Appendix G

Environmental Checklist Form

NOTE: The following is a sample form and may be tailored to satisfy individual agencies' needs and project circumstances. It may be used to meet the requirements for an initial study when the criteria set forth in CEQA Guidelines have been met. Substantial evidence of potential impacts that are not listed on this form must also be considered. The sample questions in this form are intended to encourage thoughtful assessment of impacts, and do not necessarily represent thresholds of significance.

1. Project title: The Oasis at China Lake

2. Lead agency name and address: City of Ridgecrest
   100 W. California Avenue
   Ridgecrest, CA 93555

3. Contact person and phone number: Heather Spurlock, Analyst
   (760) 499-5061

4. Project location: Southeast corner of China Lake Boulevard and Rader Avenue

5. Project sponsor's name and address: Derrill G. Whitten, Jr, PE, PLS
   Cornerstone Engineering Inc.
   208 Oak Street
   Bakersfield, CA 93304

6. General plan designation: Commercial (C) 7. Zoning: General Commercial (CG)

8. Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)

The proposed project consists of several applications as described below:

Tentative Parcel Map (TPM) 12291

The existing 17.34 gross acre site contains six assessor's parcels. TPM 12291 proposes to subdivide the commercially zoned property into 13 parcels. Proposed parcel sizes range from 10,030 sq. ft. (Parcel 3) to 495,410 sq. ft. (Parcel 13). Local and State subdivision laws allow commercially zoned properties to be subdivided using the Parcel Map process regardless of the number of parcels.

All newly created parcels meet the required minimum lot size of 10,000 sq. ft. each (Section 20-16.4) and no less than 100-foot lot depth (Section 20-16.6) of the Zoning Ordinance for properties located in General Commercial (CG) zone.

Site Plan Review (SPR) 19-01

Submitted plans indicate that the applicant intends to develop the 17.34 gross acres in phases. The proposed Phase 1 of the project includes development of 53,977 sq. ft. two story 10-screen cinema and a 7,486 sq. ft. retail space on proposed 1.73-acre Parcel 4 of TPM 12291, a retail (may include a restaurant space) buildings located immediately southwest of the proposed cinema on proposed 0.36-acre Parcel 5 of TPM 12291, a 11,993 sq. ft. professional office building on proposed 0.38-acre Parcel 1 of TPM 12291, two graded pads for future retail development on proposed 0.33-acre Parcel 2 and 0.23-acre Parcel 3 of TPM 12291, two drive-thru fast food restaurants located on either side of the main access off of China Lake Boulevard on proposed 0.36-acre Parcel 9 and 0.28-acre Parcel 10 of TPM 12291, and common parking on proposed 11.37-acre Parcel 13 of TPM 12291 to accommodate proposed Phase 1 development.

Timing and sequence of development of Phase 2 of the project area is not known at this time. The applicant anticipates that Phase 2 will occur incrementally and will include the remaining development of the project which could include additional retail and office space, a market, pharmacy and restaurant space. The proposed Development Agreement address time periods for development of the entire project.

When completed, the project will include 164,829 sq. ft. of building area and 718 parking spaces (685 regular and 33 ADA compliant). The applicant is requesting approval of a variance for parking as described below.

Submitted site plan indicates building and other setbacks including a 10-foot setback (Section 20-16.7(b)(1) of the Zoning Ordinance) along the east property line adjacent to existing residential.

All proposed buildings will be single-story except for the cinema, contemporary style and uses earth tone color palette (white and rust colored cement plaster). Storefronts will have dark red and dark bronze anodized aluminum. Light weight metal canopies will be used at entrances to buildings.

Variance 19-01

Standards for off-street parking are contained in Chapter 20-20 of the Zoning Ordinance. Additionally, Section 20-20.16 of the Zoning Ordinance incorporates City standards as established by the City Council into the ordinance. The City Council adopted parking lot design standards are contained in No. 21 of the City Engineer's Design Guidelines.

The applicant is seeking a parking variance as follows:

1. City standards require a width of 10 feet and length of 20 feet for a double striped 90^0 parking spaces. The applicant requests approval of a variance to provide 9.5 X 18-foot 90^0 parking spaces.
2. City standards require 9 X 20-foot parking spaces with a one-way drive aisle width of 19 feet for 60^0 parking (Herringbone pattern). The applicant is requesting approval to provide 9.5 X 18.5-foot shorter length and 24-foot longer length parking spaces at 60^0.
3. One-way drive aisle width of 17 feet for 60^0 parking spaces in lieu of 19 feet as required by the City standards.

The applicant's engineer has provided a justification along with a supporting document from a traffic consultant for the request.

Development Agreement

A Development Agreement between G&L China Lake, LLC and the City of Ridgecrest is also proposed for the development of the vacant 17.34-acre property. Under the proposed agreement, the City agrees to allow ten (10) years to develop the project from the date of an application for a building permit for Phase 1; provisions for extension of time period; concurrent processing of entitlement applications; authorize the City Manager to allow reasonable extension of Development Schedule; vested rights to develop the project subject to provisions of the Agreement; pay fees imposed by the City; and other provisions. Exhibit B of the Development Agreement includes a schedule for development of Phase 1 and 2 of the project.

9. Surrounding land uses and setting: Briefly describe the project's surroundings:

   North: Existing shopping center across Rader Avenue

   South: Existing bike lane, Bowman Wash and Bowman Road

   East: Existing single family homes

   West: Existing commercial center and vacant land across China Lake Boulevard

10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)

    The proposed commercial development project will require review and approval of street improvement plans by the City Engineer and Public Works, and building plan approval by the Building and Safety Department. Outside agency review and approval include, but not limited to, County Fire Department, Lahontan Regional Water Quality Control Board, and Indian Wells Valley Water District.

PROJECT LOCATION

AERIAL MAP OF PROJECT LOCATION

PHOTOGRAPHS OF PROJECT SITE

Center of the site looking northeast

Center of the project looking southwest

PHOTOGRAPHS OF PROJECT SITE

Center of the project looking east

Looking north along China Lake Boulevard

PHOTOGRAPHS OF PROJECT SITE

Looking east along the south end (bike lane) of the project site

TENTATIVE PARCEL MAP NO. 12291

BEING A SUBDIVISION OF PARCELS 2 AND 4 OF PARCEL MAP 3863 IN THE CITY OF RIDGECREST, COUNTY OF KERN, STATE OF CALIFORNIA, AS PER MAP RECORDED DECEMBER 17, 1976 IN BOOK 17, PAGE 39 OF PARCEL MAPS AND PARCELS 1, 2, 3, AND 4 OF PARCEL MAP 7602 IN THE CITY OF RIDGECREST, COUNTY OF KERN, STATE OF CALIFORNIA, AS PER MAP RECORDED MAY 13, 1980 IN BOOK 33, PAGE 47 OF PARCEL MAPS IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY AND ALSO BEING A PORTION OF THE SOUTHWEST QUARTER OF THE SOUTH-EAST QUARTER OF SECTION 3, TOWNSHIP 27 SOUTH, RANGE 40 EAST, MOUNT DIABLO MERIDIAN, IN THE CITY OF RIDGECREST, COUNTY OF KERN, STATE OF CALIFORNIA.
BEING A SUBDIVISION OF 17.36 ACRES INTO THIRTEEN (13) PARCELS.

LEGEND

BC	CROSS CUT
BK	BOOK
FND	FOUND
K.C.S.	KERN COUNTY SURVEYOR'S
OR	OFFICIAL RECORDS
PG	PAGE
PM	PARCEL MAP
PUE	PUBLIC UTILITY EASEMENT
R/S	RECORD OF SURVEY
( )	RECORD PER PM 7802 IN BK 33 PG 47 O.R.
(( ))	RECORD PER PM 3863 BK.17 PG.59 O.R.
(1)	EASEMENT PER LIST
	WATER METER
	SANITARY SEWER MANHOLE
	FIRE HYDRANT
	MONUMENT FOUND AS NOTED HEREON
	EASEMENT AS NOTED HEREON
	PARCEL BOUNDARY
	RIGHT OF WAY
	DISTINCTIVE BORDER
	EXISTING BOUNDARY LINES
	STREET CENTERLINE
	EDGE OF PAVEMENT
	FENCE
W	EXISTING WATER LINE
S	EXISTING SEWER LINE
W	PROPOSED WATER LINE
S	PROPOSED SEWER LINE
D	STORM DRAIN LINE

BASIS OF BEARINGS

THE CENTERLINE OF CHINA LAKE BOULEVARD ALSO BEING THE WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 3, T.27S, R.40E, AS SHOWN ON PARCEL MAP 7802 AS FILED IN BOOK 33 OF PARCEL MAPS AT PAGE 47 OF THE RECORDERS OFFICE OF THE COUNTY OF KERN. BEARING OF SAID LINE TAKEN TO BE NORTH 00°09'06" EAST.

BENCHMARK

FOUND COTTON SPINDLE IN POWER POLE #70190 AT SOUTHEAST CORNER OF COLLEGE HEIGHTS BLVD. AND SPRINGER – BM (ASSUMED) (CITY OF RIDGECREST)

RECORD ELEVATION = 2316.15 FEET.

LAND SURVEYOR

DERRILL G. WHITTEN, JR.
L.S. 7816
CORNERSTONE ENGINEERING INC.
208 SAN DIEGO ST.
BAKERSFIELD, CA 93304
661.323.8424

PROPERTY OWNER

G&L CHINA LAKE, LLC, A CALIFORNIA LIMITED LIABILITY COMPANY
439 NORTH BEDFORD DRIVE
BEVERLY HILLS, CA 90210
310.275.0335

SURVEYOR'S NOTES

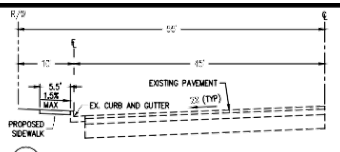
1) THE BOUNDARY LINES SHOWN AS ——— INDICATES THE BOUNDARY OF LAND SUBDIVIDED BY THIS MAP.
2) THIS WILL BE A PHASED DEVELOPMENT.

ASSESSOR PARCEL NUMBERS

080-020-27-00-9
080-020-28-00-2

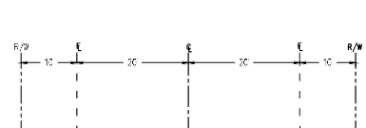
GENERAL NOTES

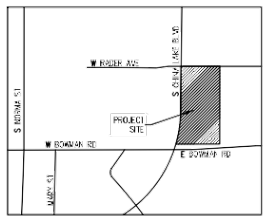
1. ALL IMPROVEMENTS TO CONFORM WITH THE CITY OF RIDGECREST AND COUNTY OF KERN STANDARDS.
2. ADDRESS: NE CORNER OF CHINA LAKE BLVD. AND BOWMAN ROAD, RIDGECREST, CA
3. APPROXIMATE ACREAGE: 17.34 GROSS ACRES
4. NUMBER OF LOTS: 13 PARCELS
5. MINIMUM LOT SIZE: 0.23 ACRES (10,030 S.F.)
6. EXISTING LAND USE: VACANT LOT
7. PROPOSED LAND USE: GENERAL COMMERCIAL
8. EXISTING GENERAL PLAN DESIGNATION: C "COMMERCIAL"
9. EXISTING ZONING: CG "GENERAL COMMERCIAL"
10. PROPOSED ZONING: CG "GENERAL COMMERCIAL" (NO CHANGE)
11. WATER: INDIAN WELLS VALLEY WATER DISTRICT
12. SEWER: CITY OF RIDGECREST
13. DRAINAGE: IN CONFORMANCE WITH CITY OF RIDGECREST & KERN COUNTY STANDARDS
14. GAS: PG&E
15. ELECTRIC: SOUTHERN CALIFORNIA EDISON CO.
16. TELEPHONE: FRONTIER
17. FIRE PROTECTION: IN CONFORMANCE WITH CITY OF RIDGECREST FIRE DEPARTMENT STANDARDS
18. THERE ARE NO EXISTING STRUCTURES WITHIN THE BOUNDARIES OF THIS MAP
19. FLOOD-ZONE: FIRM MAP NUMBER 06029C1600E EFFECTIVE SEPTEMBER 26, 2008: ZONE X: "AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN" AND SHADED ZONE X: "AREAS OF 0.2% ANNUAL CHANCE OF FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD."
THIS SITE HAS AN INCREASED FLOOD POTENTIAL DUE TO THE BOWMAN WASH.
ALL STRUCTURES SHALL BE FLOOD PROOFED.
20. ALL OFFSITE IMPROVEMENTS TO BE PUBLIC.
21. ALL OFFSITE IMPROVEMENTS SHOWN ON THIS MAP, FOR MORE DETAILS, SEE SITE PLAN.
22. ALL PARCELS OF THIS MAP ARE RESPONSIBLE FOR MAINTENANCE AND UPKEEP OF ALL OFFSITE PUBLIC IMPROVEMENTS UNTIL SUCH TIME THAT THE CITY OF RIDGECREST ACCEPTS RESPONSIBILITY.
23. COMMON ACCESS AND RECIPROCAL PARKING AND MAINTENANCE AGREEMENT PER SEPARATE DOCUMENT BETWEEN ALL THIRTEEN (13) PARCELS.
24. ENTIRE SITE SHALL DRAIN TO AN ON-SITE STORM DRAIN SYSTEM. THE ON-SITE STORM DRAIN SYSTEM WILL DRAIN TO THE EXISTING DRAINAGE CHANNEL.

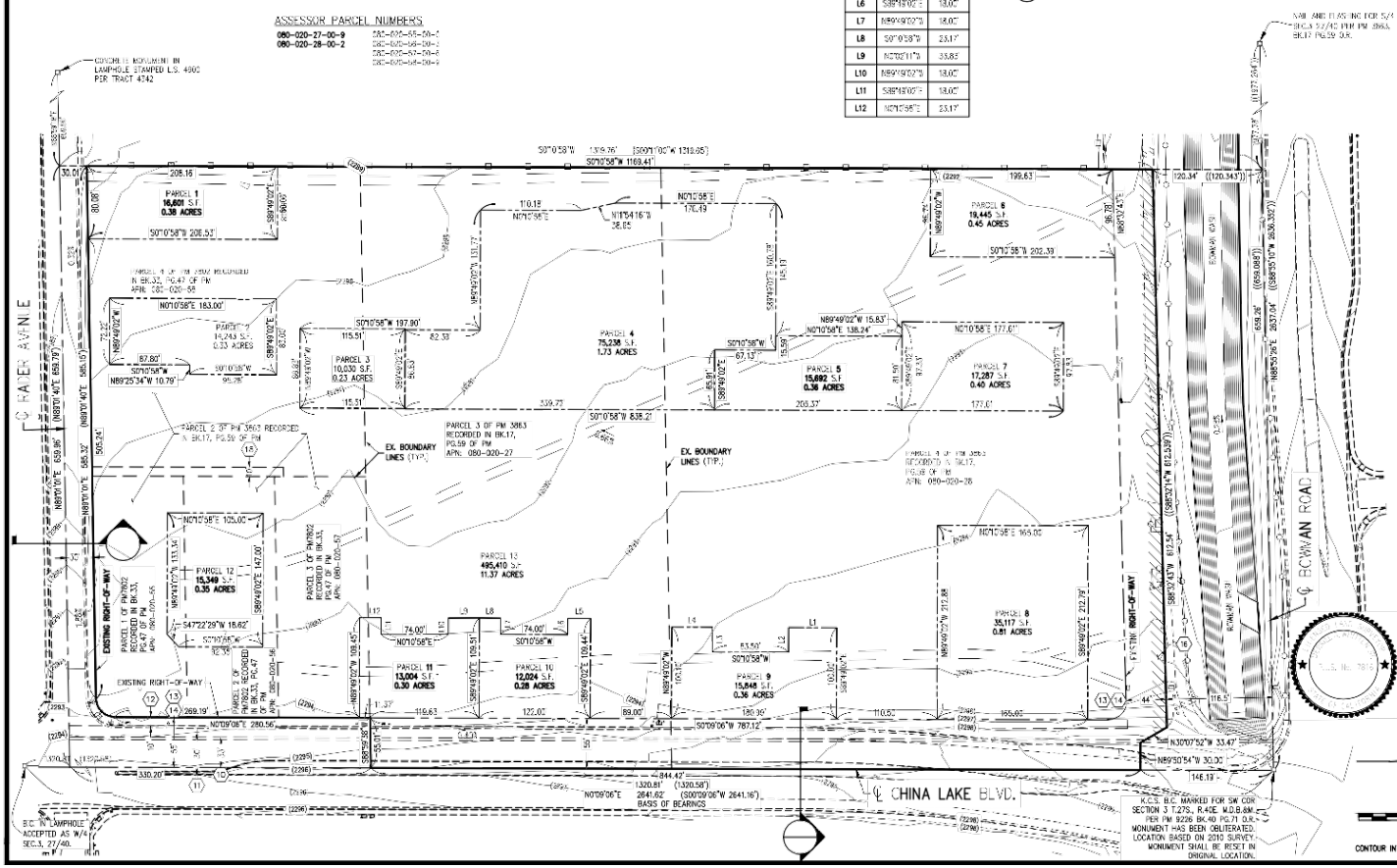


Curve Table			
CURVE #	LENGTH	RADIUS	Δ
C1	31.02	20.00	88°53'53"

LINE TABLE		
LINE #	BEARING	DISTANCE
L1	N01°06'58"E	52.99'
L2	S88°49'02"E	27.00'
L3	N89°49'02"W	27.00'
L4	S01°06'58"W	41.50'
L5	N01°06'58"E	21.83'
L6	S88°49'02"E	18.00'
L7	N89°49'02"W	18.00'
L8	S01°06'58"W	23.17'
L9	N01°06'58"E	35.83'
L10	N89°49'02"W	18.00'
L11	S88°49'02"E	18.00'
L12	N01°06'58"E	23.17'







EXCEPTIONS PER PRELIMINARY REPORT #1004-5656702

1 THROUGH 8: GENERAL AND SPECIAL TAXES AND ASSESSMENTS. NON-PLOTTABLE.

(9) A RIGHT OF WAY FOR DITCHES AND CANALS AS RESERVED BY THE UNITED STATES OF AMERICA IN THE PATENT RECORDED FEBRUARY 27, 1922 IN BOOK 21 OF PATENTS, PAGE 81. NON-PLOTTABLE.

(10) AN EASEMENT FOR ELECTRIC, TELEGRAPH AND TELEPHONE COMMUNICATION PURPOSES AS SHOWN IN BOOK 1247, PAGE 185, O.R. IN FAVOR OF: THE PACIFIC TELEGRAPH COMPANY, A CORPORATION, ITS SUCCESSORS AND ASSIGNS

(11) AN EASEMENT FOR PUBLIC HIGHWAY AND INCIDENTAL PURPOSES, RECORDED DECEMBER 27, 1954 AS INSTRUMENT NO. 37410 IN BOOK 2334, PAGE 467 OF O.R. IN FAVOR OF: THE COUNTY OF KERN

(12) AN EASEMENT FOR UNDERGROUND ELECTRICAL SUPPLY SYSTEMS AND COMMUNICATION SYSTEMS AND INCIDENTAL PURPOSES, RECORDED SEPTEMBER 19, 1973 AS BOOK 6804, PAGE 1856 OF O.R. IN FAVOR OF: CONTINENTAL TELEPHONE COMPANY OF CALIFORNIA

(13) AN EASEMENT FOR INGRESS AND EGRESS AND ROAD PURPOSES AND INCIDENTAL PURPOSES, RECORDED JULY 19, 1974 AS INSTRUMENT NO. 05970 IN BOOK 4501, PAGE 307 OF O.R.

(14) IN FAVOR OF: THE CITY OF RIDGECREST, THE ADJACENT PROPERTY OWNERS, AND THE PUBLIC IN GENERAL

(15) AN EASEMENT SHOWN OR DEDICATED ON THE MAP AS REFERRED TO IN THE LEGAL DESCRIPTION FOR DRAINAGE EASEMENT AND ACCESS EASEMENT AND INCIDENTAL PURPOSES.
ESSEX AVENUE ACCESS EASEMENT VACATED PER CERTIFICATE OF CORRECTION RECORDED JUNE 29, 2009 AS DOCUMENT NO. 0209093797 OF O.R. NOT SHOWN ON THIS MAP.

(16) ANY AND ALL RIGHTS OF INGRESS AND EGRESS TO OR FROM EAST BOWMAN ROAD, HAVE BEEN RELINQUISHED, ON THE FILED MAP (PARCEL MAP 7602). SEE HATCH ALONG SOUTHERN BOUNDARY.

(17) THE TERMS, PROVISIONS AND EASEMENT(S) CONTAINED IN THE DOCUMENT ENTITLED VACATION OF EASEMENT RECORDED SEPTEMBER 11, 1981 AS BOOK 5436, PAGE 1148 OF O.R. (LOCATION OF EASEMENT NOT ON THIS MAP). NON-PLOTTABLE)

(18) AN EASEMENT FOR DRAINAGE, SEWER AND INCIDENTAL PURPOSES, RECORDED APRIL 04, 1986 AS BOOK 5560 PAGE 883 OF O.R. IN FAVOR OF: ADJACENT PROPERTY OWNERS

(19) ACCESS FROM CHINA LAKE BOULEVARD TO PARCELS 1, 2, & 3 SHALL BE RESTRICTED TO ONE 32' DRIVEWAY FOR EACH LOT PER PARCEL MAP 7602. NON-PLOTTABLE.
AFFECTS: PARCELS 1, 2, & 3 OF PARCEL MAP 7602

(20) RIGHTS OF THE PUBLIC IN AND TO THAT PORTION OF THE LAND LYING WITHIN ANY ROAD, STREET, ALLEY OR HIGHWAY. NON-PLOTTABLE.

(21) WATER RIGHTS, CLAIMS OR TITLE TO WATER, WHETHER OR NOT SHOWN BY THE PUBLIC RECORDS. NON-PLOTTABLE.

(22) RIGHTS OF PARTIES IN POSSESSION. NON-PLOTTABLE.

LICENSED LAND SURVEYOR'S STATEMENT

I, DERRILL G. WHITTEN, JR., HEREBY STATE THAT I AM A LICENSED LAND SURVEYOR OF THE STATE OF CALIFORNIA AND THAT THIS MAP CONSISTING OF ONE (1) SHEET CORRECTLY REPRESENTS AN AERIAL AND GROUND SURVEY MADE UNDER MY SUPERVISION IN JULY 2008 IN CONFORMANCE WITH THE LOCAL ORDINANCE OF THE SUBDIVISION MAP ACT AND LOCAL ORDINANCE AND THAT THE SURVEY IS TRUE AND COMPLETE AND THAT ALL MONUMENTS SHOWN THEREON ACTUALLY EXIST AND ARE OF A CHARACTER AND DO OCCUPY THE POSITIONS INDICATED AND ARE SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED.

