.gov
State of California, Department of Finance (DOF), *E-5 City/County Population and Housing Estimates for Cities, Counties and the State, January 1, 2011-2014,* Sacramento, California, May 2014

Figure 1
Regional Location

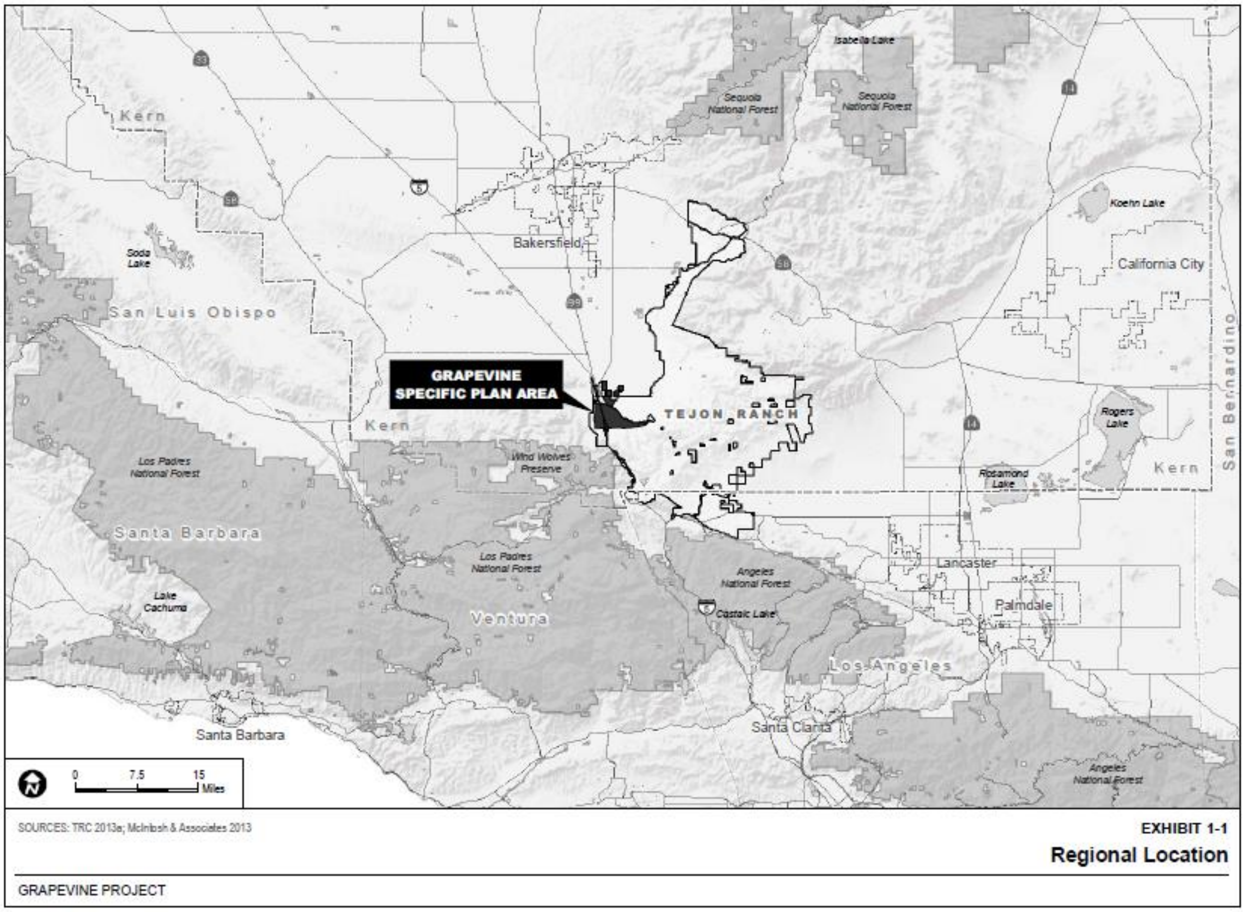


Figure 2
Vicinity Map