DERRILL G. WHITTEN JR. P.L.S. 7816 — DATE

BY | REVISION: | NO. | DATE:

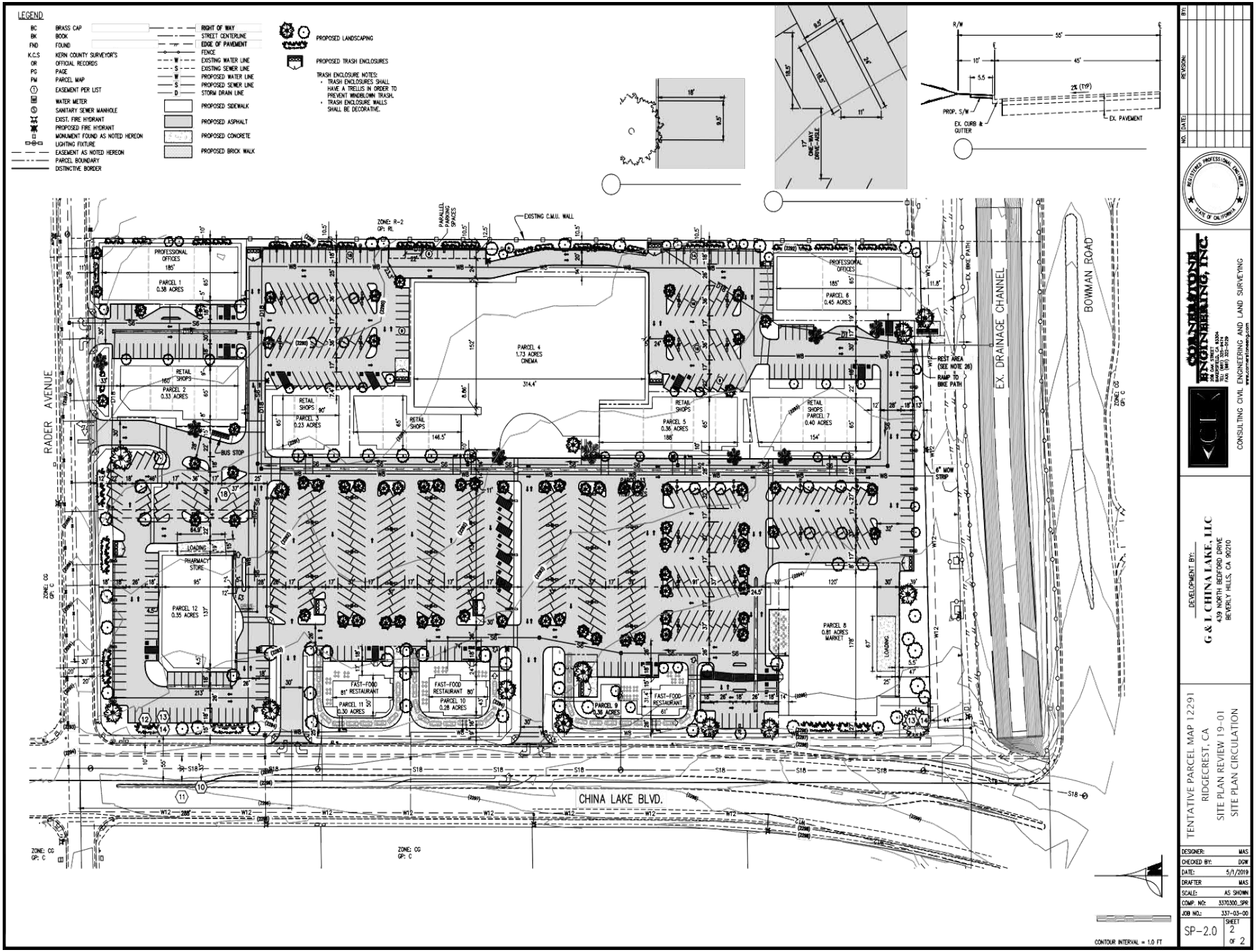
CORNERSTONE ENGINEERING, INC.
208 SAN DIEGO STREET
BAKERSFIELD, CA 93304
PH: (661) 323-8424
FAX: (661) 323-8424
www.cornerstoneeng.com
CONSULTING CIVIL ENGINEERING AND LAND SURVEYING

DEVELOPMENT BY:
G&L CHINA LAKE, LLC
439 NORTH BEDFORD DRIVE
BEVERLY HILLS, CA 90210

TENTATIVE PARCEL MAP NO. 12291

DESIGNED:	MAS
CHECKED BY:	DGW
DATE:	4/15/2010
DRAFTER	MAS
SCALE:	AS SHOWN
COMP. NO:	2010093-19
JOB NO.:	337-03-00
SHEET	1 OF 1

TPM-1.0



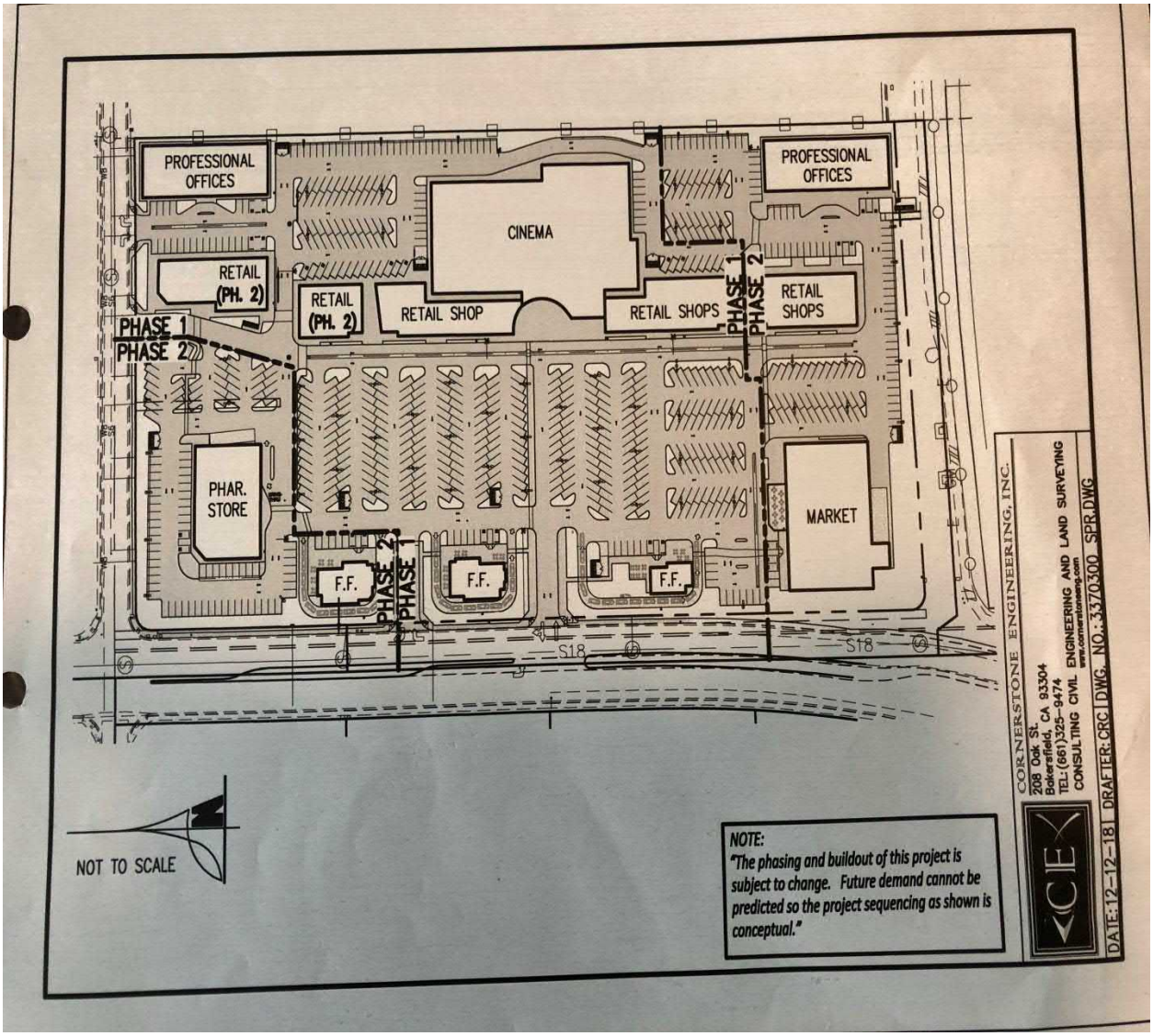
CONSTRUCTURE ENGINEERING, INC.
CONSULTING CIVIL ENGINEERING AND LAND SURVEYING

DEVELOPMENT BY:
G & I CHINA LAKE, LLC
439 NORTH BEDFORD DRIVE
BEVERLY HILLS, CA 90210

TENTATIVE PARCEL MAP 12291
RIDGECREST, CA
SITE PLAN REVIEW 19-01
SITE PLAN CIRCULATION

DESIGNER:	MAS
CHECKED BY:	DGW
DATE:	5/1/2019
DRAFTER	MAS
SCALE:	AS SHOWN
COMP. NO:	3370300_SPR
JOB NO.:	337-03-00
SP-2.0	SHEET 2 OF 2

Phasing Plan



BUILDING ELEVATIONS

WEST ELEVATION

EAST ELEVATION

MEDICAL OFFICE ELEVATIONS

THE OASIS AT CHINA LAKE
CHINA LAKE, CALIFORNIA

NADEL

BUILDING ELEVATIONS

WEST ELEVATION - PART 1

WEST ELEVATION - PART 2

SOUTH ELEVATION

CINEMA & RETAIL ELEVATIONS

THE OASIS AT CHINA LAKE
CHINA LAKE, CALIFORNIA

NADEL

COLORS AND MATERIALS BOARD

A.

C.

COLOR & MATERIALS

A. WHITE PLASTER - MEDIUM SAND FINISH

B. RUST COLOR PLASTER

C. CORRUGATED METAL PANEL

D. DARK RED ANODIZE ALUMINUM STOREFRONT

E. DARK BRONZE ANODIZE ALUMINUM STOREFRONT

F. LIGHT WEIGHT METAL CANOPY

B.

D.

E.

F.

COLORS & MATERIALS

THE OASIS AT CHINA LAKE
RIDGECREST, CALIFORNIA

DATE: NOV 20, 2018
NADEL JOB#: 1709S

NADEL STUDIO ONE, INC.
1990 S. BUNDY DR., FOURTH FLOOR
LOS ANGELES, CA 90025
T.310.826.2100 F.310.826.0182
WWW.NADELARC.COM

NADEL

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology /Soils
☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials	☐ Hydrology / Water Quality
☐ Land Use / Planning	☐ Mineral Resources	☐ Noise
☐ Population / Housing	☐ Public Services	☐ Recreation
☐ Transportation/Traffic	☐ Utilities / Service Systems	☐ Mandatory Findings of Significance

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☒ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project **MAY** have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

☐ I find that the proposed project **MAY** have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier **EIR** or **NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier **EIR** or **NEGATIVE DECLARATION**, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Heather Spurlock — 5/30/19

Signature: Heather Spurlock, Analyst — Date

_____ — _____

Signature — Date

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

    a) Earlier Analysis Used. Identify and state where they are available for review.

    b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

    c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

a) the significance criteria or threshold, if any, used to evaluate each question; and

b) the mitigation measure identified, if any, to reduce the impact to less than significance.

SAMPLE QUESTION
Issues:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS -- Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐
II. AGRICULTURE AND FOREST RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire				

Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. -- Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

III. AIR QUALITY -- Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒
IV. BIOLOGICAL RESOURCES -- Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☒	☐

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☒	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒
V. CULTURAL RESOURCES -- Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☐	☐	☐	☒

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☐	☐	☒
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries	☐	☐	☐	☒
VI. GEOLOGY AND SOILS -- Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☒
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site	☐	☐	☐	☒

landslide, lateral spreading, subsidence, liquefaction or collapse?				
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
VII. GREENHOUSE GAS EMISSIONS -- Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐
VIII. HAZARDS AND HAZARDOUS MATERIALS - Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

IX. HYDROLOGY AND WATER QUALITY -
- Would the project:

a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☒	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
f) Otherwise substantially degrade water quality?	☐	☐	☒	☐
g) Place housing within a 100-year flood hazard area as mapped on a	☐	☐	☒	☐

federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☒	☐
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☒	☐
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒
X. LAND USE AND PLANNING - Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒
XI. MINERAL RESOURCES -- Would the project:				

a) 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?	☐	☐	☐	☒
b) 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?	☐	☐	☐	☒
XII. NOISE -- Would the project result in:				
a) 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?	☐	☐	☒	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
XIII. POPULATION AND HOUSING -- Would the project:	☐	☐	☐	☐
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
XIV. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☒	☐
Police protection?	☐	☐	☒	☐

Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒
XV. RECREATION –				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒
XVI. TRANSPORTATION/TRAFFIC -- Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☒	☐
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand	☐	☐	☒	☐

measures, or other standards established by the county congestion management agency for designated roads or highways?				
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒
XVII. UTILITIES AND SERVICE SYSTEMS -- Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the	☐	☐	☒	☐

construction of which could cause significant environmental effects?				
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☒	☐
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE –				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a 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)?	☐	☐	☒	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

Note: Authority cited: Sections 21083, 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080, 21083.05, 21095, Pub. Resources Code; Eureka Citizens for Responsible Govt. v. City of Eureka (2007) 147 Cal.App.4th 357; Protect the Historic Amador Waterways v. Amador Water Agency (2004) 116 Cal.App.4th at 1109; San Franciscans Upholding the Downtown Plan v. City and County of San Francisco (2002) 102 Cal.App.4th 656.

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Tentative Parcel Map 12291/Site Plan Review 19-01/Variance 19-01/Development Agreement

DISCUSSION OF ENVIRONMENTAL IMPACTS

Section	Subsections and Explanation of Impacts
I. AESTHETICS	a.) No Impact: The City of Ridgecrest is located at the northeast corner of Kern County, within the Indian Wells Valley of the Mojave Desert. Its prime location provides vistas of four mountain ranges; Sierra Nevada Mountains to the west, the Cosos to the north, the Argus Range to the east and the El Paso Mountains to the south. The surrounding natural mountains and ridgelines provide a visual backdrop for much of the City. Both the City's General Plan Open Space & Conservation Element and Community Design Element contain policies regarding the protection of scenic resources. The proposed commercial development is not located on or in proximity to any scenic vistas in the City. Therefore, the proposed project would have no impact on scenic vistas.
	b.) No Impact: There is no State designated, Caltrans approved scenic highways in the area. However, North and South China Lake Boulevard and West Bowman Road that are located adjacent and further south, respectively, of the project site have been identified

	as scenic corridors in the Ridgecrest's Scenic Corridor Plan. These corridors are created to protect any existing landmarks or man-made features. Development of the project area would not result in any impacts to scenic resources since there are no state designated scenic highways within the area or impact any existing landmarks or man-made features.
	c.) Less Than Significant Impact: If approved, the components of the project together will result in a commercial development on the vacant site. There is an existing commercial development to the west and north and single family residential development exist to the east of the project site. Therefore, development of the site would not result in changes that would substantially differ from existing conditions relative to the overall visual environment at the site when viewed from off-site locations.
	d.) Less Than Significant Impact: The project does not propose any lighting for nighttime events or sporting activities. The only outdoor lighting included in the project would be limited to pedestrian safety lighting, landscaping lighting, and parking lot lights. The proposed outdoor lighting sources, especially adjacent to existing residential areas, will be shielded and facing down in order to minimize creation of glare and ambient light sources. The light that would be generated by the proposed project site would be visually consistent with adjacent commercial uses that are currently illuminated at night and therefore, wouldn't detract from daytime or nighttime views. Therefore, the project would have less than significant lighting and glare impacts.
II. AGRICULTURE AND FOREST RESOURCES	a.) No Impact: The site is not in an area of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as identified by the California Department of Conservation's (2015) California Important Farmland Finder. There is no farmland of any kind located within the City. Therefore, the proposed project would have no impact to Prime Farmland, Unique Farmland, or Farmland of Statewide Importance.
	b.) No Impact: No agricultural preserve areas designated or found in the City of Ridgecrest. Further, there is no Williamson Act contract land in the City. Therefore, the proposed project would not conflict with zoning for agricultural use or Williamson Act contracts and would have no related impacts.
	c.) No Impact: The project site currently zoned General Commercial (CG) and is not located in an area zoned for forestland, timberland or open space. Therefore, implementation of the proposed project would not conflict with existing zoning for, or cause re-zoning of, forestland, timberland, or timberland or land zoned for timber production. No impact would occur.
	d.) No Impact: No forestland is found on the vacant and disturbed project site. Therefore, implementation of the proposed project

	would not result in the loss of forestland or convert forestland to non-forest use. No impact would occur.
	e.) No Impact: The project site and surrounding area do not contain or support any farmland or forestland resources. Therefore, the proposed project would not result in the conversion of farmland to nonagricultural use or forestland to non-forest use and therefore, the project would have no related impacts.
III. AIR QUALITY	a.) Less Than Significant: The California Air Resources Board has divided California into regional air basins according to topography and other features. The City of Ridgecrest including the project site is located within the Mojave Desert Air Basin (MDAB) and is under the jurisdiction of the Eastern Kern County Air Pollution Control District (EKCAPCD), formerly known as the Kern County Air Pollution Control District (KCAPCD). The EKCAPCD portion of the MDAB is a nonattainment area for two criteria air pollutants, Ozone (eight hour) and PM_{10}, though it is in attainment for all other air pollutants under state standards. In regard to federal standards, the City of Ridgecrest is classified as in attainment/unclassified for all criteria air pollutants. The California Clean Air Act requires triennial preparation of an Air Quality Management Plan (AQMP) which is the responsibility of EKCAPCD and the plan is prepared according to the Kern Council of Governments (KCOG) projections. These plans are predicated on local land use plans, particularly General Plan land use designations and zoning. The proposed project does not contain a request to change the existing land use or zoning. Additionally, during construction, the project will be required to implement dust suppression measures for excavations, grading, and site preparation activities which will minimize the production of air pollutants. Thus, the project is consistent with the growth projections accommodated by the AQMP. Therefore, the proposed project would not conflict with or obstruct implementation of the applicable air quality plan, and would have less than significant associated impacts.
	b.) Less Than Significant: Air quality standards for the region are identified by both the United States Environmental Protection Agency (EPA) in the National Ambient Air Quality Standards (NAAQS) and the California Air Resources Board (CARB) in the California Ambient Air Quality Standards (CAAQS). Established standards deal with five pollutants - ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), fine particulate matter (PM_{10})

	and lead. As indicated above, air quality in the region is managed by the EKCAPCD. Development of commercial uses on the project site could result in an increase in criteria pollutants during both construction and operational activities and could also contribute to the area's existing nonattainment status. Construction activities such as excavation and grading operations, construction related traffic, and wind blowing over exposed earth could generate exhaust emissions and fugitive particulate matter that would affect local air quality. In addition to short term construction related emissions, operation of the project will contribute emissions from traffic generated by the project. Emissions during grading and construction are subject to all standard best management practices for dust control and other air pollution control measures in place. Any ongoing vehicular emissions are subject to current federal and state emission standards for vehicles. Therefore, the project will have less than significant impacts and not violate any air quality standard or contribute to any existing or projected air quality violations.
	c.) Less Than Significant: As indicated earlier, the project site is located within EKCAPCD and EKCAPCD is currently in nonattainment for both federal and state Ozone (O_3) (eight hour) and PM_{10}. The proposed project would generate O_3 and PM_{10} during both construction and ongoing operations. An increase in dust and vehicle emissions during construction is anticipated and they will be limited to short durations. Therefore, the project could cumulatively exceed an air quality standard or contribute to an existing or projected air quality exceedance. However, these activities are subject to federal, state and local dust control as well as vehicle emission regulations. Therefore, the project by itself is not expected to exceed the thresholds of significance established by EKCAPCD. Therefore, projects such as the proposed project are not considered to significantly contribute to cumulative air quality impacts including any criteria pollutants, O_3 and PM_{10}, and therefore, impacts will be less than significant.
	d.) Less Than Significant: Sensitive population groups include very young, the elderly and those suffering from certain illnesses or disabilities, especially those with cardiorespiratory diseases. Land uses where sensitive air pollutant receptors congregate include medical offices and cinemas, such as those proposed by the project.

	During construction, incidental amounts of toxic substance such as oils, solvents, paints, adhesives, and coatings would be used. The use and application of these substances would comply with all applicable rules for their use, storage, and disposal. Although construction related activities will temporarily impact air quality, these impacts will be less than significant due to control measures that are already in place by federal, state and local agencies. Vehicular operations are also subject to adopted emission standards by federal and state agencies. Therefore, this impact would be less than significant.
	e.) No Impact: Proposed retail, office, cinema and restaurant uses are not expected to generate substantial amounts of odor and associated complaints. Therefore, the project would have no impact due to objectionable odor.
IV.BIOLOGICAL RESOURCES	a.) Less Than Significant: Biotic Assessment of the subject property has been conducted by Kiva Biological Consulting and their findings are provided in a report dated November 29, 2018 (see Attachment 1). Report provides results of an assessment of the federal and state listed (threatened) Mojave desert tortoise and a habitat evaluation for the state listed (threatened) Mohave ground squirrel. The report indicates that the subject site has been impacted by variety of human activities for many years. PG&E used the southern third of the site as a hydro-test facility from July thru October 2018. The report concludes that much of the project site has been impacted by human activities. The Biotic Assessment concludes that no live desert tortoise or sign of presence of desert tortoise were observed on the site. The site is not located within a Critical Habitat, neither for the desert tortoise nor in a Desert Wildlife Management Area. The report also concludes that no Mohave ground squirrels or other sensitive vertebrate species or their sign were observed on or near the site during the survey. The subject site is located within the range of Burrowing Owl and LeConte's Thrasher, listed species of special concern. However, no signs of their presence or signs of their presence were found during the survey. Additionally, no references were found during the search of the California Natural Diversity Data Base for other sensitive species. Due to the highly disturbed nature of the property and the absence of healthy vegetation on the project site, the survey concludes that the site is not likely to provide a habitat for nesting birds.

	Therefore, development of the already degraded site will not have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations by the California Department of Fish and Game or U.S. Fish and Wildlife Service. Therefore, this impact would be less than significant.
	b.) Less Than Significant: The Ridgecrest General Plan 2030 indicates that due to the climatic conditions which highly affect habitat, a limited number of habitats thrive in dry desert-like conditions that prevails in the Ridgecrest area. These primarily include alkali and desert scrub habitats and urban areas provide no habitat valuable to wildlife. As indicated above, there are no evidence of presence of sensitive communities such as desert tortoises, Mojave ground squirrel, Borrowing Owls or LeConte's Thrasher that are subject to plans, policies, regulations of the California Department of Fish and Game or US Fish and Wildlife Service. Therefore, impacts to riparian habitat or other sensitive natural communities from the development of the project would be less than significant.
	c.) No Impact: The project site is not located within a federally protected wetland as defined by Section 404 of the Clean Water Act and does not propose direct removal, filling or hydrological interruption of any kind. Therefore, no impact would occur.
	d.) No Impact: The proposed project include an application for a land subdivision; site plan approval to construct a cinema, office, retail and restaurants; variance for parking and an approval of a Development Agreement on land located within in a rapidly urbanizing area. Commercial development already exits to the north, south and west and residential uses are located to the east of the site. The site neither provides any link between migratory wildlife corridors nor part of a known wildlife movement or migration corridor. Further, the site does not contain any waterways. Therefore, no impact would occur.
	e.) No Impact: No evidence found that the City of Ridgecrest provides any specific tree preservation policies. Therefore, the project would not conflict with any policies or ordinances protecting biological resources including tree preservation policies. Therefore, no impact would occur.
	f.) No Impact: There are no Habitat Conservation Plan, Natural Community Conservation Plan or other local, regional or state

	habitat conservation plan that is applicable to the project area. Therefore, project would have no impact on those areas.
V. CULTURAL RESOURCES	a. – d.) No Impact: As stated in the General Plan, much of the City still shares an integral symbiotic role with the Naval Air Weapons Station (NAWS) China Lake which was established in 1943 as Harvey Field. Due to absence of City or State of California designated significant historical resources; the General Plan does not include a cultural resource element. However, the City conducts further evaluation of cultural resources including historical as well as paleontological resources on project by project basis. Previous development activities in the general area including the construction of a bike path south of the project area did not discovered any evidence of cultural significance during grading. Further, the project would not directly cause a substantial adverse change in the significance of a historical, archaeological, or paleontological resource pursuant to Section 15064.5 of the Government Code. Should any resources be identified in any future studies or found during any construction activities, the proper measures will be taken including notification to appropriate authorities. Therefore, no further impact to archeological, historical or cultural resources is anticipated and no further analysis is required.
VI. GEOLOGY AND SOILS	a. i–iv.) Less Than Significant: Geotechnical Engineering Investigation dated March 20, 2019 has been performed by Moore Twining Associates, Inc. (see Attachment 2) for the project (Oasis retail development project). The study states that based on their review of the State of California Special Studies Zone map for the Ridgecrest South Quadrangle, dated January 1, 1990, the subject site is not located in the Alquist-Priolo Earthquake Fault Zone. The project site is located approximately 2,000 feet west of the known Little Lake Fault Zone. The report concludes that a potential for ground rupture at the site is considered low. The report also concludes that the project area is not within an Earthquake Fault Zone and therefore, not subject to landslides. Therefore, the project would have no impacts due to risk of loss, injury, or death due to earthquakes, ground shaking, liquefaction or landslides.
	b.–e.) No Impact: The above mentioned Geotechnical Engineering Investigation indicates that the surface soils encountered across the project site consist of silty sands extending from the ground surface to depth of about five (5) feet to 20 feet below sites grades (BSG). It

	is anticipated that cuts/fills of about 2 to 3 feet may be required to achieve the finished pad grades. The report also includes recommendations for ground preparation for construction, engineered fill, drainage and landscaping and other activities associated with construction of the project. Therefore, soil related conditions do not present an impact on the environment.
VII. GREENHOUSE GAS EMISSIONS	a.-b.) Less Than Significant: "Greenhouse gases" (GHGs) emitted by human activity are implicated in global climate change, commonly referred to as "global warming". GHGs contribute to increase in earth's atmospheric temperature. Main components of GHGs include, but not limited to, carbon dioxide (CO_2), methane, and nitrous oxide. Collectively GHGs are measured as carbon dioxide equivalent (CO_2e). The single largest source of GHG emissions are emitted by fossil fuel consumption (motor vehicles, off-highway mobile sources and aircrafts) and account for approximately one-half of GHG emissions globally. Industrial and commercial sources are the second largest contributors of GHG emissions with about one-fourth of total emissions. The State of California has several regulations including statues (AB 32 and SB 1368) and Governor's executive orders (EO S-03-05, EO S-20-06 and EO S-01-07) dealing with GHGs. The AB 32, California Global Warming Solutions Act of 2006, is one of the most significant pieces of environmental legislation that California has adopted. It is designed to maintain California's reputation as a "national and international leader in energy conservation and environmental stewardship" and others. It intends to reduce California's GHG emissions to 1990 level by year 2020. Sources of greenhouse gas emissions associated with the project include construction related vehicles and equipment, and vehicle emissions from continued use of the developed project. According to the Traffic Impact Study dated November 29, 2018 prepared by Associated Transportation Engineers, the project is expected to generate 4,375 daily vehicle trips at build-out. Greenhouse gas emissions associated with vehicles are addressed by the state and federal regulations and all vehicles are required to comply with these regulations in order to minimize GHGs. The applicant will be required to prepare and submit a Dust Control Plan (DCP) addressing grading and construction activities. These

	plans will include dust control measures and plans will require City as well as the Air Quality Management District approval. Compliance with existing regulations for construction related activities and vehicle emission regulations will reduce greenhouse gas emissions related impacts to less than significant. Therefore, no further analysis is required.
VIII. HAZARDS AND HAZARDOUS MATERIALS	a.) No Impact: The proposed project consists of a land division, commercial shopping center development anchored by a cinema, variance for parking and a Development Agreement. During construction, building materials such as dry wall, cements and glues, and paints and solvents will be used. Additionally, during construction heavy equipment which would contain fuel and petroleum products would be used. Once occupied, commercial activities would result in the use of small amounts of materials such as cleaning solvents and other chemical agents. Additionally, landscaping maintenance may include pesticides and herbicides, paints, and solvents. When used according to the manufacturer's directions, these types of products generally do not pose a substantial risk to the public. Further, products containing hazardous materials are regulated under federal and state laws, and construction contracts require compliance with these regulations. Construction workers as well as future employees are required by laws to be trained in handling of any hazardous materials. Therefore, the project would have no related impacts.
	b.) Less Than Significant: The proposed project is commercial in nature and will be built on an existing vacant parcel of land that is not expected to contain any underground storage tanks (USTs), above storage tanks (ASTs), gas lines, or other hazardous material conduits or storage facilities. The types and amounts of hazardous materials used in commercial operations would not result in hazardous emissions, and none would be acutely hazardous materials as defined in federal regulations. The project is not expected to create a hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials in to the environment. Therefore, the proposed project would not create a significant hazard to the public or the environment through reasonably feasible upset and accident conditions involving the release of hazardous materials into the environment and the project would have less than significant impacts.
	c.) No Impact: James Monroe Middle School is located one and one-half mile northwest of the proposed project site. There are no other schools located within one-quarter mile of the project site. The proposed project is not expected to emit hazardous emissions

	or handle hazardous or acutely hazardous materials, substances or waste. Therefore, the project would have no impacts.
	d.) Less Than Significant: The project site is not included on any list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. However, southerly one-third of the project site has been used as a hydro-test site by the PG&E from July through October 2018. During their operations larger equipment were used on site. However, the former test site has resulted in denuded (bare) southerly portion of the site. Soils report dated March 20, 2019 prepared by Moore Twining Associated Inc. indicate that they observed a file of dirt on the southwesterly portion of the site and the report does not indicate any soil contamination due to PG&E or any other operations. As a result, the soils report does not recommend further investigation including a Phase 1 Environmental Site Assessment. Therefore, the project would have less than significant impact on the environment.
	e.) No Impact: The City of Ridgecrest is the closest urban area to the Naval Air Weapons Station (NAWS) China Lake. As a result, the City has adopted a Military Sustainability Element in its General Plan, which is intended to demonstrate City's commitment to and support of current and future missions at China Lake. Additionally, other elements of the General Plan also contain policies related to preserving the significant economic trust for the City and the valley. Due to air operations of the China Lake, the Federal Aviation Administration (FAA) has established a Special Use Airspace (SUA) designed to alert users about areas of military activity, unusual flight hazard, or national security concerns. Two SUAs, Military Operations Area (MOA) and Restricted Areas are applicable to the planning area of the City of Ridgecrest. The City of Ridgecrest is located within the Isabella MOA. The MOA is intended to separate certain non-hazardous flight activities from Instrument Flight Rules (IFR) traffic. There are seven Restricted Airspace Areas and the area south of Ridgecrest Boulevard and west of South Downs Street is within Restricted Area 2506 (R-2506). Based on this information, the project lies outside the R-2506. An Air Installation Compatible Use Zone (AICUZ) has also been established and included in the General Plan. Based on Figure 4-2. 2007 AICUZ, the project site is located outside the AICUZ. However, in a letter dated June 8, 2018, the Department of the Navy, Naval Air Weapons Station has commented on a project indicating that 2007 AICUZ study has been updated in 2011 in order to accommodate

	current operations of the NAWS. The City has not yet adopted the findings of that study. Therefore, the project site and the development of the project would have no impact on the environment or impacted by the operations of the NAWS.
	f. – h.) No Impact: The project is not located within the vicinity of a private airport, physically interfere with an adopted emergency plan, or expose people or structures to wildland fires. Therefore, the project would not impact those aspects of the environment.
IX. HYDROLOGY AND WATER QUALITY	a.) Less Than Significant: Section 303 of the federal Clean Water Act requires states to develop water quality standards to protect the beneficial uses of receiving waters. In accordance with California's Porter/Cologne Act, the Regional Water Quality Control Boards (RWQCBs) of the State Water Resources Control Board (SWRCB) are required to develop water quality objectives that ensure their region meets the requirements of Section 303 of the Clean Water Act. The City of Ridgecrest falls within the jurisdiction of Lahontan Regional Water Quality Control Board (LRWQCB) and regulated by its Water Quality Control Plan for the Lahontan Region (Basin Plan). The Basin Plan sets forth water quality standards for surface water and groundwater of the region. The subject site is located within the Indian Wells Hydrological Unit (624.00) and overlies the Indian Wells Valley Groundwater Basin (6-54). Section 402 of the Clean Water Act requires municipalities to obtain permits for the water pollution generated by stormwater in their jurisdiction. The applicant would be required to implement Best Management Practices (BMPs) which are defined as schedules of activities, prohibition of practices, maintenance procedures and other management practices to prevent or reduce the discharge of pollutants to the waters of the United States. Additionally, BMPs also include water quality impacts such as erosion and siltation, to the maximum extent practicable. The project includes a legislative action (development agreement), approval of a TPM, site plan and a variance to develop a commercial center in an urbanized area. None of the proposed uses are point source generators of water pollutants, and thus, no quantifiable water quality standards apply to the project. As a commercial project it would add typical, urban, nonpoint-source pollutants to storm water runoff. These are permitted by local permits and would not exceed any receiving water limitations.

	Therefore, based on required compliance with existing standards for BMPs, impacts to local water quality standards or waste discharge requirements would be less than significant.
	b.) Less Than Significant: The Indian Wells Valley Water District provides portable water to the City including the project site. Groundwater is the sole source of portable water supply in the Indian Wells Valley. The primary source of natural recharge of the groundwater system in the Indian Wells Valley is infiltration of surface runoff from the Sierra Nevada, Cosos and Argus ranges; subsurface flow from Sierra Nevada bedrock unit, and geothermal upwelling and subsurface flow from the Rose Valley. The project would not install any groundwater wells and would not otherwise directly withdraw any groundwater. Direct additions to groundwater are also not proposed by the project. Additionally, the project will not involve massive substructures at depths that would significantly impair or alter the direction or rate of flow of groundwater. In a 2011 publication (IWVWD 2011 p.35), the district indicated that it had no immediate concerns with water supply reliability. Therefore, the proposed project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge, and the project would have less than significant impact on the environment.
	c.) Less Than Significant: Development projects that increase the volume or velocity of surface water can result in an increase in erosion and siltation. Increased surface water volume and velocity causes an increase in siltation and sedimentation by increasing both soil/water interaction time and the sediment load potential of flowing water. The proposed project would change the sites drainage by installing impermeable surfaces including parking lots. However, the proposed project will include an engineered drainage system to manage stormwater flows subject to a permit. The new system expected to handle both the runoff that currently flows to the site from surrounding developments and the increased runoff from the proposed impermeable surfaces on-site. Existing regulations will require that the final design of the project's drainage system will be engineered so that post-development peak runoff discharge rates are equal to or less than pre-development peak runoff rates. Further, the project does not propose channelizing any drainage course or focusing surface water flows into any areas of exposed soil. Additionally, the on-site drainage system is required to include

	best management practices (BMPs) to reduce erosion and siltation to the maximum extent practicable. Therefore, with the application of standard engineering practices, compliance with permit requirements and other City requirements, the proposed project would not result in substantial erosion or siltation on- or off-site, and the project would have less than significant impact on the environment.
	d.) Less Than Significant: A man-made flood control channel known as Bowman Wash is located to the south of the project site and it collects surface flows from stormwater during rain events (Source: Ridgecrest Commercial Specific Plan Offsite Improvement Project). Flows collected from urban developments are directed to the man-made channel and ultimately directed to a weir/culvert located at South China Lake Boulevard. The project proposes to allow surface run-off directly in to the existing man-made channel similar to other commercial developments in the area. The public right of way for the Bowman Road located to the south of the project area includes the man-made channel and a meandering bike path exists along the northerly line of the right of way for the Bowman Wash, within an easement. Low Impact Development (LID) standards will be implemented in the project to mitigate post development runoff impacts to the watershed. Other LID measures to be included are sedimentation basins and bioswales. Implementation of these measures and the existing design standards in the City Code would reduce the stormwater impacts from the project to less than significant.
	e.) Less Than Significant: The proposed project could increase runoff by increasing the impermeable surfaces on-site. However, compliance with City's Master Drainage Plan (1989) and applicable other requirements and permits, would ensure that post-development peak storm water runoff rates do not exceed pre-development peak storm runoff rates. The off-site drainage network that supports the subject property and surrounding watershed will be adequate to handle the project's post-development runoff. Also, the project will generate only typical, non-point source, urban stormwater pollutants. These pollutants are covered by the applicable permits required of the project to reduce stormwater pollutants to the maximum extent practicable. Therefore, the proposed project would not create runoff that would exceed the capacity of the stormwater drainage system and would

	not provide a substantial additional source of polluted runoff. Therefore the impacts would be less than significant.
	f.) Less Than Significant: The project will not be point-source generator of water pollutants. Long-term water pollutants expected to be generated on-site are typical urban stormwater pollutants. Compliance with the City's permitting requirements will ensure these stormwater pollutants would not substantially degrade water quality. During construction, potential to generate short-term water pollutants including sediment, trash, leftover construction materials, and equipment fluids exists. The BMPs are required of the project to prevent contaminated construction site stormwater and construction-induced contaminants from entering into the drainage system. Construction sites that are larger than one acre, such as the project site, are subject to additional stormwater pollutant requirements during construction. The LRWQCB requires a CWA, section 402 (p) stormwater permits including National Pollutant Discharge Elimination System (NPDES) General Construction Storm Water Permit, Water Quality Order (WQO) 2009-0009-DWQ obtained from the State Water Board for projects larger than one acre. Submittal requirements for permits include a Storm Water Pollution Prevention Plan (SWPPP) that outline the BMPs that will be incorporated during construction. These BMPs including but not limited to, wattles, covering of stockpiles, silt fences, and other physical means will minimize construction-induced water pollutants by controlling erosion and sediment, establishing waste handling/disposal requirements, and providing non-storm water management procedures. Therefore, project impacts to water quality would be less than significant.
	g. – i.) Less Than Significant: According to the FIRM Map number 06029C1600E effective September 26, 2008, the project site is located within Zone X (areas determined to be outside the 0.2% annual chance floodplain) and shaded Zone X (areas of 0.2% annual chance of flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood). However, project's location adjacent to the Bowman Wash adds to potential impacts from flooding. City requires all structures to be flood proofed. Additionally, the proposed project is not a residential project.

	There are no major dams or waterways located on or near the site, nor did it locate near any bodies of water or water storage facilities that would be considered susceptible to seiche. Project is not located within a flooding or inundation area due to a break of a levee. Therefore, impacts due to flooding would be less than significant.
	j.) No Impact: The project site is relatively flat and the site does not lie in a potential inundation area. There are no major hills or steep slopes in the immediate vicinity of the project site. Additionally, it is not located within any potential source of mudflow. Therefore, no impact would occur with respect to seiche, tsunami or mudflow.
X. LAND USE AND PLANNING	a.) No Impact: The General Plan and Zoning designate and zoned the area as commercial. The development of the project will comply with General Plan policies as well as Zoning Ordinance requirements except as requested under the Variance. As proposed, the project would not create new barriers or obstruction for vehicles or pedestrians/bicyclists outside the project site. Therefore, the project would have no impact related to physically dividing a community.
	b.) Less Than Significant: Applications submitted include a TPM, SPR, Variance and a Development Agreement. Except for requested variance for parking as described under the Project Description above, all applications are in compliance with the General Plan and the Zoning Ordinance. The commercial designation of the property allows proposed uses that are to be developed in phases. The project is not a part of a specific plan area or any other plan designed with the purpose of avoiding or mitigating an environmental effect. The City of Ridgecrest is not located in a Coastal Zone. Therefore, the project would have less than significant impact with regards to adopted land use plan or regulation.
	c.) No Impact: The 9.4–million acre West Mojave Habitat Conservation Plan covers the area bounded by Olancha in Inyo County on the north to the San Gabriel and San Bernardino mountains on the south, and from the Antelope Valley on the west to the Mojave National Preserve on the east. This area includes private lands, public lands managed by the federal Bureau of Land Management (BLM) and military bases. The Plan's main objective is to protect the desert tortoise and nearly 100 other sensitive plants and animals, as well as their ecosystems. As indicated in Section IV – Biological Resources, Issue (f), the biotic assessment prepared for the project did not identify any presence

	of sensitive species or their habitat on the project site. This report further states that the site has been highly degraded due to human and previous on-site activities and other factors. Therefore, no impacts anticipated due to conflicts with habitat conservation plans or natural community conservation plans or regulation.
XI.MINERAL RESOURCES	a.-b.) No Impact: No known mineral resources of any value to the region and the residents of the state have been identified within the City of Ridgecrest and on the project site. The project would not result in the loss of availability of a locally important mineral resource recovery site delineated on the local general plan, any specific plan or other land use plan. Therefore, no aspect of the project would impact mineral and energy resources.
XII. NOISE	a.) Less Than Significant: Noise impacts are considered significant if they expose persons to levels in excess of standards established in local general plan or noise ordinances. In the City of Ridgecrest, maximum allowable noise exposure for office buildings and business commercial and professional is 61 to 65 dBA while 66 – 75 dBA considered conditionally acceptable as indicated in Table 8-1 of the General Plan. Residential uses are located to the east of the project site. Adjacent residents may be exposed to periodic increases in noise levels during construction; however, construction noise would be temporary and short term construction noise due to activities poses no impacts. Longer term noise will be generated by operations associated with the project such as vehicles entering and exiting the project site, vehicle testing and vehicles on nearby roadways. All grading and construction equipment must comply with established noise regulations. Future buildings on the site will be built in compliance with California Building Code standards for noise attenuation. Therefore, 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 would be considered less than significant.
	b.) Less Than Significant: There are no established vibration standards in the City of Ridgecrest. Additionally, the proposed commercial development would neither generate, nor expose people to excessive ground-borne vibrations or ground-borne noise levels. Furthermore, the proposed project does not involve

	construction practices that are typically associated with vibrations, such as pile driving and largescale demolition. Construction equipment generated vibrations, if any, will be limited to short durations. Therefore, impacts from exposure to vibrations would be less than significant.
	c.) Less than Significant: The project proposes to construct a commercial shopping center anchored by a movie theater. There are other actions requested by the applicant to facilitate the project. The Traffic Impact Study dated November 29, 2018 prepared by Associated Transportation Engineers estimate that the project at build out would generate 4,375 average daily trips (see Section XVI – Transportation/Traffic below). The primary noise generated by the project would be from vehicles. Noise generated from vehicular traffic on adjacent South China Lake Boulevard and other local streets would be higher than the vehicle related noise generated within the project. Therefore, permanent increase in ambient noise from the project would be less than significant.
	d.) Less Than Significant: During periods of construction, the project would generate short-term noise. Examples of levels of such incidents include 81-96 dBA from pile driver, 75-85 dBA from a jackhammer, 85-90 dBA from operating a dozer; all at 50 feet of the source. These noise levels typically dissipate at a rate of 6 dBA per doubling of distance. Therefore, a noise level of 86 dBA at 50 feet would be reduced to 80 dBA at 100 feet. A residential development is located immediately east of the project site. Approximate distance from proposed buildings, where much of the pad preparation as well as construction activities would occur, is 30 feet with a six foot high existing wall located at the property line. Based on above information, noise levels would be closer to acceptable levels established by the General Plan due to existence of a wall. However, any noise levels that exceeds acceptable levels would be temporary, limited to times during construction. However, operational noise levels generated by vehicular activities would be within the guidelines due to mandated vehicle operation standards. Therefore, operation of the project would not cause a substantial periodic increase in ambient noise levels and associated impacts would be less than significant.
	e.-f.) No Impact: The nearest public/private airport is the Inyokern Airport located several miles northwest of the project site. However, as discussed in Section VIII. HAZARDS AND HAZARDOUS

	MATERIALS above, the City of Ridgecrest is the closest urban area to the Naval Air Weapons Station (NAWS) China Lake and the project area is located outside of the established Air Installation Compatible Use Zone (AICUZ) based on Figure 4-2. 2007 AICUZ of the General Plan. Since the project is a commercial development and the site is not located within any airport land use plan, public or private airport, the project would not expose people to severe noise levels from an airport or aircraft-related activities. Therefore, the project would not be impacted by the operations of public or private airports.
XIII. POPULATION AND HOUSING	a.) Less Than Significant: The proposed project is a commercial development as such would not directly contribute to the populations. However, the project will generate number of employment opportunities within the City. It is difficult to predict whether new employees would come from outside of the City of Ridgecrest or not, and therefore, it is difficult to estimate the actual number of residents as a result of the project. With an approximate 2016 population of over 28,000, the City of Ridgecrest has the second largest population in Kern County. The Indian Wells Valley where the City is located is estimated to have over 40,000 people. Assuming that all employed by the proposed project would come from outside the City, it would contribute to the day time population of the City. However, project would attract new population due to new employment opportunities created by the project. Further, the project would provide additional services as well as pay fees to improve such services as required by various servicing agencies. However, the incremental addition of new population due to the project would be minimal. Therefore, the proposed project would contribute less than significant population growth.
	b.-c.) No Impact: The proposed project would neither displace people nor would it displace substantial numbers of existing housing. The proposed project is a commercial development to be located on vacant land. Therefore, the proposed project would have no impact by displacing people from existing housing or substantially reduce the numbers of existing housing.
XIV. PUBLIC SERVICES	i.) Fire Protection: Less Than Significant: The Kern County Fire Department and Office of Emergency Services (KCFD) provide fire protection services in the City of Ridgecrest. Fire Stations No. 77 and 74 provide primary service with Fire Station No. 73 located in Inyokern serving as the backup. Fire Station 74 is located

	approximately three miles north of the project site at 139 East Las Flores Avenue. Fire station 77 is located approximately 1.5 miles southwest of the project site at 815 West Dolphin Avenue. The Kern County Fire Department regularly evaluate service needs and take actions to provide adequate fire protection services to the City. The project would result in developing a new commercial shopping center anchored by a cinema. Project would add to the fire hazard potential needing new or extension of existing services. However, the Kern County Fire Department has not indicated that they are unable to provide service to the proposed project area.
	ii.) Police Protection: Less Than Significant: The Ridgecrest Police Department (RPD) provides police protection services to the City. RPD regularly evaluate staff needs to adequately serve the City. Therefore, the proposed project would have less than significant impact on police services.
	iii.) Schools: No Impact: The Sierra Sands Unified School District provides education services to students in K–12 grades. The proposed project is a commercial development and thus, would not directly add any school-aged children. Therefore, the proposed project would not impact school services. However, the development will be subject to paying school impact fees as adopted by the jurisdiction.
	iv.) Parks: No Impact: The City provides parks and recreation opportunities for its residents. The proposed commercial project would not directly lead to an increase in the use of the local and regional park system. Therefore, the proposed project would have no adverse impact on park services. However, the development will require a payment of impact fees as adopted by the City.
	v.) Other Public Facilities: No Impact: The proposed commercial project would not directly contribute new residents to the area that would lead to an increase in the use of local library system and other public services. Therefore, the project would not result in the need for new or expanded public and other services.
XV. RECREATION	a.-b.) No Impact: The proposed development includes entitlement approval for a TPM, SPR, Variance and a Development Agreement. The project is a commercial development and would be used primarily by the population of Ridgecrest and surrounding communities. The proposed project is not expected to increase the use of public parks and other recreational opportunities.

	Therefore, the proposed project would not lead to physical deterioration of any existing recreational facilities or effect on the environment from the construction or extension of recreational facilities.
XVI. TRANSPORTATION/TRAFFIC	a.-b.) Less Than Significant: A Traffic Impact Study for the proposed 17.35 gross acre commercial project known as the Oasis at China Lake has been prepared by Associated Transportation Engineers dated November 29, 2018 (see Attachment 3). The analysis provides information relative to existing and future traffic conditions in the vicinity of the project site and identifies potential impacts based on impact threshold outlined in the General Plan. The City of Ridgecrest General Plan, Circulation Element, Policy C-2.4, indicates that the City strive to maintain Level of Service(LOS) "C" or better on local streets and intersections. The study finds that all study-area intersections are currently operate at LOS C or better. The intersection of South China Lake Boulevard at Rader Avenue operates at LOS A for both AM and PM Peak Hour. Intersection of South China Lake Boulevard at Bowman Road operates at LOS B for AM Peak Hour and LOS C for PM Peak Hour. These LOS are expected to be operated at the same level at year 2022. Study assumes the project to be fully operational by year 2022. Based on the Institute of Transportation Engineering (ITE) Trip Generation manual, the study expects the project at build-out to generate 4,375 average daily trips (ADT) with AM Peak Hour trips of 151 and PM Peak Hour trips of 562. The study concludes that project area intersections to operate at LOS C or better with project generated trips added. Therefore, the study concludes that the project would not significantly impact the study-area intersections.
	c.) No Impact: No aspect of the project expected to change in air traffic patterns by increasing traffic levels or change in location.
	d.) No Impact: The project's circulation design is required to meet or exceed the City's engineering standards and the City Engineer will be reviewing all related plans for compliance with City standards. The City Engineer has reviewed the requested variance to reduce parking space width, length and drive aisle width at 60^0 parking and did not indicated any associated issues with the proposal. Therefore, the proposed project would not increase hazards due to a design feature or incompatible use and therefore, would have no associated impacts.

	e.) No Impact: Main access as well as a secondary driveway access to the project site is provided on South China Lake Boulevard. Two other access points are located on East Rader Avenue. No gates or any other barriers are proposed at any access point that would limit emergency access. The project has been circulated for comments to various agencies including the fire and police departments. No adverse comments related to access or emergency access have been received by the City. Therefore, the proposed project would have no impacts on emergency access.
	f.) No Impact: The proposed project would not conflict with any plan; policy or program related to public transit, bicycle, or pedestrian facilities or decrease the performance or safety of such facilities. A bicycle path already exists along the southerly boundary of the project site within an easement. The proposed site plan does leave the existing facilities as is and no revisions are proposed. Therefore, the proposed project would have no impact to these areas.
XVII. UTILITIES AND SERVICE SYSTEMS	a.) Less Than Significant: The City of Ridgecrest is responsible for collection, conveyance, treatment, and disposal of waste water generated in both City and Naval Air Weapons Station China Lake. The treatment facility is located on government (Navy) property and the facility is operating at 75 percent or less of capacity. The proposed project includes the construction of a commercial development and other on-site amenities. None of the proposed uses would generate atypical wastewater such as industrial or agricultural effluent. All wastewater generated by the project is expected to be domestic sewage. Wastewater treatment facilities are designed to treat domestic sewage; and thus, typical domestic sewage does not exceed wastewater treatment requirements. Since the project would not generate atypical wastewater, the project would not exceed wastewater treatment requirements, and the project would have less than significant impacts.
	b.) Less Than Significant: As indicated above, waste water generated by the project is processed at City maintained waste water treatment facilities. Water supply for the City is provided by the Indian Wells Water District. The District relies on the continued use of groundwater as its source of portable water, consistently manages the valuable groundwater resources and actively participates in the Indian Wells Valley Cooperative Groundwater Management Group.

	The project would increase the demand for water and wastewater service. However, the increased demand for water/wastewater services would be minimal in comparison to the existing service areas of the water and wastewater service purveyors. Additionally, the facilities currently maintained by the service purveyors are adequate to serve the proposed increase in demand. The water and wastewater improvements required for the project are on-site pipelines and unit connections to the infrastructure systems, which are subject to connection fees. Therefore, the proposed project would not require or result in the construction or expansion of new water or wastewater treatment facilities off-site, and the project would have less than significant associated impacts.
	c.) Less Than Significant: As discussed in subsection IX, Hydrology and Water Quality, the proposed project would generate stormwater runoff. The City maintains its stormwater and drainage infrastructure. New developments are required to be responsible for expansion of existing water, sewer, and storm drainage systems necessary to accommodate the development. The final design of the project's drainage system would be engineered so that post-development peak runoff discharge rates are equal to or less than pre-development peak runoff rates. Project is designed with an off-site detention basin to be located on the Bowman Wash located along the southerly border of the project. This concept is consistent with existing commercial developments in the general vicinity. Based on the proposed drainage features including the detention basin and application of standard engineering practices are expected to minimize impacts to storm water drainage system. Therefore, the proposed project would not require or result in the construction of new off-site stormwater drainage facilities or the expansion of existing facilities off-site, and the project would have less than significant related impacts.
	d.) Less Than Significant: As stated above, the Indian Wells Valley Water District provides water throughout the City of Ridgecrest including the project site. The district relies on local groundwater as its main source of water. The District has not indicated that they are unable to provide service to the proposed project site, nor has it issued a Will Serve letter. Therefore, it is assumed that the existing water supplies are sufficient to adequately serve the project.

	The proposed project would not require new or expanded water entitlements and therefore, the project would have less than significant impacts.
	e.) Less Than Significant: As indicated above, the City is responsible for the collection, conveyance, treatment, and disposal of all wastewater generated in the City and the adjacent Naval Air Weapons Station, China Lake. All wastewater collected is conveyed through regional wastewater conveyance facilities (trunk sewer lines, lift station, and force main) to the City's Regional Wastewater Treatment Plant. The treatment plant is located on the China Lake property and generates secondary treated effluent. The plant's current capacity is 3.6 million gallons per day (approximately 11 acre-feet per day), and is currently operating at approximately 75 percent or less of capacity (IWVWD 2011, p. 31). More than one-third of the wastewater treated at the plant is generated by the China Lake facilities, with the remainder generated in Ridgecrest (IWVWD 2011, p. 31). Since existing facilities have the capacity to service projected demand for wastewater treatment including the proposed project, the project would have less than significant impacts.
	f.-g.) Less Than Significant: The proposed project including the development of a commercial center is consistent with the General Plan and zoning and thus, is consistent with growth projections. Solid waste collection and disposal for commercial developments in the City of Ridgecrest is processed by the Ridgecrest Recycling and Sanitary Landfill. Collected garbage and recycling is taken to the Ridgecrest Recycling and Sanitary Landfill. The landfill has been estimated to operate until the end of 2045 (CalRecycle 2011). Therefore, the development of the proposed project would have less than significant related impacts and comply with federal, state, and local statues and regulations related to solid waste.
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE	a.) Less Than Significant: Based on analysis contained in Sections IV. Biological Resources and VI. Geology and soils of this Initial Study, approval of requested entitlements and subsequent construction of the proposed project would not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory. According to the Biotic Assessment of the project site, no evidence of species identified as a candidate, sensitive, or special status species in local

	or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service were found on the site. Additionally, geotechnical engineering investigation of the project site did not reveal any evidence of presence of any important examples of major periods of California history or prehistory. Therefore, the proposed project does not have a Mandatory Finding of Significance due to impacts to biological or cultural resources.
	b.) Less Than Significant: The proposed project is a commercial development bounded by commercial developments to the north, south and west and located within an increasingly urbanizing area. The proposed project will meet all of the City of Ridgecrest's development standards (Except as described in the variance) as defined by the Unified Building Code as well as all requirements defined by the California Building Code. Therefore, based on the analysis contained in this Initial Study, the project would not have a cumulatively considerable contribution to any significant cumulative impact. Therefore, the proposed project does not have a Mandatory Finding of Significance due to cumulative impacts.
	c.) Less Than Significant: According to the preceding environmental evaluation, there are no aspects of the proposed commercial project that would have a substantial adverse effect on human beings, either directly or indirectly. Under each environmental condition addressed herein, the proposed project is considered to have either no impact, or less than significant impact. Therefore, the proposed project would not create environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly.

PROPOSED NEGATIVE DECLARATION

City of Ridgecrest
Planning Department

100 West California Ave., Ridgecrest, CA 93555
(760) 499-5061 FAX (760) 499-1580
www.ci.ridgecrest.ca.us

PROPOSED NEGATIVE DECLARATION

Project No.: Tentative Parcel Map (TPM) 12291, Site Plan Review (SPR) 19-01, Variance 19-01 and Development Agreement

Applicant: G&L China Lake, LLC

Applicant Address: 430 North Bedford Drive
Beverly Hills, CA 90210

Project Description:

Tentative Parcel Map (TPM) 12291

The existing 17.34 gross acre site contains six assessor's parcels. TPM 12291 proposes to subdivide the commercially zoned property into 13 parcels. Proposed parcel sizes range from 10,030 sq. ft. (Parcel 3) to 495,410 sq. ft. (Parcel 13). Local and State subdivision laws allow commercially zoned properties to be subdivided using the Parcel Map process regardless of the number of parcels.

All newly created parcels meet the required minimum lot size of 10,000 sq. ft. each (Section 20-16.4) and no less than 100-foot lot depth (Section 20-16.6) of the Zoning Ordinance for properties located in General Commercial (CG) zone.

Site Plan Review (SPR) 19-01

Submitted plans indicate that the applicant intends to develop the 17.34 gross acres in phases. The proposed Phase 1 of the project includes development of 53,977 sq. ft. two story 10-screen cinema and a 7,486 sq. ft. retail space on proposed 1.73-acre Parcel 4 of TPM 12291, a retail (may include a restaurant space) buildings located immediately southwest of the proposed cinema on proposed 0.36-acre Parcel 5 of TPM 12291, a 11,993 sq. ft. professional office building on proposed 0.38-acre Parcel 1 of TPM 12291, two graded pads for future retail development on proposed 0.33-acre Parcel 2 and 0.23-acre Parcel 3 of TPM 12291, two drive-thru fast food restaurants located on either side of the main access off of China Lake Boulevard on proposed

0.36-acre Parcel 9 and 0.28-acre Parcel 10 of TPM 12291, and common parking on proposed 11.37-acre Parcel 13 of TPM 12291 to accommodate proposed Phase 1 development.

Timing and sequence of development of Phase 2 of the project area is not known at this time. The applicant anticipates that Phase 2 will occur incrementally and will include the remaining development of the project which could include additional retail and office space, a market, pharmacy and restaurant space. The proposed Development Agreement address time periods for development of the entire project.

When completed, the project will include 164,829 sq. ft. of building area and 718 parking spaces (685 regular and 33 ADA compliant). The applicant is requesting approval of a variance for parking as described below.

Submitted site plan indicates building and other setbacks including a 10-foot setback (Section 20-16.7(b)(1) of the Zoning Ordinance) along the east property line adjacent to existing residential.

All proposed buildings will be single-story except for the cinema, contemporary style and uses earth tone color palette (white and rust colored cement plaster). Storefronts will have dark red and dark bronze anodized aluminum. Light weight metal canopies will be used at entrances to buildings.

Variance 19-01

Standards for off-street parking are contained in Chapter 20-20 of the Zoning Ordinance. Additionally, Section 20-20.16 of the Zoning Ordinance incorporates City standards as established by the City Council into the ordinance. The City Council adopted parking lot design standards are contained in No. 21 of the City Engineer's Design Guidelines.

The applicant is seeking a parking variance as follows:

1. City standards require a width of 10 feet and length of 20 feet for a double striped 90^0 parking spaces. The applicant requests approval of a variance to provide 9.5 X 18-foot 90^0 parking spaces.
2. City standards require 9 X 20-foot parking spaces with a one-way drive aisle width of 19 feet for 60^0 parking (Herringbone pattern). The applicant is requesting approval to provide 9.5 X 18.5-foot shorter length and 24-foot longer length parking spaces at 60^0.
3. One-way drive aisle width of 17 feet for 60^0 parking spaces in lieu of 19 feet as required by the City standards.

The applicant's engineer has provided a justification along with a supporting document from a traffic consultant for the request.

Development Agreement

A Development Agreement between G&L China Lake, LLC and the City of Ridgecrest is also proposed for the development of the vacant 17.34-acre property. Under the proposed agreement, the City agrees to allow ten (10) years to develop the project from the date of an application for a building permit for Phase 1; provisions for extension of time period; concurrent processing of entitlement applications; authorize the City Manager to allow reasonable extension of Development Schedule; vested rights to develop the project subject to provisions of the Agreement; pay fees imposed by the City; and other provisions. Exhibit B of the Development Agreement includes a schedule for development of Phase 1 and 2 of the project.

Project Location: Southeast corner of South China Lake Boulevard and East Rader Avenue

On the basis of the Initial Study prepared for the project, it has been determined that the project would not have a potentially significant effect on the environment. A copy of said Initial Study is available for review at the City of Ridgecrest, Planning Division, 100 West California Avenue, Ridgecrest, CA 93555. This document constitutes a Negative Declaration.

Heather Spurlock
Analyst
Date:

ATTACHMENT 1

BIOLOGICAL ASSESSMENT

BIOTIC ASSESSMENT

FOR A PROPOSED DEVELOPMENT PROJECT

(ASSESSORS MAP 80-02) IN RIDGECREST, CALIFORNIA

Prepared for:

Cornerstone Engineering
208 Oak Street
Bakersfield, CA 93304

Prepared By:

Kiva Biological Consulting
PO Box 1210
Inyokern, CA 93527

November 29, 2018

Peter Woodman P. Woodman **Date** November 29, 2018

The findings of this report are valid through November 29, 2019.

INTRODUCTION

This report provides the results of an assessment of the federal and state listed (threatened) Mojave desert tortoise (*Gopherus agassizii*) and a habitat evaluation for the state listed (threatened) Mohave ground squirrel (*Spermophilus mohavensis*) on approximately 15.57 acres in the southeastern portion of Ridgecrest, Kern County, California (Figure 1). Cornerstone Engineering has proposed to construct a commercial develoipment on the site. This purpose of this biotic survey was threefold: to determine the presence/ absence of desert tortoises and potential impacts to their habitat, amount of existing human impacts to the habitat on the proposed project site for Mohave ground squirrel, and the presence or absence of other sensitive species.

Studies have shown that tortoise habitat is shrinking in California and Nevada and tortoise densities are declining. On August 4, 1989 in response to the declines in tortoise densities, the U.S. Fish and Wildlife Service (USFWS) determined the desert tortoise to be endangered under an emergency rule (as authorized under the Endangered Species Act of 1979, as amended). USFWS published a proposed rule in the Federal Register on October 13, 1989 that would provide long-term endangered status. On April 2, 1990 the desert tortoise was permanently listed as a Federally Threatened species. On June 22, 1989 the California Fish and Game Commission voted to list the desert tortoise as threatened under the California Endangered Species Act of 1970. The tortoise is also listed as a U. S. Bureau of Land Management (BLM) sensitive species. The USFWS and California Department of Fish and Wildlife (CDFW) requires that a survey be conducted to determine the presence or absence of desert tortoises prior to habitat alteration.

The project site lies within the known range of Mohave ground squirrels (MGS), a State-listed threatened species (California Department of Fish and Wildlife 2015). This species has a relatively limited range, occurring in southwestern Inyo, eastern Kern, northwestern San Bernardino, and northeastern Los Angeles counties (Leitner 2008). The site is within the known range of the species. However it is not within any of the four core population areas or movement corridors.

The site is also within the known range of two (CDFG 1998) sensitive species of birds that may be residents: Burrowing Owl (*Athene cunicularia*) and LeConte's Thrasher (*Toxostoma lecontei*).

PROJECT DESCRIPTION

Cornerstone Engineering has proposed to develop six parcels of Assessors Map No. 80-02, Parcel Maps 7802 (Parcels 55, 56, 57, and 58) and 3863 (Parcels 27 and 28). The site is in the south 1/2 of Section 3 in Township 27 South, Range 40 East (Figure 1). Cornerstone Engineering has proposed to construct a commercial development with retail stores on the property. The property is approximately 15.6 acres (6.3 ha) in size.

METHODS

There are two state and or federally listed species of concern in Ridgecrest: the desert tortoise and the Mohave ground squirrel. The desert tortoise can be identified either by finding live tortoises and/or diagnostic tortoise sign (i.e. burrows, scat, carcasses, and/or tracks). Most recommendations in USFWS protocols for desert tortoise surveys (2010) were followed. Transects, spaced at five meter intervals, were walked throughout the 15.6 acre site in a north to south direction. The survey was not conducted during the tortoise activity period. Because the survey was not conducted during the tortoise active season transects were spaced at five meter intervals instead of ten meters as recommended by the Service. The site is quite open thus sign, especially burrows, would be visible..

During the tortoise survey Woodman searched for active rodent burrows and scat. A burrow was considered active only if it was in clean and in good condition (i.e., it was not collapsed). Impacts were noted and mapped. These impacts include off highway vehicle (OHV) use, roads through area, horse and foot traffic, dog activity, urbanization, garbage dumping, mining activity, utilities, grazing, and shrub disturbance. Impacts were mapped and photographs were taken of the project site. Protocol surveys were not conducted.

Emphasis was placed on identifying sign of or live Burrowing Owls and LeConte's Thrasher during the survey. Burrowing Owls leave diagnostic sign, scat and pellets at burrows whereas LeConte's Thrasher must be heard or seen during the survey.

During the tortoise survey and human impact assessment, a plant list was compiled and all vertebrate species were noted (Appendices 1 and 2). Peter Woodman conducted the field survey on November 5, 2018.

ENVIRONMENTAL SETTING

The site is at an elevation of 2,250 feet. The habitat was saltbush scrub with very few subshrubs. The dominant perennial species was *Atriplex polycarpa* (allscale). Three *Larrea tridentata* (creosote) were in the northwest corner. A few *Ambrosia salsola* (cheesebush) were along the south border. No other perennial shrubs were observed. Common annuals included *Erodium cicutarium* (filaree) and *Schismus barbatus* (split grass). Soils were primarily sandy loam with some pebbles. Topographically the site was flat and drainage is via sheet flooding, primarily onto Upjohn Street, immediately south of the proposed project site. The slope is low, approximately one to two percent and the aspect is to the southeast.

EXISTING IMPACTS

The proposed project site is located in the southeastern portion of the City of Ridgecrest, California. Development of this part of Ridgecrest began in the 1950's with the site initially developed as an agricultural field. The area has developed markedly since then. Currently the site is completely surrounded by single-family homes to the east and commercial developments to the north, south, and west: Super WalMart is immediately south, the old WalMart and Albertsons Grocery Store is to the southwest, AltaOne Credit Union is immediately west, and a

commercial development with bowling alley, restaurants and a Veterinary practice is to the north. The site is completely bordered by paved roads. Bowman Road is adjacent to the south and China Lake Blvd. is immediately west of the site. Both roads are main arterial roads for Ridgecrest and used by thousands of vehicles daily. Distribution roads are to the north and east.

The site itself has been impacted by a variety of human uses for many years (Figures 2 thru 8). The site was cleared in the 1950's for an agricultural field. The furrows for the field are still visible on the central portion of the site. The fields have been fallow since the 1960's. PG&E used the southern third of the site for a hydro-test from July thru October 2018. At the time of the their test site was still fenced wiuth plastic OSHA fencing and was completely denuded. Much large equipment and personnel were used for the test. Several two-track roads, two off-road vehicle (ORV) trails, and a few motorcycle tracks were on the site. Three large billboards are adjacent to China Lake Blvd.

There is an approximately 10 acre area of desert west of the south half of the project site but it has also been impacted by much human use. Although this area is currently creosote bush scrub it has been heavily impacted by human use and there are dirt roads and motorcycle trails that bisect the site. Over the past 15 years Woodman has conducted Desert Tortoisee Surveys for several proposed projects near the current project site but has found no evidence of desert tortoise or Mohave ground squirrel.

RESULTS AND DISCUSSION

No live desert tortoises or desert tortoise sign were observed on the property (Appendix 3). The proposed project site is not within Critical Habitat for the desert tortoise nor in a Desert Wildlife Management Area. The region is designated as Category 3 habitat for the desert tortoise by the Bureau of Land Management (1988). This means that desert tortoises may or may not be present, that conflicts are variable in extent and intensity, and there is no special management emphasis. Given the project site is mostly denuded, surrounded by homes and heavily used paved roads this area is not habitat for desert tortoise.

No Mohave ground squirrels were observed during the survey which was expected due to the time of year. In fact only three rodent burrows of any kind were found during the survey. All were old and in poor condition and were to small for ground squirrels. No antelope ground squirrel (*Ammospermophilus leucurus*) were observed during the survey. Its burrow was not found. MGS have not been trapped within two miles of the site for many years. When assessing the site for permitting several factors should be taken into consideration: the project proposed would be inbuilding, that is filling in undeveloped land that is surrounded by existing developments; the land has been impacted for many years by a variety of human impacts; and the property is not and will never be part of a larger, functional ecosystem.

No other sensitive vertebrate species or their sign were observed on or near the project site. However, the site is within the range of two other species of special concern, Burrowing Owl and LeConte's Thrasher. No sign of Burrowing Owls was found. Owls were not seen or heard nor

was their diagnostic sign (pellets, tracks, or feathers at a burrow). No burrows large enough to accommodate an owl were found. By walking transects spaced at ten meter intervals, one would expect owls to flush if they were present on site. LeConte's Thrashers were also not seen or heard, even though we were on the job site for 4.5 hours. However, apparently snow geese used the site last winter for foraging on dried annual plants as there was much goose scat and several thousand snow geese use the Indian Wells Valley for a winter home. The geese primarily feed on the expanses of grass at athletic fields, golf courses, parks, etc. Obviously there was something to graze or the site was used as a roost.

No additional sensitive species were reported on the California Natural Diversity Data Base records search.

This report is valid until November 29, 2019.

RECOMMENDATIONS

1. Because there were no desert tortoises nor sign of desert tortoises on or adjacent to the property, no additional recommendations are made to mitigate for desert tortoise.

2. Although a trapping program was not conducted to verify presence /absence of Mohave ground squirrels the site is heavily impacted by a variety of human use. Because of the location of the proposed development and its lack of potential as long-term habitat, no recommendations to mitigate for Mohave ground squirrels are made.

3. Common ravens and coyotes are known predators of the desert tortoises. Both species are attracted to areas with litter and discarded food items. Littering is illegal and cannot be tolerated.

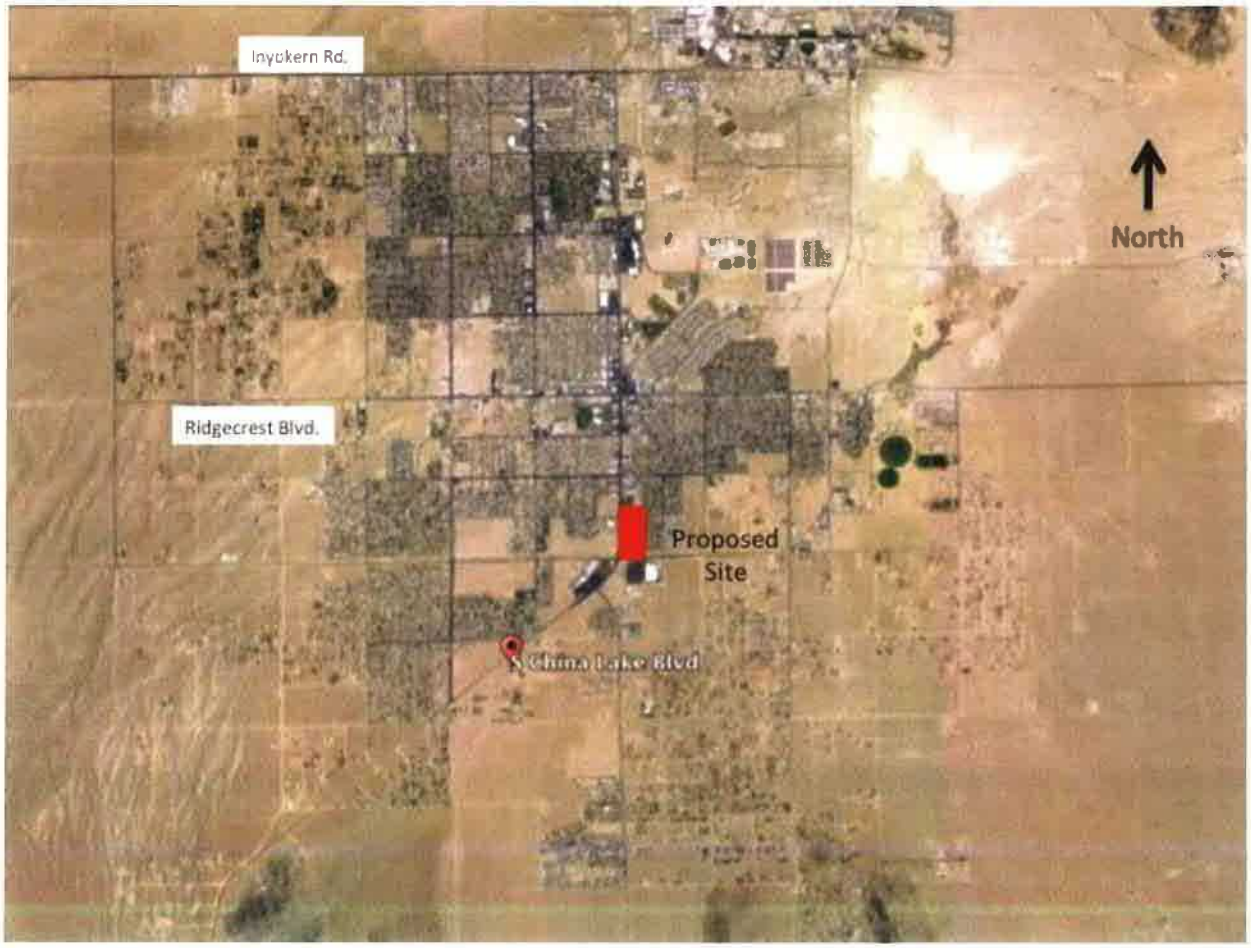

Figure 1. General location of the project site proposed by Cornerstone Engineering in Ridgecrest, California

Figure 2. Project site proposed by Cornerstone Engineering in Ridgecrest, California. Details of impacts surrounding the site.

Figure 3. Project site proposed by Cornerstone Engineering in Ridgecrest, California. Details of impacts on the site.

Figure 4. Habitat in the center of proposed project site looking northeast. Retail center and homes in background

Figure 5. Habitat from center of Cornerstone project looking southwest. Note the motorcycle tracks and orange safety fencing.

Figure 4. Central portion of Cornerstone project looking southeast. Note old furrows.

Figure 5. From west edge of Cornerstone project looking north. China Lake Blvd to left.

Figure 6. From southwest corner of Cornerstone project looking east. In foreground is PG&E test site, paved walkway, and rest stop for the walkway. Homes are in the background.

Figure 7. South-central portion of Cornerstone project looking to southeast. PG&E test site, safety fencing in foreground with WalMart and homes in background.

LITERATURE CITED

Baldwin, B. G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D. H. Wilkins, editors. 2012. The Jepson manual: vascular plants of California, 2nd Edition. University of California Press, Berkeley, California.

California Department of Fish and Wildlife, Natural Heritage Division. 2015. List of Special Animals. Sacramento, California.

Leitner, P. 2008. Current status of the Mohave ground squirrel. Trans West. Sect. Wildl. Soc. 44: 11-29.

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APPENDIX 1

LIST OF PLANT SPECIES

OBSERVED ON A PROPOSED DEVELOPMENT

SITE IN RIDGECREST, CALIFORNIA

PLANT SPECIES LIST
Cornerstone Engineering: Apartment Development (AMN 80-02)
T27S, R40E, Section 3, Kern Co., CA
Compiled by P. Woodman, November, 2018

ASTERACEAE	**Composite Family**	
Ambrosia salsola	Cheesebush	Native shrub, four along southern boundary
BORAGINACEAE	**Borage Family**	
Amsinkia tessellata	Fiddleneck	Weedy annual, common on site
CHENOPODIACEAE	**Goosefoot Family**	
Atriplex polycarpa	Allscale	Native perennial, uncommon on site
Chenopodium californicum		Weedy exotic, along southern boundary
Salsola tragus	Russian thistle	Weedy exotic, common in disturbed areas
EUPHOBIACEAE	**Spurge Family**	
Eremocarpus setigerus	Turkey mullien	Weedy annual, occasional on site
GERANIACEAE	**Geranium Family**	
Erodium cicutarium	Storksbill, Filaree	Weedy annual, common on site
POACEAE	**Grass Family**	
Bromus madritensis	Red brome	Weedy exotic, in northern portion
Schismus sp.	Split grass	Low exotic annual, abundant throughout the site
ZYGOPHYLLACEAE	**Caltrop Family**	
Larrea tridentata	Creosote Bush	Tall open shrub, 3 plants in NW corner

APPENDIX 2

LIST OF VERTEBRATE SPECIES

OBSERVED ON A PROPOSED DEVELOPMENT

SITE IN RIDGECREST, CALIFORNIA

VERTEBRATE SPECIES LIST
Cornerstone Engineering: Commercial Development (Assessors Map 80-02)
T27S, R40E, Section 3, Kern Co., CA
Compiled by P. Woodman, November 5, 2018

CLASS REPTILIA

FAMILY: IGUANADAE

Uta stansburiana	Side-blotched lizard

CLASS AVES

FAMILY: ANATIDAE

Chen caerulescens	Snow Goose (scat)

FAMILY: ALAUDIDAE

Eremophila alpestris	Horned lark

FAMILY: CORVIDAE

Corvus corax	Common raven

FAMILY: FRINGILLIDAE

Carpodacus mexicanus	House finch

FAMILY: PASSERIDAE

Passer domesticus	House sparrow

CLASS MAMMALIA

FAMILY: CANIDAE

Canis familiaris	Domestic dog

APPENDIX 3

DESERT TORTOISE SURVEY FORM

FOR THE U. S.

FISH AND WILDLIFE SERVICE

USFWS DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Please submit completed copies of all datasheets and a shapefile of the sampled area to the action agency and local USFWS office within 30-days of survey completion

Date of survey: November 5, 2018 (day, month, year) Survey biologist(s): Peter Woodman (name, email, and phone number)

Site description: Cornerstone Engineering, Assessors Map 80-02 (project name and size; general location)

County: Kern Quad: Ridgecrest Location: S 1/2, Sect. 3, T27S, R40E (UTM coordinates, lat-long, and/or TRS; map datum)

Circle one: 100% coverage or Sampling Area size to be surveyed: 15.6 Transect #: ____ Transect length: 360 m

GPS Start-point: 0439390/3941070 (easting, northing, elevation in meters) Start time: 1200 am/pm

GPS End-point: 439390/3940710 (easting, northing, elevation in meters) End time: 1630 am/pm

Start Temp: 22 °C End Temp: 22 °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (*in burrow*: all of tortoise beneath plane of burrow opening, or *not in burrow*)	Approx MCL ≥180 mm? (*Yes, No or Unknown*)	Existing tag # and color, if present
1						
2						
3						
4						
5						
6						
7						
8						

NO SIGN

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (*burrows, scats, carcass, etc*)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

NO SIGN

ATTACHMENT 2

Geotechnical Engineering Investigation

MOORE TWINING ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING

INVESTIGATION PROPOSED RETAIL

DEVELOPMENT

THE OASIS

NORTHEAST CORNER OF SOUTH CHINA LAKE BOULEVARD AND BOWMAN ROAD

RIDGECREST, CALIFORNIA

Project Number: G70401.01

For:

G&L China
Lake, LLC 439
North Bedford
Drive
Beverly Hills,

California 90210

www.mooretwining.com

PH: 559.268.7021

FX: 559.268.7126

MOORE TWINING ASSOCIATES, INC.

March 20, 2019 G70401.01

G&L China Lake,
LLC 439 North
Bedford Drive
Beverly Hills, California

90210 Attention: Mr.

Richard J. Gottlieb

Subject: **Geotechnical Engineering Investigation Report Proposed Retail Development - The Oasis**
Northeast Corner of South China Lake Boulevard and Bowman Road Ridgecrest, California

Dear Mr. Gottlieb:

We are pleased to submit this geotechnical engineering investigation report prepared for the proposed Oasis retail development to be located at the northeast corner of South China Lake Boulevard and Bowman Road in Ridgecrest, California.

The contents of this report include the purpose of the investigation, scope of services, background information, investigative procedures, our findings, evaluation, conclusions, and recommendations. It is recommended that those portions of the plans and specifications that pertain to earthwork, pavements, and foundations be reviewed by Moore Twining Associates, Inc. (Moore Twining) to determine if they are consistent with our recommendations. This service is not a part of this current contractual agreement; however, the client should provide these documents for our review prior to their issuance for construction bidding purposes.

In addition, it is recommended that Moore Twining be retained to provide inspection and testing services for the excavation, earthwork, pavement, and foundation phases of construction. These services are necessary to determine if the subsurface conditions are consistent with those used in the analyses and formulation of recommendations for this investigation, and if the construction complies with our recommendations. These services are not, however, part of this current contractual agreement. A representative with our firm will contact you in the near future regarding these services.

We appreciate the opportunity to be of service to G&L China Lake, LLC. If you have any questions regarding this report, or if we can be of further assistance, please contact us at your convenience.

Sincerely,

MOORE TWINING ASSOCIATES, INC.

Zubair
anwar, EIT
Staff
Engineer
Geotechnical Engineering Division

EXECUTIVE SUMMARY

This report presents the results of a geotechnical engineering investigation for the proposed Oasis retail development to be located at the northeast corner of South China Lake Boulevard and Bowman Road in Ridgecrest, California. The site is considered geotechnically suitable for the proposed construction with regard to support of the proposed improvements, provided the recommendations contained in this report are followed.

The project site is undeveloped with scattered scrub brush. In addition, a gravel covered area was noted in the southwest portion of the site and along a roadway access leading to the north side of the site. A small soil stockpile about 5 feet in height was noted in the northwest portion of the site. Multiple rodent burrows were noted within the site. The subject site is relatively flat and slopes gently to the north.

The near surface soils encountered across the site consisted of silty sands extending from the ground surface to depths of about 5 feet to 20 feet BSG. The near surface silty sands were underlain by interbedded layers of clayey sands, silty sands, sandy silts and poorly graded sands extending to the maximum depth explored, about 51½ feet BSG. The upper about 2 to 5 feet of soils encountered were described as medium dense. Below a depth of about 2 to 5 feet below site grade, much of the silty sand soils were observed to be cemented and were described as dense to very dense to depths of greater than 20 feet.

Groundwater was not encountered in the test borings drilled at the time of our December 2018 and January 2019 field exploration to the maximum depth explored, about 51½ feet BSG. Based on our review of available groundwater data from the Department of Water Resources online well database, groundwater within the vicinity of the site is at depths greater than 50 feet BSG.

Due to the compressibility of the near surface soils, to provide uniform bearing surface for the proposed foundations and to account for variability in near surface soils across the subject site, over- excavation of the near surface soils is recommended to support the new foundations on engineered fill. The recommended preparation is intended to limit the static settlement of the structure to 1 inch total and ½ inch differential. Provided the site preparation recommendations of this report are followed, a net allowable soil bearing pressure of 3,500 pounds per square foot, for dead-plus-live loads, may be used for foundation design.

Much of the near surface soils encountered were dense to very dense below depths of about 2 to 5 feet BSG. These soils are typically cemented and will require more effort to excavate than the non- cemented soils. In addition, the cemented soils will require mechanical effort to pulverize the soils and reduce the materials in size to allow for moisture conditioning and mixing prior to placement as engineered fill.

Based on the samples tested, moisture content of near surface soils up to a depth of about 5 feet BSG ranged from about 1 to 3 percent. Therefore, the onsite soils to be over-excavated are anticipated to have low moisture contents and will require significant amounts of water to moisture condition these soils for use as engineered fill.

The near surface soils are anticipated to have a very low expansion potential. Consolidation testing of site soils indicated moderate compressibility characteristics. R-value testing indicated good to excellent support characteristics for pavements when compacted as engineered fill.

EXECUTIVE SUMMARY (Continued)

Chemical testing of soil samples indicated the soils exhibit a “corrosive” corrosion potential and a “negligible” potential for sulfate attack on concrete placed in contact with the near surface soils.

This executive summary should not be used for design or construction and should be reviewed in conjunction with the attached report.

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GEOTECHNICAL ENGINEERING INVESTIGATION

PROPOSED RETAIL DEVELOPMENT

THE OASIS

NORTHEAST CORNER OF SOUTH CHINA LAKE BOULEVARD AND BOWMAN ROAD

RIDGECREST, CALIFORNIA

Project Number: G70401.01

1.0 INTRODUCTION

This report presents the results of a geotechnical engineering investigation for the proposed Oasis retail development to be located at the northeast corner of South China Lake Boulevard and Bowman Road in Ridgecrest, California. Moore Twining Associates, Inc. (Moore Twining) was authorized by G&L China Lake, LLC to perform this geotechnical engineering investigation.

The contents of this report include the purpose of the investigation and the scope of services provided. The site history, previous studies, site description, and anticipated construction are discussed. In addition, a description of the investigative procedures used and the subsequent findings obtained are presented. Finally, the report provides an evaluation of the findings, general conclusions, and related recommendations. The report appendices contain the drawings (Appendix A), the logs of borings (Appendix B), and the results of laboratory tests (Appendix C).

2.0 PURPOSE AND SCOPE OF INVESTIGATION

2.1 Purpose: The purpose of the investigation was to conduct a field exploration and a laboratory testing program, evaluate the data collected during the field and laboratory portions of the investigation, and provide the following:

2.1.1 Evaluation of the near surface soils within the zone of influence of the proposed foundations;

2.1.2 Recommendations for 2016 California Building Code seismic coefficients and earthquake spectral response acceleration values;

2.1.3 Geotechnical parameters for use in design of foundations and slabs-on-grade, (e.g., soil bearing capacity and settlement);

2.1.4 Recommendations for site preparation including placement, moisture conditioning, and compaction of engineered fill soils;

2.1.5 Recommendations for the design and construction of new asphaltic concrete (AC) and Portland cement concrete (PCC) pavements;

2.1.6 Recommendations for temporary excavations and trench backfill; and

2.1.7 Conclusions regarding soil corrosion potential.

This report is provided specifically for the G&L China Lake, LLC project referenced in the Anticipated Construction section of this report. This investigation did not include a geologic/seismic hazards evaluation, flood plain investigation, compaction tests, environmental investigation, or environmental audit.

2.2 Scope: Our proposal, dated November 6, 2018, outlined the scope of our services. The actions undertaken during the investigation are summarized as follows.

2.2.1 A site plan entitled "The Oasis- Option H.5,"prepared by Nadel Architects, revised version dated October 22, 2018, was reviewed and will be referred to as the site plan.

2.2.2 An ALTA Survey prepared by Cornerstone Engineering, Inc., dated January 18, 2017, was reviewed.

2.2.3 A visual site reconnaissance and subsurface exploration were conducted.

2.2.4 Satellite images of the site between the years 1994 and 2017 from online sources, were reviewed.

2.2.5 Laboratory tests were conducted to determine selected physical and engineering properties of the subsurface soils.

2.2.6 Mr. Richard J. Gottlieb (G&L China Lake, LLC) was consulted during the investigation.

2.2.7 The data obtained from the investigation were evaluated to develop an understanding of the subsurface soil conditions and the engineering properties of the subsurface soils.

2.2.8 This report was prepared to present the purpose and scope, background information, field exploration procedures, findings, evaluation, conclusions, and recommendations.

3.0 BACKGROUND INFORMATION

The site history, previous studies, existing site features, and the anticipated construction are summarized in the following subsections.

3.1 Site History: Based on our review of satellite images of the site dating back to 1994, the site appears relatively unchanged and consistent with the current site conditions until the time of our field investigation (December 2018 and January 2019). The 2003 aerial image depicts a gravel covered area in the southwest portion of the site.

3.2 Previous Studies: At the time of preparation of this report, no previous geotechnical engineering, geological, or compaction test reports conducted for this site were provided for review. If these reports become available, the reports should be provided for review and consideration for this project.

3.3 Site Description: The subject site comprises about 15.6 acres of land located at the northeast corner of South China Lake Boulevard and Bowman Road in Ridgecrest, California. A site location map is presented on Drawing No. 1 in Appendix A. The site was bound to the north by East Rader Avenue with commercial/retail development beyond, to the west by South China Lake Boulevard, to the south by an existing concrete lined canal with Bowman Road beyond, and to the east by single family residential development. The existing canal is located about 40 feet south of the property boundary.

At the time of our field exploration, the ground surface was mostly bare ground with scattered scrub brush. In addition, small amounts of scattered debris was noted at the ground surface. Two(2) billboard signs were noted within the subject site area adjacent to South China Lake Boulevard. In addition, a gravel covered area was noted in the southwest portion of the site and along a roadway access leading to the north side of the site. A small soil stockpile about 5 feet in height was noted in the northwest portion of the site. Multiple rodent burrows were noted within the site. The subject site is relatively flat and slopes gently to the north.

Accordingly to the ALTA Survey, existing public and utility easements are located adjacent the south and west property boundary. In addition, the ALTA Survey depicts an underground sewer line traversing the west property boundary.

3.4 Anticipated Construction: The site plan indicates the site has an area of about15.6 acres. It is understood that the project will include a 46,700 square foot Cinema, a 22,000 square foot Market, a 12,900 square foot Drug Store, two (2) Medical Office buildings about 12,000 square feet each, five (5) Shop buildings ranging from about 5,785 to 10,780 square feet and three (3) Pad buildings ranging from about 2,020 to 3,500 square feet. Appurtenant construction is anticipated to include asphalt concrete and Portland cement concrete paving, trash enclosures, loading dock, drive through lanes and various underground utility service lines and landscaping.

Based on review of the ALTA Survey, existing site elevations are shown to range from about 2,288 feet AMSL in the northeast corner of the site to 2,300 feet AMSL in the southeast corner of the

property. A grading plan was not available at the time of preparation of this report. However, based on review of the existing site grades compared with the proposed building locations, it is anticipated that cuts/fills of about 2 to 3 feet may be required to achieve the finished pad grades.

It is anticipated that the proposed Cinema building will consist of a single-story building with a wall height of 2- stories in some areas. The proposed building will also include a mezzanine and sloped theater-style seating. The remainder of the structures are anticipated to comprise single story construction with a variety of construction types including wood or metal stud frames and concrete masonry walls, with wood or steel frame roofs. Basements are not anticipated for the proposed construction.

Foundation and floor slab loads for the proposed buildings were not available at the time of preparation of this report. For the purpose of this report, it is assumed the Cinema building would have a maximum dead plus live load of 200 kips for the columns and 8.5 kips per lineal foot for perimeter walls; the Market and Drug Store buildings were assumed to have a maximum dead plus live load of about 100 kips for the columns and 3.5 kips per lineal foot for perimeter walls; and the Medical Offices, Shops and Pad buildings were assumed to have a maximum dead plus live load of about 40 kips for the columns and 2.5 kips per lineal foot for perimeter walls.

4.0 INVESTIGATIVE PROCEDURES

The field exploration and laboratory testing programs conducted for this investigation are summarized in the following subsections.

4.1 Field Exploration: The field exploration consisted of a site reconnaissance, drilling test borings, conducting standard penetration tests and soil sampling.

4.1.1 Site Reconnaissance: The site reconnaissance consisted of walking the site and noting visible surface features. The reconnaissance was conducted by a Moore Twining staff geologist on January 2, 2019. The features noted are described in the background information section of this report.

4.1.2 Drilling Test Borings: Prior to drilling, the site was marked for Underground Service Alert for members to mark out the locations of existing public utilities.

The depths and locations of the test borings were selected based on the size of the structures, type of construction, estimated depth of influence of the anticipated foundation loads, and the subsurface soil conditions encountered.

On December 19 and 20, 2018 and January 2 and 3, 2019, twenty-seven (27) test borings were drilled at the site to depths ranging from about 5 to 51½ feet below site grades (BSG). Twenty -two (22) of the borings were drilled within the proposed building areas to depths ranging from about 15 to 51½ feet BSG and five (5) of the soil borings were drilled within the proposed parking and drive

areas to depths of about 5 feet BSG. The borings were drilled with a conventional truck-mounted CME-75 drill rig equipped with 6-5/8 inch outside diameter (O.D.) hollow-stem augers.

Drilling refusal due to cemented soil was encountered one (1) of borings (B-22) at a depth of about 19 feet BSG.

The soils encountered in the test borings were logged during drilling by a representative of our firm. The field soil classification was in accordance with the Unified Soil Classification System and consisted of particle size, color, and other distinguishing features of the soil.

The presence and elevation of free water, if any, in the borings were noted and recorded during drilling and immediately following completion of the borings.

Test boring locations were determined with reference to existing site features shown on the site plan. The locations of the test borings are described on the boring logs in Appendix B. Elevations of the test borings were not surveyed as a part of the investigation. However, the ground surface elevations at the boring locations were interpolated from the referenced ALTA Survey.

The test borings were loosely backfilled with material excavated during the drilling operations; thus, some settlement should be anticipated at the boring locations.

4.1.3 Soil Sampling: Standard penetration tests were conducted in the test borings, and both bulk and relatively undisturbed soil samples were obtained.

The standard penetration resistance, N-value, is defined as the number of blows required to drive a standard split barrel sampler into the soil. The standard split barrel sampler has a 2-inch O.D. and a 1 ⅜ inch inside diameter (I.D.). The sampler is driven by a 140-pound weight free falling 30 inches. The sampler is lowered to the bottom of the bore hole and set by driving it an initial 6 inches. It is then driven an additional 12 inches and the number of blows required to advance the sampler the additional 12 inches is recorded as the N-value.

Relatively undisturbed soil samples for laboratory tests were obtained by pushing or driving a California modified split barrel ring sampler into the soil. The soil was retained in brass rings, 2.5 inches O.D. and 1-inch in height. The lower 6-inch portion of the samples were placed in close-fitting, plastic, airtight containers which, in turn, were placed in cushioned boxes for transport to the laboratory. Soil samples obtained were taken to Moore Twining's laboratory for classification and testing.

4.2 Laboratory Testing: The laboratorytesting was programmed to determine selected physical and engineering properties of the soils sampled during drilling. The tests were conducted on bulk and relatively undisturbed samples considered representative of the subsurface soils encountered.

The results of laboratory tests are summarized in Appendix C. These data, along with the field observations, were used to prepare the final test boring logs in Appendix B.

5.0 FINDINGS AND RESULTS

The findings and results of the field exploration and laboratory testing are summarized in the following subsections.

5.1 Surface Conditions: At the time of our field exploration, the ground surface was generally bare with scattered shrubs. Additional information regarding the existing site conditions is noted in the Background Information section of this report.

5.2 Soil Profile: The subsurface soils encountered in the borings conducted for this investigation consisted of silty sands extending from the ground surface to depths of about 5 feet to 20 feet BSG. The near surface silty sands were underlain by interbedded layers of clayey sands, silty sands, sandy silts and poorly graded sands extending to the maximum depth explored, about 51½ feet BSG. Below a depth of about 2 to 5 feet below site grade, the silty sand soils were generally cemented and were commonly described as dense to very dense to depths greater than 20 feet BSG.

Two (2) of the soil borings drilled within the gravel covered area in the southwest portion of the site encountered about 8 inches of gravel.

The foregoing is a general summary of the soil conditions encountered in the test borings drilled for this investigation. Detailed descriptions of the soils encountered at each test boring location are presented in the logs of borings in Appendix B. The stratification lines on the logs represent the approximate boundary soil types; the actual in-situ transition may be gradual.

5.3 Soil Engineering Properties: The following is a description of the soil engineering properties as determined from our field exploration and laboratory testing.

Silty Sands: The silty sands encountered were described as medium dense to very dense, as determined by standard penetration resistance, N-values, ranging from 12 to greater than 98 blows per foot. The moisture content of the samples tested ranged from about 0.9 to 6.2 percent. Eleven (11) relatively undisturbed samples revealed dry densities ranging from 101.3 to 126.8 pounds per cubic foot. Five (5) consolidation tests conducted on samples collected from the near surface soils indicated moderate compressibility characteristics (about 5.6 to 6.1 percent consolidation under a load of 8 kips per square foot). When inundated under a load of 2 kips per square foot, the samples exhibited an apparent slight collapse potential ranging from about 0.9 to 1.7 percent. Three (3) direct shear tests conducted on near surface samples indicated internal angles of friction of 38, 42 and 49 degrees, with corresponding cohesion values of 590, 580 and 200 pounds per square foot.

Clayey Sands: The clayey sands encountered were described as dense to very dense, as determined by standard penetration resistance, N-values, ranging from 46 to greater than 99 blows per foot. The moisture content of the samples tested ranged from about 4.3 to 7.6 percent. One relatively undisturbed sample revealed a dry density of 108.6 pounds per cubic foot. Two (2) Atterberg Limits

tests conducted on clayey sand samples indicated low plasticity characteristics as indicated by plasticity indices of 8 and 9.

Poorly Graded Sands: The poorly graded sands encountered were described as loose to dense, as determined by standard penetration resistance, N-values, ranging from 10 to 35 blows per foot.

Sandy Silts: The sandy silts encountered were described as stiff to hard as determined by standard penetration resistance, N-values, ranging from 12 to greater than 96 blows per foot.

Moisture/Density Relationships: A maximum density/optimum moisture determination test result for a near surface sample indicated a maximum dry density of 132.7 pounds per cubic foot and an optimum moisture content of 6.6 percent.

R-value Test: Five (5) R-value tests conducted on near surface samples collected from depths of about 0 to 5 feet BSG in borings B-2, B-10, B-14, B-16 and B-17, indicated R-values ranging from 48 to 61.

Chemical Tests: Chemical tests performed on three (3) near surface soil samples collected at depths of 0 to 5 feet BSG from borings B-2, B-16 and B-17, indicated pH values of 7.9, 7.9 and 7.8; minimum resistivity values of 3,802, 3,935 and 3,802 ohms-centimeter; 0.002, "Not Detected," and 0.013 percent by weight concentration of sulfates (reporting limit of 0.00060 percent by weight concentration); and 0.006, 0.00069 and 0.022 percent by weight concentration of chloride, respectively.

5.4 Groundwater Conditions: Groundwater was not encountered in the test borings drilled at the time of our December 2018 and January 2019 field exploration to the maximum depth explored, about 51½ feet BSG.

Based on our review of available groundwater data from the Department of Water Resources online well database, groundwater within the vicinity of the site is at depths greater than 50 feet BSG.

It should be recognized, however, that groundwater elevations fluctuate with time, since they are dependent upon seasonal precipitation, irrigation, land use, and climatic conditions as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered both during the construction phase and the design life of the project. The evaluation of such factors was beyond the scope of this investigation and report.

6.0 EVALUATION

The data and methodology used to develop conclusions and recommendations for project design and preparation of construction specifications are summarized in the following subsections. The evaluation was based upon the subsurface soil conditions encountered during this investigation and

our understanding of the proposed construction. The conclusions obtained from the results of our evaluations are described in the Conclusions section of this report.

6.1 Existing Surface Conditions: At the time of our field exploration, the ground surface was generally bare ground with scattered shrubs. Some billboard signs were noted along the western side of the site.

As part of site development, the surface vegetation and root structures should be stripped and removed from the site. In addition, existing structures and foundations associated with the billboards should be removed.

6.2 Soil Excavation and Processing: Much of the near surface soils encountered were dense to very dense below depths of about 2 to 5 feet BSG. These soils are typically cemented and will require more effort to excavate than the non-cemented soils. In addition, the cemented soils will require mechanical effort to pulverize the soils and reduce the materials in size to allow for moisture conditioning and mixing prior to placement as engineered fill. All soil materials to be used as engineered fill should be well graded and should not contain cemented fragments greater than 2 inches in dimension.

It is anticipated that predominantly cemented soils will be encountered during installation of underground utilities, below depths of about 2 to 5 feet. The cemented soils are anticipated to be difficult to excavate and may require significant processing to be used as engineered fill for trench backfill. Excavating and processing of cemented soils during installation of underground utilities can be difficult due to the limited size and type of the equipment being utilized. Therefore, it may be advantageous to over-excavate areas with higher concentrations of utilities such as building pads, to the bottom of the utility trench depth to allow the utilities to be excavated in engineered fill soils.

In addition, due to the low moisture contents of the near surface soils encountered, significant moisture conditioning is anticipated in order to achieve a moisture content suitable for use as engineered fill.

6.3 Expansive Soils: In evaluation of the potential for expansive soils at the site, classification testing was performed on representative samples of the near surface soils which are anticipated to be within the zone of influence of the planned improvements. The soils tested are summarized in Appendix C of this report. The near surface soils were generally described as non plastic silty sands. The results of three (3) sieve analysis tests conducted on near surface soils extending from the ground surface to depths of about 5 feet BSG indicated fines contents (silt and clay) passing the No. 200 sieve ranging from 13.5 to 18.0 percent. Based on the low fines content (less than 20 percent passing the No. 200 sieve), the near surface are not anticipated to be expansive. Therefore, special mitigation for expansive soils are not anticipated for the subject site.

6.4 **Static Settlement and Bearing Capacity of Shallow Foundations:** The potential

for excessive total and differential static settlement of foundations and slabs-on-grade is a geotechnical concern that was evaluated for this project. The increases in effective stress to underlying soils which can occur from new foundations and structures, placement of fill, withdrawal of groundwater, etc. can cause vertical deformation of the soils, which can result in damage to the overlying structures and improvements. The differential component of the settlement is often the most damaging. In addition, the allowable bearing pressures of the soils supporting the foundations were evaluated for shear and punching type failure of the soils resulting from the imposed foundation loads.

The recommendations provided in this report are intended to limit the static settlement to 1 inch total and ½ inch differential for the proposed building foundations. Due to the compressibility of the near surface soils, to provide uniform bearing surface for the proposed foundations and to account for variability in near surface soils across the subject site, over-excavation of the near surface soils is recommended to support the new foundations on engineered fill to reduce the potential for excessive static settlement. Provided the site preparation recommendations of this report are followed, a net allowable soil bearing pressure of 3,500 pounds per square foot, for dead-plus-live loads, may be used for design of spread foundations.

The net allowable soil bearing pressure is the additional contact pressure at the base of the foundations caused by the structure. The weight of the soil backfill and weight of the footing may be neglected.

A structural engineer experienced in foundation and slab-on-grade design should determine the thickness, reinforcement, design details and concrete specifications for the proposed building foundations and slabs-on-grade based on the anticipated settlements estimated in this report.

6.5 Seismic Ground Rupture and Design Parameters: Based on our review of the State of California Special Studies Zone map for the Ridgecrest South Quadrangle, dated January 1, 1990, the project site is not located in the Alquist-Priolo Earthquake Fault Zone. The subject site is located about 2,000 feet west of the Alquist-Priolo Earthquake Fault Zone for the Little Lake Fault Zone. Accordingly, the potential for ground rupture at the site is considered low.

It is our understanding that the 2016 CBC will be used for structural design. Based on the 2016 CBC, a Site Class D represents the on-site soil conditions with standard penetration resistance, N-values averaging between 15 and 50 blows per foot in the upper 100 feet below site grade. A table providing the recommended design acceleration parameters for the project site, based on a designation of site class D, is included in the Foundations recommendations section of this report.

A table providing the recommended seismic coefficients and earthquake spectral response acceleration values for the project site is included in the Foundation Recommendations section of this report. A Maximum Considered Earthquake (geometric mean) peak ground acceleration adjusted for site effects (PGA_M) of 0.569g was determined for the site using the Ground Motion Parameter Calculator provided by the United States Geological Survey

(http://earthquake.usgs.gov/designmaps/us/application.php).

6.6 Liquefaction and Seismic Settlement: Liquefaction and seismic settlement are conditions that can occur under seismic shaking from earthquake events. Liquefaction describes a phenomenon in which a saturated, cohesionless soil loses strength during an earthquake as a result of induced shearing strains. Lateral and vertical movement of the soil mass, combined with loss of bearing, can result. Saturated, loose, granular soils, higher intensity earthquakes, and particularly long duration of ground shaking are the requisite conditions for liquefaction. One of the most common phenomena that occurs during seismic shaking is the induced settlement of loose, unconsolidated sediments. This can occur in unsaturated and saturated granular soils, however, seismic settlements are typically largest where liquefaction occurs (saturated soils).

Due to lack of groundwater within the upper 50 feet BSG, liquefaction is not a concern for the subject site. However, the potential for dry seismic settlement was evaluated for granular soils encountered is soil boring B-1. The N-values from the SPT data were relied upon in the evaluations. Soil parameters, such as wet unit weight, N-value, and fines content were input for the soil layers encountered throughout the depths explored (see test boring logs, Appendix B).

The seismic settlement analyses were conducted using the computer program LIQUEFYPRO by Civiltech. An earthquake horizontal ground acceleration (PGA_M) of 0.569 was used for the evaluation. A Maximum Considered Earthquake magnitude of 6.69 was applied in the analysis based deaggregation analysis (United States Geological Survey deaggregation website (https://earthquake.usgs.gov/hazards/interactive/).

Due to the significant thickness of cemented crust (more than feet) overlying the site, strain weighting factors from the "Probabilistic Model for the Assessment of Cyclically Induced Reconsolidation (Volumetric) Settlements", Journal of Geotechnical and Geoenvironmental Engineering, ASCE, March 2009, Cetin et al, were applied to the native soil layers below the cemented soils to estimate the potential seismic settlement at the ground surface. The analyses indicated a total dry seismic settlement of about ¾ inch. The differential dry seismic settlement was estimated to be about ½ inch over a horizontal distance of about 40 feet.

6.7 Asphaltic Concrete (AC) Pavements: Recommendations for asphaltic concrete pavement structural sections are presented in the "Recommendations" section of this report for proposed asphaltic concrete (AC) pavements. The structural sections were designed using the gravel equivalent method in accordance with the California Department of Transportation Highway Design Manual. The analysis was based on traffic index values ranging from 5.0 to 7.0. The appropriate paving section should be determined by the project civil engineer or applicable design professional based on the actual vehicle loading (traffic index) values. If traffic loading is anticipated to be greater than assumed, the pavement sections should be re-evaluated.

It should be noted that if pavements are constructed prior to the construction of the structures, the additional construction truck traffic should be considered in the selection of the traffic index value.

If more frequent or heavier traffic is anticipated and higher Traffic Index values are needed, Moore Twining should be contacted to provide additional pavement section designs.

Five (5) R-value tests were conducted on near surface samples of silty sands collected between the depths of about 0 and 5 feet BSG, which indicated R-values ranging from of 48 to 61. Based on the results of the testing, the procedures of the Caltrans Highway Design Manual and considering the extent of grading planned for the project, an R-value of 40 was used to determine the minimum pavement section thickness recommendations.

6.8 Portland Cement Concrete (PCC) Pavements: Recommendations for Portland cement concrete (PCC) pavement structural sections are presented in the "Recommendations" section of this report. The PCC pavement sections are based upon the amount and type of traffic loads being considered and the Resistance or R-value of the subgrade soils which will support the pavement. The measure of the amount and type of traffic loads are based upon an index of equivalent axle loads (EAL) from the loading of heavy trucks called a traffic index (T.I).

The recommendations provided in this report for PCC pavements are based on a trash truck loading and semi-tractor trailer loading and the design procedures contained in the Portland Cement Association "Thickness Design of Highway and Street Pavements." In addition, a vehicular pavement section recommendation is included in this report for drive through areas.

The PCC pavement sections were designed for a life of 20 years, a load safety factor of 1.1, axle weights for trash trucks and semi-trucks. A modulus of subgrade reaction, K-value, for the pavement section, of 200 psi/in was used for the pavement design considering the results of the R-value testing and considering that the pavement will be underlain by 4 inches of aggregate base.

6.9 Soil Corrosion: The risk of corrosion of construction materials relates to the potential for soil-induced chemical reaction. Corrosion is a naturally occurring process whereby the surface of a metallic structure is oxidized or reduced to a corrosion product such as iron oxide (i.e., rust). The metallic surface is attacked through the migration of ions and loses its original strength by the thinning of the member.

Soils make up a complex environment for potential metallic corrosion. The corrosion potential of a soil depends on numerous factors including soil resistivity, texture, acidity, field moisture and chemical concentrations. In order to evaluate the potential for corrosion of metallic objects in contact with the onsite soils, chemical testing of soil samples was performed by Moore Twining as part of this report. The test results are included in Appendix C of this report. Conclusions regarding the corrosion potential of the soils tested are included in the Conclusions section of this report based on the National Association of Corrosion Engineers (NACE) corrosion severity ratings listed in the Table No. 1 below.

Table No. 1

Soil Resistivity and Corrosion Potential Ratings

Soil Resistivity (ohm cm)	Corrosion Potential Rating
>20,000	Essentially non-corrosive
10,000 - 20,000	Mildly corrosive
5,000 - 10,000	Moderately corrosive
3,000 - 5,000	Corrosive
1,000 - 3,000	Highly corrosive
<1,000	Extremely corrosive

The results of soil sample analyses indicate that the near-surface soils exhibit a "corrosive" corrosion potential to buried metal objects. Appropriate corrosion protection should be provided for buried improvements based on the " highly corrosive" corrosion potential. If piping or concrete are placed in contact with imported soils, these soils should be analyzed to evaluate the corrosion potential of these soils.

If the manufacturers or suppliers cannot determine if materials are compatible with the soil corrosion conditions, a professional consultant, i.e., a corrosion engineer, with experience in corrosion protection should be consulted to provide design parameters. Moore Twining does not provide corrosion engineering services.

6.10 Sulfate Attack of Concrete: Degradation of concrete in contact with soils due to sulfate attack involves complex physical and chemical processes. When sulfate attack occurs, these processes can reduce the durability of concrete by altering the chemical and microstructural nature of the cement paste. Sulfate attack is dependent on a variety of conditions including concrete quality, exposure to sulfates in soil/groundwater and environmental factors. The standard practice for geotechnical engineers in evaluation of the soils anticipated to be in contact with concrete is to perform testing to determine the sulfates present in the soils. The test results are then compared with the provisions of ACI 318, section 4.3 to provide guidelines for concrete exposed to sulfate- containing solutions. Common methods used to resist the potential for degradation of concrete due to sulfate attack from soils include, but are not limited to the use of sulfate-resisting cements, air- entrainment and reduced water to cement ratios. The test results are included in Appendix C of this report. Conclusions regarding the sulfate test results are included in the Conclusions section of this report.

The soil corrosion data should be provided to the manufacturers or suppliers of materials that will

be in contact with soils (pipes or ferrous metal objects, etc.) to provide assistance in selecting the protection and materials for the proposed products or materials. If the manufacturers or suppliers cannot determine if materials are compatible with the soil corrosion conditions, a professional consultant, i.e., a corrosion engineer, with experience in corrosion protection should be consulted to provide design parameters.

7.0 CONCLUSIONS

Based on the data collected during the field and laboratory investigations, our geotechnical experience in the vicinity of the project site, and our understanding of the anticipated construction, the following general conclusions are presented.

7.1 The site is considered suitable for the proposed construction with regard to support of the proposed improvements, provided the recommendations contained in this report are followed. It should be noted that the recommended design consultation and observation of clearing, and earthwork activities by Moore Twining are integral to this conclusion.

7.2 The subsurface soils encountered in the borings conducted for this investigation consisted of silty sands extending from the ground surface to depths of about 5 feet to 20 feet BSG. The near surface silty sands were underlain by interbedded layers of clayey sands, silty sands, sandy silts and poorly graded sands extending to the maximum depth explored, about 51½ feet BSG. The upper about 2 to 5 feet of soils encountered were described as medium dense. Below a depth of about 2 to 5 feet below site grade, much of the silty sand soils were observed to be cemented and were described as dense to very dense to depths of greater than 20 feet.

7.3 Due to the cemented nature of the near surface soils, these soils will require more effort to excavate than the non-cemented soils. In addition, the cemented soils will require mechanical effort to pulverize the soils and reduce the materials in size to allow for moisture conditioning and mixing prior to placement as engineered fill. All soil materials to be used as engineered fill should be well graded and should not contain cemented fragments greater than 2 inches in dimension.

7.4 Based on the samples tested, the moisture contents of the near surface soils up to a depth of about 5 feet BSG were relatively low. The samples tested ranged from about 1 to 3 percent moisture content. Therefore, the on-site soils to be over- excavated are anticipated to have low moisture contents and are anticipated to require significant amounts of water to moisture condition the soils for use as engineered fill.

7.5 The near surface soils are anticipated to have a very low expansion potential. Consolidation testing of site soils indicated moderate compressibility characteristics and slight collapse potential. R-value testing indicated good to excellent support characteristics for pavements when compacted as engineered fill.

7.6 Groundwater was not encountered to the maximum depth explored, 51½ feet BSG, in the test borings drilled at the time of our December 2018 and January 2019 field exploration.

7.7 Due to the compressibility of the near surface soils and to reduce the potential for excessive differential settlement, this report recommends over-excavation and placement of engineered fill below foundations. Static settlements of 1 inch total and ½ inch differential in 40 linear feet should be anticipated for foundations supported on subgrade soils prepared as recommended in this report.

7.8 Due to lack of groundwater within the upper 50 feet BSG, liquefaction is not a concern for the subject site. A total dry seismic settlement of ¾ inch and a differential dry seismic settlement of ½ inch over a horizontal distance of about 40 feet were estimated.

7.9 Chemical testing of soil samples indicated the soils exhibit a "corrosive" corrosion potential.

7.10 Chemical analyses indicated a "negligible" potential for sulfate attack on concrete placed in contact with the near surface soils.

7.11 The site is not located in an Alquist-Priolo Earthquake Fault Zone and the potential for fault rupture on the site is estimated to be low.

8.0 RECOMMENDATIONS

Based on the evaluation of the field and laboratory data and our geotechnical experience in the vicinity of the project, the following recommendations are presented for use in the project design and construction. However, this report should be considered in its entirety. When applying the recommendations for design, the background information, procedures used, findings, evaluation, and conclusions should be considered. The recommended design consultation and construction monitoring by Moore Twining are integral to the proper application of the recommendations. The Contractor is required to comply with the requirements and recommendations presented in this report.

Where the requirements of a governing agency, utility agency or pipe manufacturer differ from the recommendations of this report, the more stringent recommendations should be applied to the project.

8.1 General

8.1.1 The recommendations in this report are based on assumed foundation loads as described in the Background Information of this report. Moore Twining should be provided the actual building loads when available. If the loads are higher, the recommendations in this report will need to be revised to address the higher loading.

8.1.2 Moore Twining should be provided the opportunity to review the final grading plans and foundation plans before the plans are released for bidding purposes so that any relevant recommendations can be presented.

8.1.3 A preconstruction meeting including, as a minimum, the owner, general contractor, earthwork contractor, foundation and paving subcontractors, and Moore Twining should be scheduled by the general contractor at least one week prior to the start of clearing and grubbing. The purpose of the meeting should be to discuss critical project requirements and scheduling.

8.1.4 Due to the cemented nature of the near surface soils, these soils will require more effort to excavate than the non-cemented soils. In addition, the cemented soils will require mechanical effort to pulverize the soils and reduce the materials in size to allow for moisture conditioning and mixing prior to placement as engineered fill. All soil materials to be used as engineered fill should be well graded and should not contain cemented fragments greater than 2 inches in dimension.

8.1.5 The Contractor(s) bidding on this project should determine if the information included in the construction documents are sufficient for accurate bid purposes. If the data are not sufficient, the Contractor should conduct, or retain a qualified geotechnical engineer to conduct, supplemental studies and collect information as required to prepare accurate bids.

8.2 Site Grading and Drainage

8.2.1 Shallow, cemented soils were encountered at the site which will increase the potential for perched water from surface irrigation and stormwater sources

that infiltrate the near surface soils. Due to the low permeability of the cemented material, water may infiltrate the upper soils and result in a perched condition, ponding and migrating laterally over the top of the cemented materials. Perched water will reduce the drainage capacity of the soils, increasing the potential for moisture-related problems. Therefore, providing and maintaining positive drainage systems, limiting irrigation use, using thickened slab edges and deepened curbs and control of surface runoff and irrigation water, and use of area drains and roof drains connected to the site storm drain system will be important aspects of design and site development to reduce the potential for moisture-related problems.

8.2.2 It is critical to develop and maintain site grades which will drain surface and roof runoff away from foundations and floor slabs - both during and after construction. Adjacent exterior finished grades should be sloped a minimum of five percent for a distance of at least ten feet away from the structures, or as necessary to preclude ponding of water adjacent to foundations, whichever is more stringent. Adjacent exterior grades which are paved should be sloped at least 2 percent away from the foundations.

8.2.3 It is recommended that landscape planted areas, etc. not be placed adjacent to the building foundations and/or interior slabs-on-grade. Trees should be setback from the proposed structures at least 10 feet or a distance equal to the anticipated drip line radius of the mature tree. For example, if a tree has an anticipated drip-line diameter of 30 feet, the tree should be planted at least 15 feet away (radius) from proposed or existing buildings.

8.2.4 Landscaping after construction should direct rainfall and irrigation runoff away from the structures and should establish positive drainage of water away from the structures. Care should be taken to maintain a leak-free sprinkler system.

8.2.5 Landscape and planter areas should be irrigated using low flow irrigation (such as drip, or mist type emitters). The use of plants with low water requirements are recommended.

8.2.6 Rain gutters and roof drains should be provided, and connected directly to the site storm drain system. As an alternative, the roof drains should extend a minimum of 5 feet away from the structures and the resulting runoff directed away from the structures at a minimum of 2 percent.

8.2.7 Due to the cemented nature of the near surface soils, storm water infiltration systems are not appropriate for this site. In addition, storm water systems

which allow wetting of the soils, such as bioswales or similar designs are not recommended for this site. In the event bioswales or bioretention systems are planned, the proposed locations and details of these features should be provided to Moore Twining for review and comment. In general, if storm water systems which allow artificial wetting of the subgrade soils are required, sufficient setbacks to existing improvements should be maintained (on a preliminary basis - minimum of 25 feet away from foundations), and/or specific measures such as deepened curbs, cutoffs, liners, etc. should be incorporated in the designs to reduce the potential for drainage problems and excessive settlement of improvements due to moisture and freewater migration.

8.3 Site Preparation

8.3.1 All surface topsoil, vegetation and organics should be removed from all work areas. The general depth of stripping should be sufficiently deep to remove the root systems and organic top soils. The actual depth of stripping should be reviewed by Moore Twining at the time of construction.

8.3.2 The root systems of shrubs should be removed in their entirety. All roots larger than ¼ inch in diameter and any accumulation of organic matter that will result in an organic content more than 2 percent by weight should be removed and not used as engineered fill. The areas occupied by concentrated roots should be excavated to a minimum depth of 12 inches below the excavations required to remove the shrubs, root ball, and roots. The bottom of the excavation should be scarified to a minimum depth of 8 inches and compacted as engineered fill prior to backfilling operations.

8.3.3 Existing foundations for the billboards should be removed to a minimum depth of 5 feet below finished grade, or 5 feet below the bottom of the proposed foundation, whichever is greater. All disturbed soils should be removed from the excavation to expose undisturbed native soils prior to backfill of the excavations with engineered fill.

8.3.4 As part of site preparation, underground utilities scheduled to be removed, subsurface structures, and associated fills (if any) in the areas of new construction, should be excavated and removed from the site and all soils disturbed from the demolition and removal of these improvements should be over-excavated to expose undisturbed soils. The existing onsite gravel material covering part of the site should not be used as engineered fill, unless these materials are thoroughly blended with onsite soil meeting the requirements of this report. Utilities to be removed should be completely removed and disposed of off-site. Excavations to remove existing improvements should extend to at least 12 inches below the bottom of the

improvements to be removed or to the depth required to remove all soils disturbed from demolition, whichever is greater. After over-excavation, prior to backfill, the bottom of the excavation should be scarified to a depth of 8 inches, moisture conditioned, and compacted as engineered fill.

8.3.5 Building Pad Preparation for Cinema Building: After stripping and removal of existing surface and subsurface improvements, the building pad area for the proposed cinema building and all new foundations should be over-excavated to the depth required to remove all undocumented fill (if any), to a depth of at least 2 feet below preconstruction site grade, to at least 12 inches below the bottom of the improvements to be removed, or to a minimum of 1 foot below the bottom of footings, whichever requires the deeper excavation. The over-excavation limits should include the entire building footprint, all foundations and adjacent walkways, and a minimum of 5 feet beyond the foundations, or 5 feet beyond walkways adjacent to the building, whichever is further. After approval of the over-excavation by Moore Twining Associates, Inc. based on the contractor's survey data, the bottom of the over-excavation should be scarified to a minimum depth of 8 inches, moisture conditioned to between zero (0) and three (3) percent above optimum moisture content and compacted as engineered fill. All concrete slabs on grade within the building pad preparation limits (the building slab and all adjacent walkways) be underlain by at least 4 inches of aggregate base.

Where cemented soils are encountered at the bottom of the over-excavation, it is anticipated that the cemented soils will be difficult to scarify and compact as engineered fill. Thus, in lieu of scarification and compaction at the bottom of the over-excavation; after achieving the required bottom of over-excavation, the bottom of the over-excavation specified above may be excavated an additional 6 inches and the exposed bottom may be proofrolled under the observations of Moore Twining to verify stability prior to backfilling the excavation with engineered fill.

8.3.6 Building Pad Preparation for Market, Drug Store, Medical Offices, Shops and Pads: After stripping and removal of existing surface and subsurface improvements, the building pad area for these structures and all new foundations should be over-excavated to the depth required to remove all undocumented fill (if any), to a depth of at least 2 feet below preconstruction site grade, to at least 12 inches below the bottom of the improvements to be removed, or to the bottom of footings, whichever requires the deeper excavation. The over-excavation limits should include the entire building footprint, all foundations and adjacent walkways, and a minimum of 5 feet beyond the foundations, or 5 feet beyond walkways

adjacent to the building, whichever is further. After approval of the over-excavation by Moore Twining Associates, Inc., the bottom of the over-excavation should be scarified to a minimum depth of 8 inches, moisture conditioned to between zero (0) and three (3) percent above optimum moisture content and compacted as engineered fill. Where cemented soils are encountered at the bottom of the over-excavation, it is anticipated that the cemented soils will be difficult to scarify and compact as engineered fill. Thus, in lieu of scarification and compaction at the bottom of the over- excavation; after achieving the required bottom of over-excavation, the bottom of the over-excavation specified above may be excavated an additional 6 inches and the exposed bottom may be proofrolled under the observations of Moore Twining to verify stability prior to backfilling the excavation with engineered fill. All concrete slabs on grade within the building pad preparation limits (the building slab and all adjacent walkways) be underlain by at least 4 inches of aggregate base.

8.3.7 The plans should depict the minimum limits of over-excavation for the building pads as described in section 8.3.4 and 8.3.5.

8.3.8 It is recommended that extra care be taken by the contractor to ensure that the horizontal and vertical extent of the over-excavation and compaction conform to the site preparation recommendations presented in this report. Moore Twining is not responsible for surveying and measuring to verify the horizontal and vertical extent of over-excavation and compaction. The contractor should verify in writing to the owner and Moore Twining that the horizontal and vertical over-excavation limits were completed in conformance with the recommendations of this report, the project plans, and the specifications (the most stringent applies). It is recommended that this verification be performed by a licensed surveyor. This verification should be provided prior to requesting pad certification from Moore Twining or excavating for foundations.

8.3.9 Following stripping, removal of existing surface and subsurface improvements, exterior slabs-on-grade, pavements and areas to receive fill outside the building pads over-excavation limits should be prepared by over-excavation to a minimum of 12 inches below preconstruction site grade, to a minimum of 12 inches below the bottom of the aggregate base section, to the depth required to remove undocumented fill soils (if any) or to at least 12 inches below the bottom of improvements to be removed, whichever requires the deeper excavation. Over-excavation should extend horizontally a minimum of 3 feet beyond exterior slabs on grade and pavements, or up to the existing improvements to remain, whichever occurs first. After approval

of the over-excavation by Moore Twining Associates, Inc., the bottom of the over-excavation should be scarified to a minimum depth of 8 inches, moisture conditioned to between zero (0) and three (3) percent above optimum moisture content and compacted as engineered fill. Where cemented soils are encountered at the bottom of the over-excavation, it is anticipated that the cemented soils will be difficult to scarify and compact as engineered fill. Thus, in lieu of scarification and compaction at the bottom of the over-excavation; after achieving the required bottom of over- excavation, the bottom of the over-excavation specified above may be excavated an additional 6 inches and the exposed bottom may be proofrolled under the observations of Moore Twining to verify stability prior to backfilling the excavation with engineered fill. Exterior slabs-on-grade which are not directly adjacent to the building (i.e, exterior slabs on grade which are located outside the building pad preparation limits noted in Sections 8.3.4 and 8.3.5 of this report), and Portland cement concrete pavements should be underlain by a minimum of 4 inches of Class 2 aggregate base.

8.3.10 The on-site near surface soils are anticipated to have low moisture contents. These soils are anticipated to require significant amounts of water to moisture condition these soils to within optimum to three (3) percent above optimum moisture content as recommended in this report.

8.3.11 Structural loads for miscellaneous, lightly loaded foundations (such as retaining walls, sound walls, screen walls, monument signs, trash enclosures, etc.) should be evaluated on a case by case basis to present supplemental recommendations for site preparation and foundation design. In lieu of a case by case evaluation, the areas of miscellaneous foundations should be over-excavated to at least 2 feet below preconstruction site grades, to the depth required to remove undocumented fill soils (if any), to at least 12 inches below subsurface structures to be removed, or to at least 12 inches below preconstruction site grade, whichever requires the deeper excavation. After approval of the over-excavation by Moore Twining Associates, Inc., the bottom of the over-excavation should be scarified to a depth of 8 inches, moisture conditioned to zero (0) to three (3) percent above optimum moisture content and compacted as engineered fill. The over-excavation should extend a minimum of 3 feet beyond the limits of the foundations on all sides, or to property lines, or to improvements to remain, whichever occurs first.

Where cemented soils are encountered at the bottom of the over-excavation,

it is anticipated that the cemented soils will be difficult to scarify and compact as engineered fill. Thus, in lieu of scarification and compaction at the bottom of the over-excavation; after achieving the required bottom of over-excavation, the bottom of the over-excavation specified above may be excavated an additional 6 inches and the exposed bottom may be proofrolled under the observations of Moore Twining to verify stability prior to backfilling the excavation with engineered fill.

8.3.12 All fill required to bring the site to final grades should be placed as engineered fill. In addition, all native soils over-excavated should be compacted as engineered fill.

8.3.13 The contractor should locate all on-site water wells (if any). All wells scheduled for demolition should be abandoned per state and local requirements. The contractor should obtain an abandonment permit from the local environmental health department, and issue certificates of destruction to the owner and Moore Twining upon completion. At a minimum, wells in building areas (and within 5 feet of building perimeters) should have their casings removed to a depth of at least 8 feet below preconstruction site grades or finished pad grades, whichever is deeper. In parking lot or landscape areas, the casings should be removed to a depth of at least 5 feet below site grades or finished grades. The wells should be capped with concrete and the resulting excavations should be backfilled as engineered fill.

8.3.14 The moisture content and density of the compacted subgrade soils should be maintained in accordance with the recommendations for engineered fill until the placement of concrete. If soft or unstable soils are encountered during excavation or compaction operations, our firm should be notified so the soils conditions can be examined and additional recommendations provided to address the pliant areas.

8.3.15 Final grading shall produce building pads which are smooth, planar, and resistant to rutting. The finished pads (before aggregate base is placed) shall not depress more than one-half (½) inch under the wheels of a fully loaded water truck, or equivalent loading. If depressions more than one-half (½) inch occur, the contractor shall perform remedial grading to achieve this requirement at no cost to the owner.

8.3.16 The Contractor should be responsible for the disposal of concrete, asphaltic concrete, soil, spoils, etc. (if any) that must be exported from the site. Individuals, facilities, agencies, etc. may require analytical testing and other assessments of these materials to determine if these materials are acceptable.

The Contractor should be responsible to perform the tests, assessments, etc. to determine the appropriate method of disposal.

8.4 Engineered Fill

8.4.1 The on-site near surface soils encountered at the subject site are predominantly silty sands. The on-site soils with an expansion index of less than 20 will be suitable for use as engineered fill below the recommended , provided then can be processed to achieve the particle size recommendations of this report. This report recommends that all concrete slabs on grade within the building pad preparation limits (the building slab and all adjacent walkways) be underlain by at least 4 inches of aggregate base and all exterior concrete slabs on grade which are not located adjacent to the building, including Portland cement concrete pavements are recommended to be underlain by at least 4 inches of aggregate base. Engineered fill soils should be free of organics (less than 3 percent by weight and no roots larger than 1/4 inch in diameter), free of cemented materials greater than 2 inches, and the moisture content of the soil is within the range recommended in this report. If soils other than those considered in this report are encountered, Moore Twining should be notified to provide alternate recommendations. Where/if expansive soils are encountered, expansive soils should not be placed within the upper 24 inches of the finished subgrade.

Due to the cemented nature of the near surface soils, use of the onsite soils as engineered fill is anticipated to require special equipment and mechanical pulverization and blending to achieve a suitable consistency, reduce the particle size, and moisture condition the soils for compaction. These conditions should be anticipated for earthwork. The onsite soils should be processed to achieve a well-graded material with a uniform consistency and a maximum particle size of 2 inches prior to placement and compaction as engineered fill. Where processing is not deemed effective, imported engineered fill materials conforming to the recommendations of this report may be used in lieu of onsite soils.

The existing onsite gravel material covering part of the site should not be used as engineered fill, unless these materials are thoroughly blended with onsite soils such that the blended material does not contain more than 25 percent by weight of gravel (material larger than a No. 4 sieve).

8.4.2 The compactability of the native soils is dependent upon the moisture contents, subgrade conditions, degree of mixing, type of equipment, as well as other factors. The evaluation of such factors was beyond the scope of this report; therefore, it is recommended that they be evaluated by the contractor during preparation of bids and construction of the project.

8.4.3 Import fill soil (if any) should be non-recycled, non-expansive and granular in nature with the following acceptance criteria recommended.

Percent Passing 3-Inch Sieve	100
Percent Passing No. 4 Sieve	85 - 100
Percent Passing No. 200 Sieve	10 - 40
Expansion Index (ASTM D4829)	Less than 15
Organics	Less than 3 percent by weight
R-Value	Minimum 40*
Sulfates	< 0.05 percent by weight
Min. Resistivity	> 5,000 ohms-cm

* for pavement areas only

Prior to being transported to the site, the import material shall be certified by the Contractor and the supplier (to the satisfaction of the Owner) that the soils do not contain any environmental contaminates regulated by local, state or federal agencies having jurisdiction. In addition, Moore Twining should be requested to sample and test the material to determine compliance with the above geotechnical criteria. Contractors should provide a minimum of 7 working days to complete the testing.

8.4.4 Processed native soils and imported non-expansive engineered fill soil should be placed in loose lifts approximately 8 inches thick, moisture-conditioned to between optimum moisture content and three (3) percent above optimum moisture content, and compacted to a dry density of at least 92 percent of the maximum dry density as determined by ASTM Test Method D1557. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable. The upper 12 inches of fill and subgrade compacted in pavement areas should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM Test Method D1557.

8.4.5 In-place density testing should be conducted in accordance with ASTM D 6938 (nuclear methods) at a frequency of at least:

Table No. 2
Minimum Test Frequency

Area	Minimum Test Frequency
Building Pads	1 test per 5,000 square feet per compacted lift with a minimum of 2 tests per pad for each compacted lift
Pavement Subgrade and Mass Grading Outside Building Pad	1 test per 10,000 square feet per compacted lift
Utility Lines	1 test per 150 feet per lift

8.4.6 Open graded gravel and rock material such as ¾-inch crushed rock or ½-inch crushed rock should not be used as backfill including trench backfill. In the event gravel or rock is required by a regulatory agency for use as backfill (Contractor to obtain a letter from the agency stating the requirement for rock and/or gravel as backfill), all open graded materials shall be fully encased in a geotextile filter fabric, such as Mirafi 140N, to prevent migration of fine grained soils into the porous material. Gravel and rock cannot be used without the written approval of Moore Twining. If the contractor elects to use crushed rock (and if approved by Moore Twining), the contractor will be responsible for slurry cut off walls at the locations directed by Moore Twining. Crushed rock should be placed in thin (less than 8 inch) lifts and densified with a minimum of three (3) passes using a vibratory compactor.

8.4.7 Aggregate base below the interior building slab on grade shall be non-recycled and comply with Class 2 aggregate base (AB) per the State of California (Caltrans) Standard Specifications. Aggregate base used for pavement construction should comply with Class 2 aggregate base in accordance with the State of California Standard Specifications and may include recycled materials. Aggregate base shall be compacted to a minimum relative compaction of 95 percent in accordance with ASTM D1557 standards.

8.5 Conventional Shallow Spread Foundations

8.5.1 A structural engineer experienced in foundation design should recommend the thickness, design details and concrete specifications for the foundations based on the estimated settlements. The following static settlements should be anticipated for design: 1) a total static settlement of 1 inch; 2) a differential static settlement of ½ inch in 40 feet; and 3) differential seismic settlement of ½ inch in 40 feet.

8.5.2 Foundations supported on subgrade soils prepared as recommended in the Site Preparation section of this report may be designed for a maximum net allowable soil bearing pressure of 3,500 pounds per square foot for dead-plus-live loads. This value may be increased by one-third for short duration wind or seismic loads.

8.5.3 The bottom of all perimeter footings should have a minimum depth of 18 inches below the lowest adjacent grade. All interior foundations should have a minimum depth of 18 inches below the bottom of the floor slab. All footings should have a minimum width of 15 inches, regardless of load.

8.5.4 The foundations should be continuous around the perimeter of the structure to reduce moisture migration beneath the structure. Continuous perimeter foundations should be extended through doorways and/or openings that are not needed for support of loads.

8.5.5 The following seismic factors were developed using online data obtained from the United States Geological Survey (U.S.G.S.) based upon a latitude of 35.609957 degrees and a longitude of -117.668945 degrees. The reported values are based upon Sections 1613.3.1 through 1613.3.4 of the 2016 California Building Code and were not determined based upon a ground motion hazard analysis. If a ground motion hazard analysis is required based upon the Seismic Design Category or structural detailing of the proposed structure(s), the following values will need to be updated with seismic factors determined by a ground motion hazard analysis. The designer should determine whether a ground motion hazard analysis is required for the project. If required, Moore Twining should be notified and requested to conduct the additional analysis and develop updated seismic factors for the project.

Table No. 3
Seismic Factors

Seismic Factor	2016 CBC Value
Site Class	D

Seismic Factor	2016 CBC Value
Maximum Considered Earthquake (geometric mean) peak ground acceleration adjusted for site effects (PGA_M)	0.569
Mapped Maximum Considered Earthquake (geometric mean) peak ground acceleration ASCE 7-10 (PGA)	0.569
Spectral Response At Short Period (0.2 Second), Ss	1.387
Spectral Response At 1-Second Period, S_1	0.489
Site Coefficient (based on Spectral Response At Short Period), Fa	1.0
Site Coefficient (based on spectral response at 1-second period) Fv	1.511
Maximum considered earthquake spectral response acceleration for short period, SM_S	1.387
Maximum considered earthquake spectral response acceleration at 1 second, SM_1	0.738
Five percent damped design spectral response accelerations for short period, SDs	0.925
Five percent damped design spectral response accelerations at 1-second period, SD_1	0.492

8.5.6 Foundation excavations should be observed by Moore Twining prior to the placement of steel reinforcement and concrete to verify conformance with the intent of the recommendations of this report. The Contractor is responsible for proper notification to Moore Twining and receipt of written confirmation

of this observation prior to placement of steel reinforcement.

8.5.7 Foundation excavations or exposed soils should not be left uncovered and allowed to dry such that the moisture content of the soils is less than specified for engineered fill. The exposed soils, such as sidewalls, excavation bottoms, etc. should be moistened to maintain the moisture content at least one percent above optimum until concrete is placed.

8.5.8 The bottom surface area of concrete footings or concrete slabs in direct contact with engineered fill can be used to resist lateral loads. An allowable coefficient of friction of 0.35 can be used for design. In areas where slabs are underlain by a synthetic moisture barrier, an allowable coefficient of friction of 0.10 can be used for design.

8.5.9 The allowable passive resistance of the native soils and engineered fill may be assumed to be equal to the pressure developed by a fluid with a density of 300 pounds per cubic foot. The upper 12 inches of subgrade in landscaped areas should be neglected in determining the total passive resistance.

8.5.10 Structural loads for miscellaneous lightly loaded foundations with line loads of 1.5 kips per foot or less (such as retaining walls, sound walls, screen walls, monument, trash enclosures, and pylon signs, etc.) should be evaluated on a case by case basis to present supplemental recommendations for site preparation and foundation design. In lieu of a case by case evaluation, miscellaneous foundations extending a minimum of 1.5 feet below finished grades may be supported on spread or continuous footings supported on subgrade soils prepared in accordance with the Site Preparation Section of this report. Spread and continuous footings may be designed for a maximum net allowable soil bearing pressure of 2,000 pounds per square foot for dead-plus-live loads. These values may be increased by one-third for short duration wind or seismic loads. The weight of the footing and the soil backfill may be ignored in design

8.5.11 Sight lighting and pylon signs (if any) may be supported on a drilled-cast-in-hole reinforced concrete foundation (pier). An allowable skin friction of 150 pounds per square foot may be used to resist axial loads. Lateral load resistance may be estimated using the 2016 CBC non-constrained procedure (Section 1807.3.2.1). The allowable passive resistance of the native soils may be assumed to be equal to the pressure developed by a fluid with a density of 300 pounds per square foot per foot of depth to a maximum of 3,000 pounds per square foot. The passive pressure may be assumed to act over twice the pier diameter. The upper 12 inches of subgrade soils in landscaped areas should be neglected in determining the total passive resistance.

8.6 Site Retaining/Screen Walls and Loading Dock Retaining Wall

8.6.1 Structural loads for retaining walls/screen walls may be supported on spread or continuous footings on engineered fill or native soils as recommended for miscellaneous foundations in Section 8.5.10 of this report.

8.6.2 Retaining walls may be constructed with onsite granular soils or non-expansive granular free-draining backfill placed within the zone extending from a distance of 1 foot laterally from the bottom of the wall footing at a 1 horizontal to 1 vertical gradient to the surface. This requirement should be detailed on the construction drawings. Granular backfill will reduce the effects of swell pressures on the wall. Imported granular wall backfill should meet the following requirements:

Percent Passing 3-Inch Sieve	100
Percent Passing No. 4 Sieve	85 - 100
Percent Passing No. 200 Sieve	10 - 30
Plasticity Index	Less than 5
Internal Angle of Friction	30 degrees

8.6.3 The import fill material should be tested and approved as indicated under the Engineered Fill section of this report.

8.6.4 Segmented wall design (if any) should be conducted by a California licensed geotechnical engineer familiar with segmented wall design and having successfully designed at least three walls at sites with similar soil conditions. None of the data included in this report should be used for segmented wall design. A design level geotechnical report should be conducted to provide wall design parameters. If the designer uses the data in this report for wall design, the designer assumes the sole risk for this data. The wall designer should perform sufficient observations of the wall construction to certify that the wall was constructed in accordance with the design plans and specifications.

8.6.5 Retaining walls should be constructed with a drain system including, as a minimum, drain pipes surrounded by at least 1 cubic foot of crushed ¾ inch or ½ inch rock backfill fully encapsulated in Mirafi 140 N, or equivalent. The final selection of filter fabric should be as recommended by the fabric manufacturer for the specific site conditions. Drain pipes should be located near the wall to adequately reduce the potential for hydrostatic pressures behind the wall. Drainage should be directed to pipes which gravity drain to closed pipes of the storm drain or subdrain system. Drain pipe outlet invert elevations should be sufficient (a bypass should be constructed if necessary)

to preclude hydrostatic surcharge to the wall in the event the storm drain system did not function properly. Drainage should be directed to the site storm drain system. The drainage system should be designed by the wall designer and detailed on the plans.

8.6.6 For loading dock area retaining walls only, as an alternative to using drain pipes behind the wall to adequately reduce the potential for hydrostatic pressures behind the wall, weep holes may be used, provided that a continuous crushed rock (minimum 1 cubic foot per lineal foot) and filter fabric section is provided directly behind the wall. The weep holes cannot have the potential for clogging. The weep holes should discharge directly to an approved drainage.

8.6.7 The bottom surface area of concrete footings or grade beams in direct contact with engineered fill can be used to resist lateral loads. An allowable coefficient of friction of 0.35 can be used for design.

8.6.8 The allowable passive resistance of the onsite soils and engineered fill may be assumed to be equal to the pressure developed by a fluid with a density of 300 pounds per cubic foot. The upper 12 inches of subgrade should be neglected in determining the total passive resistance.

8.6.9 The onsite, granular native soils or non-expansive imported granular fill may be used as backfill of vertical walls, such as retaining walls or loading dock walls. Backfill of these features extending within a zone defined by a 1 Horizontal to 1 Vertical plane from the back of the wall foundation to the ground surface may consist of onsite native granular soils or an imported, granular fill meeting the requirements of section 8.6.2 of this report. This requirement should be depicted on the project plans. The active and at-rest pressures of imported, granular backfill placed in accordance with this report, may be assumed to be equal to the pressures developed by a fluid with a density of 45 and 67 pounds per cubic foot, respectively. These pressures assume a level ground surface and do not include the surcharge effects of construction equipment, loads imposed by nearby foundations, roadways or hydrostatic water pressure.

8.6.10 The at-rest pressure should be used in determining lateral earth pressures against walls which are not free to deflect. For walls which are free to deflect at least one percent of the wall height at the top, the active earth pressure may be used.

8.6.11 The above earth pressures assume that the backfill soils will be drained. Therefore, all retaining walls should incorporate the use of a backdrain as recommended in this report.

8.6.12 The wall designer should determine if seismic increments are required. If seismic increments are required, Moore Twining should be contacted for recommendations for seismic geotechnical design considerations for the retaining structures.

8.6.13 It is recommended to use lighter hand operated or walk behind compaction equipment in the zone equal to one wall height behind the wall to reduce the potential for damage to the wall during construction. Heavier compaction equipment could cause loads in excess of design loads which could result in cracking, excessive rotation, or failure of a retaining structure.

8.6.14 If retaining walls are to be finished with dry wall, plaster, decorative stone, etc., or if effervescence is undesirable, waterproofing measures should be applied to walls. Waterproofing systems should be designed by a qualified professional.

8.7 Interior Slabs-on-Grade

8.7.1 Interior slabs-on-grade should be constructed over a minimum of 4 inches of non-recycled aggregate base over engineered fill placed for the building pad preparation in accordance with the Site Preparation section of this report. The moisture content and compaction of the prepared subgrade soils should be verified prior to placement of aggregate base.

8.7.2 The recommendations provided herein are intended only for the design of interior concrete slabs-on-grade and their proposed uses, which do not include construction traffic (i.e., cranes, cement mixers, and rock trucks, etc.). The building contractor should assess the slab section and determine its adequacy to support any proposed construction traffic.

8.7.3 The slabs and underlying subgrade should be constructed in accordance with current American Concrete Institute (ACI) standards.

8.7.4 ACI recommends that the interior slab-on-grade should be placed directly on a vapor retarder when the potential exists that the underlying subgrade or sand layer could be wet or saturated prior to placement of the slab-on-grade. It is recommended that Stegowrap 15 should be used where floor coverings, such as carpet and tile, are anticipated or where moisture could permeate into the interior and create problems. The vapor retarder should overlay the compacted aggregate base. It should be noted that placing the PCC slab directly on the vapor barrier will increase the potential for cracking and curling; however, ACI recommends the placement of the vapor retarding membrane directly below the slab to reduce the amount vapor emission through the slab-on-grade. Based on discussions with Stego Industries,

L.L.C. (telephone 949-493-5460), the Stegowrap can be placed directly on the aggregate base and the concrete can be placed directly on the Stegowrap. It is recommended that the design professional obtain written confirmation from Stego Industries that this product is suitable for the specific project application. It is recommended that the slab be moist cured for a minimum of 7 days to reduce the potential for excessive cracking. The underslab membrane should have a high puncture resistance (minimum of approximately 2,400 grams of puncture resistance), high abrasion resistance, rot resistant, and mildew resistant. It is recommended that the membrane be selected in accordance with the current ASTM C 755, Standard Practice For Selection of Vapor Retarder For Thermal Insulation and conform to the current ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Waters, or as Ground Cover. It is recommended that the vapor barrier selection and installation conform to the current ACI Manual of Concrete Practice, Guide for Concrete Floor and Slab Construction (302.1R), Addendum, Vapor Retarder Location and current ASTM E 1643, Standard Practice for Installation of Water Vapor Retarders Used In Contact with Earth or Granular Fill Under Concrete Slabs. In addition, it is recommended that the manufacturer of the floor covering and floor covering adhesive be consulted to determine if the manufacturers have additional recommendations regarding the design and construction of the slab-on-grade, testing of the slab-on-grade, slab preparation, application of the adhesive, installation of the floor covering and maintenance requirements. It should be noted that the recommendations presented in this report are not intended to achieve a specific vapor emission rate.

8.7.5 The membrane should be installed so that there are no holes or uncovered areas. All seams should be overlapped and sealed with the manufacturer approved tape continuous at the laps so they are vapor tight. All perimeter edges of the membrane, such as pipe penetrations, interior and exterior footings, joints, etc., should be caulked per manufacturer's recommendations.

8.7.6 Tears or punctures that may occur in the membrane should be repaired prior to placement of concrete per manufacturer's recommendations. Once repaired, the membrane should be inspected by the contractor and the owner to verify adequate compliance with manufacture's recommendations.

8.7.7 The moisture retarding membrane is not required beneath exposed concrete floors, such as warehouses and garages, provided that moisture intrusion into the structures are permissible for the design life of the structures.

8.7.8 Additional measures to reduce moisture migration should be implemented for floors that will receive moisture sensitive coverings. These include: 1) constructing a less pervious concrete floor slab by maintaining a water-cement ratio of 0.52 or less in the concrete for slabs-on-grade, 2) ensuring

that all seams and utility protrusions are sealed with tape to create a "water tight" moisture barrier, 3) placing concrete walkways or pavements adjacent to the structures, 4) providing adequate drainage away from the structures, 5) moist cure the slabs for at least 7 days, and 6) locating lawns, irrigated landscape areas, and flower beds away from the structures.

8.7.9 The Contractor shall test the moisture vapor transmission through the slab, the pH, internal relative humidity, etc., at a frequency and method as specified by the flooring manufacturer or as required by the plans and specifications, whichever is most stringent. The results of vapor transmission tests, pH tests, internal relative humidity tests, ambient building conditions, etc. should be within floor manufacturer's and adhesive manufacturer's specifications at the time the floor is placed. It is recommended that the floor manufacturer and subcontractor review and approve the test data prior to floor covering installation.

8.7.10 To reduce the potential for damaging slabs during construction the following recommendations are presented: 1) design for a differential slab movement of ½ inch relative to interior columns; and 2) the construction equipment which will operate on slabs or pavements should be evaluated by the contractor prior to loading the slab.

8.7.11 Backfill the zone above the top of footings at interior column locations, building perimeters, and below the bottom of slabs with an approved backfill as recommended herein for the area below interior slabs-on-grade. This procedure should provide more uniform support for the slabs which may reduce the potential for cracking.

8.8 Exterior Slabs-On-Grade

The recommendations for exterior slabs provided below are not intended for use for slabs subjected to vehicular traffic, rather lightly loaded sidewalks, curbs, and planters, etc. outside the building pad.

8.8.1 Exterior improvements that subject the subgrade soils to a sustained load greater than 150 pounds per square foot should be prepared in accordance with recommendations presented in this report for interior slabs-on-grade. Moore Twining can provide alternative design recommendations for exterior

slabs, if requested.

8.8.2 Subgrade soils for exterior slabs should be prepared as recommended in the "Site Preparation" section of this report. Upon completion of the over-excavation and compaction of subgrade soils, the exterior slabs should be supported on a minimum of 4 inches of aggregate base overlying subgrade soils prepared in accordance with the recommendations provided in the "Site Preparation" section of this report.

8.8.3 The moisture content of the subgrade soils should be verified to be at least optimum moisture content within 48 hours of placement of the slab-on-grade. In addition, the density and stability of the prepared subgrade should be verified prior to placement of the aggregate base. If necessary to achieve the recommended moisture content, the subgrade could be over-excavated, moisture conditioned as necessary and compacted as engineered fill.

8.8.4 The exterior slabs-on-grade adjacent to landscape areas should be designed with thickened edges which extend to at least a depth of 6 inches below the bottom of the slabs-on-grade.

8.8.5 Since exterior sidewalks, curbs, etc. are typically constructed at the end of the construction process, the moisture conditioning conducted during earthwork can revert to natural dry conditions. Placing concrete walks and finish work over dry or slightly moist subgrade should be avoided. It is recommended that the general contractor notify Moore Twining to conduct in-place moisture and density tests prior to placing concrete flatwork. Written test results indicating passing density and moisture tests should be in the general contractor's possession prior to placing concrete for exterior flatwork.

8.9 Asphaltic Concrete (AC) Pavements

Recommendations are provided below for new asphaltic concrete pavements planned as part of the new construction.

8.9.1 The subgrade soils for asphaltic concrete pavements should be over-excavated and compacted as recommended in the "Site Preparation" section of the recommendations in this report. The prepared subgrade should be proofrolled to verify stable conditions prior to placement of the aggregate base.

8.9.2 The following pavement sections are based on an R-value of 40 and traffic index values ranging from 5.0 to 7.0. It should be noted that if pavements are constructed prior to construction of the buildings, the traffic index value

should account for construction traffic. The actual traffic index values applicable to the site should be determined by the project civil engineer.

Table No. 4
Asphaltic Concrete Pavements

Traffic Index	AC thickness, inches	AB thickness, inches	Compacted Subgrade, inches
5.0	3.0	4.0	12
5.5	3.0	5.0	12
6.0	3.0	6.5	12
6.5	3.5	6.5	12
7.0	4.0	7.0	12

AC - Asphaltic Concrete compacted as recommended in this report

AB - Class II Aggregate Base with minimum R-value of 78 and compacted to at least 95 percent relative compaction (ASTM D1557)

Subgrade - Subgrade soils compacted to at least 95 percent relative compaction (ASTM D1557)

8.9.3 The curbs where pavements meet irrigated landscape areas or uncovered open areas should extend at least to the bottom of the aggregate base section. This should reduce subgrade moisture from irrigation and runoff from migrating into the base section and reducing the life of the pavements.

8.9.4 If actual pavement subgrade materials are significantly different from those tested for this study due to unanticipated grading or soil importing, the pavement sections should be re-evaluated for the changed subgrade conditions.

8.9.5 If the paved areas are to be used during construction, or if the type and frequency of traffic are greater than assumed in design, the pavement sections should be re-evaluated for the anticipated traffic.

8.9.6 Pavement section design assumes that proper maintenance, such as sealing and repair of localized distress, will be performed on an as needed basis for longevity and safety.

8.9.7 Pavement materials and construction method should conform to the State of California Standard Specifications.

8.9.8 It is recommended that the base 2 inch thick course of asphaltic concrete

consist of a ¾ inch maximum medium gradation. The top course or wear course should consist of a ½ inch maximum medium gradation.

8.9.9 The asphaltic concrete, including the joint density, should be compacted to an average relative compaction of 93 percent, with no single test value being below a relative compaction of 91 percent and no single test value being above a relative compaction of 97 percent of the referenced laboratory density according to ASTM D2041.

8.9.10 The asphalt concrete should comply with the requirements for a Type "A" asphalt concrete as described in Section 39 of the 2015 State of California Department of Transportation (Caltrans) Standard Specification, or the requirements of the governing agency, whichever is more stringent.

8.10 Portland Cement Concrete (PCC) Pavements

Recommendations for Portland Cement Concrete pavement structural sections are presented in the following subsections. The PCC pavement design assumes a minimum modulus of rupture of 500 psi. The design professional should specify where Portland cement concrete pavements are used based on the anticipated type and frequency of traffic.

8.10.1 The subgrade soils for Portland cement concrete pavements should be over-excavated and compacted as recommended in the “Site Preparation” section of the recommendations in this report.

8.10.2 The following pavement section designs are based on a design modulus of subgrade reaction, K-value, of 200 psi/in considering the pavements to be underlain by 4 inches of aggregate base. The design thicknesses were prepared based on the procedures outlined in the Portland Cement Association (PCA) document, “Thickness Design for Concrete Highway and Street Pavements,” assuming the following: 1) minimum modulus of rupture of 500 psi for the concrete, 2) a design life of 20 years, 3) load transfer by aggregate interlock or dowels, 4) concrete shoulder, and 5) a load safety factor of 1.1. The PCC section thicknesses provided in Table No.5 below are based on trash truck loading consisting of 1 single axle load of 20 kips and two tandem axle loads of 35 kips each. The pavement sections provided in Table No.6 are based on semi-tractor trailer truck loading consisting of 1 single axle load of 12 kips and two tandem axle loads of 34 kips each. In addition, Table No. 6 includes a minimum recommended PCC pavement section for drive through lanes receiving only vehicular traffic.

Table No. 5
Trash Truck Loading
Portland Cement Concrete Pavements

ADTT (Trucks/day)	PCC thickness (inches)	Aggregate Base, AB (inches)	Compacted Subgrade (inches)
1	6.5	4.0	12.0
3	7.0	4.0	12.0

ADTT - Average Daily Truck Traffic based on a loaded garbage/dumpster truck
PCC - Portland Cement Concrete (minimum Modulus of Rupture=500 psi)

AB - Class II Aggregate Base with minimum R-value of 78 and compacted to at least 95 percent relative compaction (ASTM D1557).

Subgrade - Subgrade soils compacted to at least 95 percent relative compaction (ASTM D-1557)

Table No. 6
Semi-Tractor Trailer Loading Portland Cement Concrete Pavements

ADTT (Trucks/day)	PCC thickness (inches)	Aggregate Base, AB (inches)	Compacted Subgrade (inches)
Drive Through Lanes Only	5.0	4.0	12.0
3	6.0	4.0	12.0
7	6.0	4.0	12.0
20	6.5	4.0	12.0

ADTT - Average Daily Truck Traffic based on a loaded semi-tractor trailer
PCC - Portland Cement Concrete (minimum Modulus of Rupture=500 psi)

AB - Class II Aggregate Base with minimum R-value of 78 and compacted to at least 95 percent relative compaction (ASTM D1557).

Subgrade - Subgrade soils compacted to at least 95 percent relative compaction (ASTM D-1557)

8.10.3 The PCC pavement should be constructed in accordance with American Concrete Institute requirements, the requirements of the project plans and specifications, whichever is the most stringent. The pavement design engineer should include appropriate construction details and specifications

for construction joints, contraction joints, joint filler, concrete specifications, curing methods, etc.

8.10.4 Concrete used for PCC pavements shall possess a minimum flexural strength (modulus of rupture) of 500 pounds per square inch. A minimum compressive strength of 3,500 pounds per square inch, or greater as required by the pavement designer, is recommended. Specifications for the concrete to reduce the effects of excessive shrinkage, such as maximum water requirements for the concrete mix, allowable shrinkage limits, contraction joint construction requirements, etc. should be provided by the designer of the PCC slabs.

8.10.5 The pavement section thickness design provided above assumes the design and construction will include sufficient load transfer at construction joints. Coated dowels or keyed joints are recommended for construction joints to transfer loads. The joint details should be detailed by the pavement design engineer and provided on the plans.

8.10.6 Contraction and construction joints should include a joint filler/sealer to prevent migration of water into the subgrade soils. The type of joint filler should be specified by the pavement designer. The joint sealer and filler material should be maintained throughout the life of the pavement.

8.10.7 Contraction joints should have a depth of at least one-fourth the slab thickness, e.g., 1.5-inch for a 6-inch slab. Specifications for contraction joint spacing, timing and depth of sawcuts should be included in the plans and specifications.

8.10.8 Stresses are anticipated to be greater at the edges and construction joints of the pavement section. A thickened edge is recommended on the outside of slabs subjected to wheel loads.

8.10.9 Joint spacing in feet should not exceed twice the slab thickness in inches, e.g., 12 feet by 12 feet for a 6-inch slab thickness. Regardless of slab thickness, joint spacing should not exceed 15 feet.

8.10.10 Lay out joints to form square panels. When this is not practical, rectangular panels can be used if the long dimension is no more than 1.5 times the short.

8.10.11 Isolation (expansion) joints should extend the full depth and should be used only to isolate fixed objects abutting or within paved areas.

8.10.12 Pavement section design assumes that proper maintenance such as sealing

and repair of localized distress will be performed on a periodic basis.

8.11 Slopes, Shoring and Temporary Excavations

8.11.1 It is the responsibility of the contractor to provide safe working conditions with respect to excavation slope stability. The contractor is responsible for site slope safety, classification of materials for excavation purposes, and maintaining slopes in a safe manner during construction. The grades, classification and height recommendations presented for temporary slopes are for consideration in preparing budget estimates and evaluating construction procedures.

8.11.2 Temporary excavations should be constructed in accordance with CAL OSHA requirements. Temporary cut slopes should not be steeper than 1.5:1, horizontal to vertical, and flatter if possible. If excavations cannot meet these criteria, the temporary excavations should be shored.

8.11.3 In no case should excavations extend below a 2H to 1V zone below existing utilities, foundations and/or floor slabs which are to remain after construction. Excavations which are required to be advanced below the 2H to 1V envelope should be shored to support the soils, foundations, and slabs.

8.11.4 All soils disturbed as part of the shoring removal shall be over-excavated and compacted as engineered fill. In addition, all cavities and void space resulting from the shoring removal activity shall be backfilled with engineered fill or a controlled density fill material to backfill the voids created by removal of the shoring. All voids resulting from removal of shoring shall be backfilled and all soils disturbed from the shoring removal shall be over-excavated and compacted as engineered fill.

8.11.5 Excavation stability should be monitored by the contractor. Slope gradient estimates provided in this report do not relieve the contractor of the responsibility for excavation safety. In the event that tension cracks or distress to the structure occurs, during or after excavation, the owner should be notified immediately and the contractor should take appropriate actions to minimize further damage or injury.

8.12 Utility Trenches

8.12.1 It is anticipated that predominantly cemented soils will be encountered during installation of underground utilities, below depths of about 2 to 5 feet. The

cemented soils are anticipated to be difficult to excavate and may require significant processing to be used as engineered fill for trench backfill. Excavating and processing of cemented soils during installation of underground utilities can be difficult due to the limited size and type of the equipment being utilized. Therefore, it may be advantageous to over-excavate areas with higher concentrations of utilities such as building pads, to the bottom of the utility trench depth to allow the utilities to be excavated in engineered fill soils.

8.12.2 The utility trench subgrade should be prepared by excavation of a neat trench without disturbance to the bottom of the trench. If sidewalls are unstable, the Contractor shall either slope the excavation to create a stable sidewall or shore the excavation. All trench subgrade soils disturbed during excavation, such as by accidental over-excavation of the trench bottom, or by excavation equipment with cutting teeth, should be compacted to a minimum of 92 percent relative compaction prior to placement of bedding material. The Contractor is responsible for notifying Moore Twining when these conditions occur and arrange for Moore Twining to observe and test these areas prior to placement of pipe bedding. The Contractor shall use such equipment as necessary to achieve a smooth undisturbed native soil surface at the bottom of the trench with no loose material at the bottom of the trench. The Contractor shall either remove all loose soils or compact the loose soils as engineered fill prior to placement of bedding, pipe and backfill of the trench.

8.12.3 The trench width, type of pipe bedding, the type of initial backfill, and the compaction requirements of bedding and initial backfill material for utility trenches (storm drainage, sewer, water, electrical, gas, cable, phone, irrigation, etc.) should be specified by the project Civil Engineer or applicable design professional in compliance with the manufacturer's requirements, governing agency requirements and this report, whichever is more stringent. The contractor is responsible for contacting the governing agency to determine the requirements for pipe bedding, pipe zone and final backfill. The contractor is responsible for notifying the Owner and Moore Twining if the requirements of the agency and this report conflict, the most stringent applies. For flexible polyvinylchloride (PVC) pipes, these requirements should be in accordance with the manufacturer's requirements or ASTM D- 2321, whichever is more stringent, assuming a hydraulic gradient exists (gravel, rock, crushed gravel, etc. cannot be used as backfill on the project). The width of the trench should provide a minimum clearance of 8 inches between the sidewalls of the pipe and the trench, or as necessary to provide a trench width that is 12 inches greater than 1.25 times the outside diameter of the pipe, whichever is greater. As a minimum, the pipe bedding should consist of 4 inches of compacted (92 percent relative compaction) select sand with a minimum sand equivalent of 30 and meeting the following

requirements: 100 percent passing the 1/4 inch sieve, a minimum of 90 percent passing the No. 4 sieve and not more than 10 percent passing the No. 200 sieve. The haunches and initial backfill (12 inches above the top of pipe) should consist of a select sand meeting these sand equivalent and gradation requirements that is placed in maximum 6-inch thick lifts and compacted to a minimum relative compaction of 92 percent using hand equipment. The final fill (12 inches above the pipe to the surface) should be on-site or imported, non-expansive materials moisture conditioned to between optimum and three (3) percent above optimum moisture content and compacted to a minimum of 92 percent relative compaction. The project civil engineer should take measures to control migration of moisture in the trenches such as slurry collars, etc.

8.12.4 If ribbed or corrugated HDPE or metal pipes are used on the project, then the backfill should consist of select sand with a minimum sand equivalent of 30, 100 percent passing the 1/4 inch sieve, a minimum of 90 percent passing the No. 4 sieve and not more than 10 percent passing the No. 200 sieve. The sand shall be placed in maximum 6-inch thick lifts, extending to at least 1 foot above the top of pipe, and compacted to a minimum relative compaction of 92 percent using hand equipment. Prior to placement of the pipe, as a minimum, the pipe bedding should consist of 4 inches of compacted (92 percent relative compaction) sand meeting the above sand equivalent and gradation requirements for select sand bedding. The width of the trench should meet the requirements of ASTM D2321 listed in Table No. 7 (minimum manufacturer requirements), or as necessary to provide sufficient space to achieve the required compaction, whichever is greater. As an alternative to the trench width recommended above and the use of the select sand bedding, a lesser trench width for HDPE pipes may be used if the trench is backfilled with a 2-sack sand-cement slurry from the bottom of the trench to 1 foot above the top of the pipe.

Table No. 7
Minimum Trench Widths for HDPE Pipe with
Sand Bedding Initial Backfill

Inside Diameter of HDPE Pipe (inches)	Outside Diameter of HDPE Pipe (inches)	Minimum Trench Width (inches) per ASTM D2321
12	14.2	30
18	21.5	39
24	28.4	48
36	41.4	64
48	55	80

8.12.5 Open graded gravel and rock material such as ¾-inch crushed rock or ½-inch crushed rock should not be used as backfill including trench backfill. In the event gravel or rock is required by a regulatory agency for use as backfill (Contractor to obtain a letter from the agency stating the requirement for rock and/or gravel as backfill), all open graded materials shall be fully encased in a geotextile filter fabric, such as Mirafi 140N, to prevent migration of fine grained soils into the porous material. Gravel and rock cannot be used without the written approval of Moore Twining. If the contractor elects to use crushed rock (and if approved by Moore Twining), the contractor will be responsible for slurry cut off walls at the locations directed by Moore Twining. Crushed rock should be placed in thin (less than 8 inch) lifts and densified with a minimum of three (3) passes using a vibratory compactor.

8.12.6 Utility trench backfill placed in or adjacent to building areas, exterior slabs or pavements should be placed in 8 inch lifts, moisture conditioned to between zero (0) and three (3) percent above the optimum moisture content and compacted to at least 92 percent of the maximum dry density as determined by ASTM Test Method D1557. Lift thickness can be increased if the contractor can demonstrate the minimum compaction requirements can be achieved. The contractor should use appropriate equipment and methods to avoid damage to utilities and/or structures during placement and compaction of the backfill materials.

8.12.7 On-site soils and approved imported engineered fill may be used as final backfill (12 inches above the pipe to the ground surface) in trenches

8.12.8 Jetting of trench backfill is not allowed to compact the backfill soils.

8.12.9 Where utility trenches extend from the exterior to the interior limits of a building, lean concrete should be used as backfill material for a minimum

distance of 2 feet laterally on each side of the exterior building line to prevent the trench from acting as a conduit to exterior surface water.

8.12.10 Storm drains and/or utility lines should be designed to be "watertight." If encountered, leaks should be immediately repaired. Leaking storm drain and/or utility lines could result in trench failure, sloughing and/or soil movement causing damage to surface and subsurface structures, pavements, flatwork, etc. In addition, landscaping irrigation systems should be monitored for leaks. The Contractor is required to video inspect or pressure test the wet utilities prior to placement of foundations, slabs-on-grade or pavements to verify that the pipelines are constructed properly and are "watertight." The Contractor shall provide the Owner a copy of the results of the testing. The Contractor is required to repair all noted deficiencies at no cost to the owner.

8.12.11 The plans should note that all utility trenches, including electrical lines, irrigation lines, etc. should be compacted to a minimum relative compaction of 92 percent per ASTM D-1557 except for the upper 12 inches below pavements which should be compacted to at least 95 percent relative compaction.

8.12.12 Utility trenches should not be constructed within a zone defined by a line that extends at an inclination of 2 horizontal to 1 vertical downward from the bottom of building foundations.

8.13 Corrosion Protection

8.13.1 Based on the National Association of Corrosion Engineers corrosion severity rating listed in Section 6.9 of this report, the analytical results of sample analyses indicate the samples had resistivity values of 3,802, 3,935 and 3,802 ohms-centimeter, with pH values of 7.9, 7.9 and 7.8, respectively. Based on the resistivity value, the soils exhibit a "corrosive" corrosion potential. Therefore, buried metal objects should be protected in accordance with the manufacturer's recommendations based on a "corrosive" corrosion potential. The evaluation was limited to the effects of soils to metal objects; corrosion due to other potential sources, such as stray currents and groundwater, was not evaluated. If piping or concrete are placed in contact with deeper soils or engineered fill, these soils should be analyzed to evaluate the corrosion potential of these soils.

8.13.2 Corrosion of concrete due to sulfate attack is not anticipated based on the concentration of sulfates determined for the near-surface soils (0.002, "Not Detected" and 0.013 percent by dry weight concentrations of sulfate).

According to provisions of ACI 318, section 4.3 , the sulfate concentration falls in the negligible classification (0.00 to 0.10 percent by weight) for concrete. Therefore, no restrictions are required regarding the type, water-to-cement ratio, or strength of the concrete used for foundation and slabs due to the sulfate content. However, a low water to cement ratio is recommended for slabs on grade as recommended in the "Interior Slab on Grade" section of this report.

8.13.3 These soil corrosion data should be provided to the manufacturers or suppliers of materials that will be in contact with soils (pipes or ferrous metal objects, etc.) to provide assistance in selecting the protection and materials for the proposed products or materials. If the manufacturers or suppliers cannot determine if materials are compatible with the soil corrosion conditions, a professional consultant, i.e., a corrosion engineer, with experience in corrosion protection should be consulted to design parameters. Moore Twining is not a corrosion engineer; thus, cannot provide recommendations for mitigation of corrosive soil conditions. It is recommended that a corrosion engineer be consulted for the site specific conditions.

9.0 DESIGN CONSULTATION

9.1 Moore Twining should be retained to review those portions of the contract drawings and specifications that pertain to earthwork operations and foundations prior to finalization to determine whether they are consistent with our recommendations. This service is not part of this current contractual agreement.

9.2 It is the client's responsibility to provide plans and specification documents for our review prior to their issuance for construction bidding purposes.

9.3 If Moore Twining is not retained for the plan review, we assume no liability for the misinterpretation of our conclusions and recommendations. This review is documented by a formal plan/specification review report provided by Moore Twining.

10.0 CONSTRUCTION MONITORING

10.1 It is recommended that Moore Twining be retained to observe the excavation, earthwork, and foundation phases of work to determine that the subsurface conditions

are compatible with those used in the analysis and design.

10.2 Moore Twining can conduct the necessary observation and field testing to provide results so that action necessary to remedy indicated deficiencies can be taken in accordance with the plans and specifications. Upon completion of the work, a written summary of our observations, field testing and conclusions will be provided regarding the conformance of the completed work to the intent of the plans and specifications. This service is not, however, part of this current contractual agreement.

10.3 In the event that the earthwork operations for this project are conducted such that the construction sequence is not continuous, (or if construction operations disturb the surface soils) it is recommended that the exposed subgrade that will receive floor slabs be tested to verify adequate compaction and/or moisture conditioning. If adequate compaction or moisture contents are not verified, the fill soils should be over-excavated, scarified, moisture conditioned and compacted are recommended in the Recommendations of this report.

10.4 The construction monitoring is an integral part of this investigation. This phase of the work provides Moore Twining the opportunity to verify the subsurface conditions interpolated from the soil borings and make alternative recommendations if the conditions differ from those anticipated.

10.5 If Moore Twining is not afforded the opportunity to provide engineering observation and field-testing services during construction activities related to earthwork, foundations, pavements and trenches; then, Moore Twining will not be responsible for compliance of any aspect of the construction with our recommendations or performance of the structures or improvements if the recommendations of this report are not followed. It is recommended that if a firm other than Moore Twining is selected to conduct these services that they provide evidence of professional liability insurance satisfactory to the client and review this report. After their review, the firm should, in writing, state that they understand and agree with the conclusions and recommendations of this report and agree to conduct sufficient observations and testing to ensure the construction complies with this report's recommendations. Moore Twining should be notified, in writing, if another firm is selected to conduct observations and field-testing services prior to construction.

10.6 Upon the completion of work, a final report should be prepared by Moore Twining. This report is essential to ensure that the recommendations presented are incorporated into the project construction, and to note any deviations from the project plans and specifications. The client should notify Moore Twining upon the completion of work to prepare a final report summarizing the observations during site preparation activities relative to the recommendations of this report. This service is

not, however, part of this current contractual agreement.

11.0 NOTIFICATION AND LIMITATIONS

11.1 The conclusions and recommendations presented in this report are based on the information provided regarding the proposed construction, and the results of the field and laboratory investigation, combined with interpolation of the subsurface conditions between boring locations. The nature and extent of subsurface variations between borings may not become evident until construction.

11.2 If variations or undesirable conditions are encountered during construction, Moore Twining should be notified promptly so that these conditions can be reviewed and our recommendations reconsidered where necessary. It should be noted that unexpected conditions frequently require additional expenditures for proper construction of the project.

11.3 If the proposed construction is relocated or redesigned, or if there is a substantial lapse of time between the submission of our report and the start of work (over 12 months) at the site, or if conditions have changed due to natural cause or construction operations at or adjacent to the site, the conclusions and recommendations contained in this report should be considered invalid unless the changes are reviewed and our conclusions and recommendations modified or approved in writing.

11.4 Changed site conditions, or relocation of proposed structures, may require additional field and laboratory investigations to determine if our conclusions and recommendations are applicable considering the changed conditions or time lapse.

11.5 The conclusions and recommendations contained in this report are valid only for the project discussed in Section 3.4, Anticipated Construction. The use of the information and recommendations contained in this report for structures on this site not discussed herein or for structures on other sites not discussed in this report is not recommended. The entity or entities that use or cause to use this report or any portion thereof for other structures or site not covered by this report shall hold Moore Twining, its officers and employees harmless from any and all claims and provide Moore Twining's defense in the event of a claim.

11.6 This report is issued with the understanding that it is the responsibility of the client to transmit the information and recommendations of this report to developers, owners, buyers, architects, engineers, designers, contractors, subcontractors, and other parties having interest in the project so that the steps necessary to carry out these recommendations in the design, construction and maintenance of the project are taken by the appropriate party.

11.7 This report presents the results of a geotechnical engineering investigation only and

should not be construed as an environmental audit or study.

11.8 Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally-accepted engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied.

11.9 Reliance on this report by a third party (i.e., that is not a party to our written agreement) is at the party's sole risk. If the project and/or site are purchased by another party, the purchaser must obtain written authorization and sign an agreement with Moore Twining in order to rely upon the information provided in this report for design or construction of the project.

We appreciate the opportunity to be of service to the G&L China Lake, LLC. If you have any questions regarding this report, or if we can be of further assistance, please contact us at your convenience.

Sincerely,
MOORE TWINING ASSOCIATES, INC.
Geotechnical Engineering Division

Zubair Anwar, EIT
Staff Engineer

Read Andersen, RGE
Manager

APPENDIX A

DRAWINGS

Drawing No. 1 - Site Location Map

Drawing No. 2 - Test Boring Location Map

SITE

SOURCE: U.S.G.S. TOPOGRAPHIC MAP, 7 ½ MINUTE SERIES
RIDGECREST SOUTH, CALIFORNIA QUADRANGLE 1973

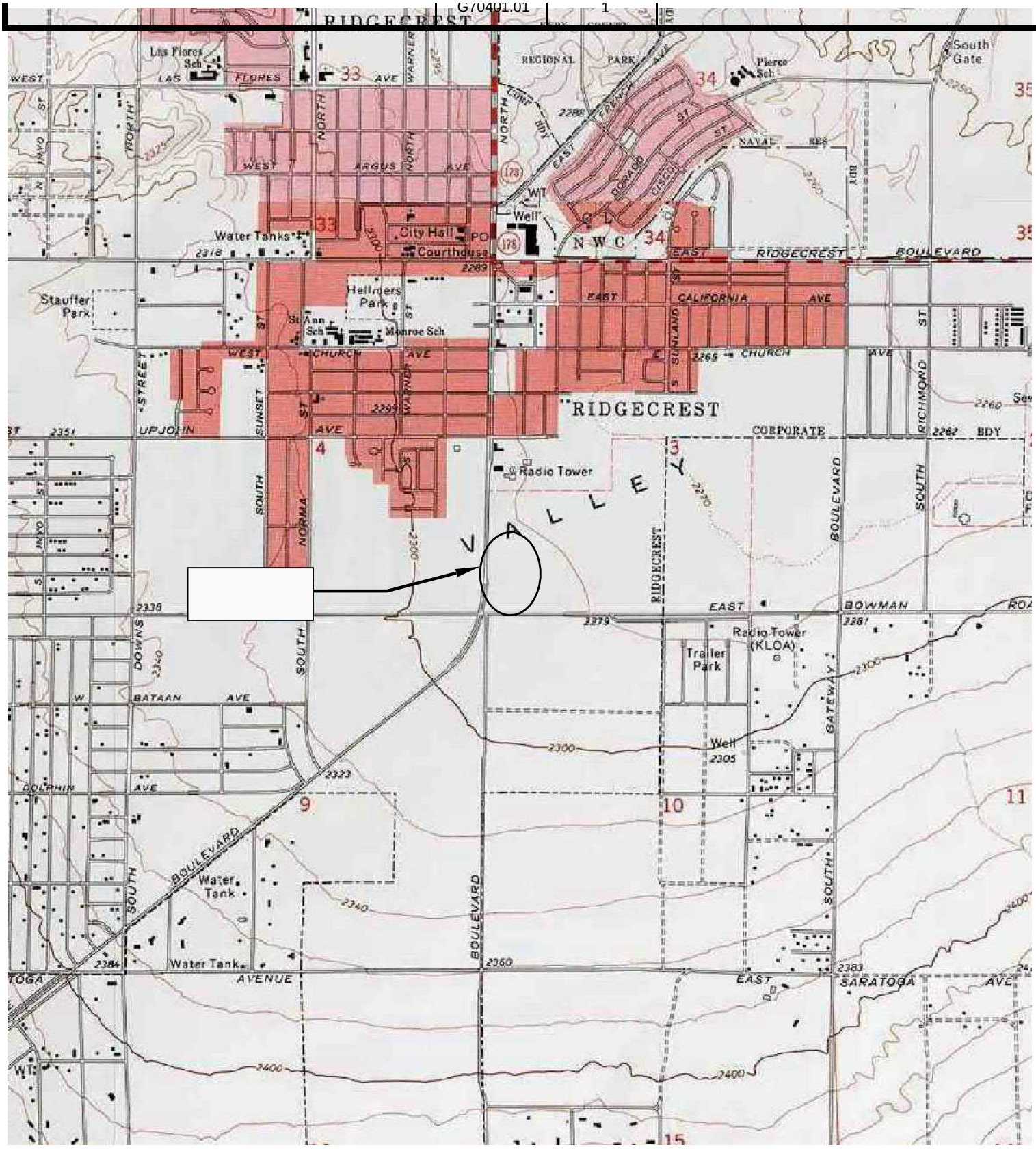
0 2000

APPROXIMATE SCALE
IN FEET

SITE LOCATION MAP
THE OASIS AT CHINA LAKE
NEC SOUTH CHINA LAKE BOULEVARD AND BOWMAN ROAD
RIDGECREST, CALIFORNIA

FILE NO.:	DATE:
70401-01-01	02/14/19
	APPROVED BY:
	DRAWING NO:

MOORE TWINING ASSOCIATES, INC.


RIDGECREST
Las Flores Sch
FLORES
33
AVE
WARNER
REGIONAL
PARK
Pierce Sch
South Gate
34
35
NORTH
WEST
ARGUS
AVE
178
WT
Well
Water Tanks
City Hall
PO
Courthouse
NWC
34
EAST
RIDGECREST
BOULEVARD
Stauffer Park
Hellmers Park
St Ann Sch
Monroe Sch
CALIFORNIA
AVE
CHURCH
STREET
SUNSET
WARNER
SUNLAND
RICHMOND
RIDGECREST
CORPORATE
BDY
UPJOHN
4
3
Radio Tower
VALLEY
SOUTH
NORMA
RIDGECREST
BOULEVARD
EAST
BOWMAN
Radio Tower (KLOA)
Trailer Park
DOWNS
BATAAN
AVE
GATEWAY
Well
2305
DOLPHIN
9
10
11
Water Tank
Water Tank
BOULEVARD
AVENUE
EAST
SARATOGA
AVE
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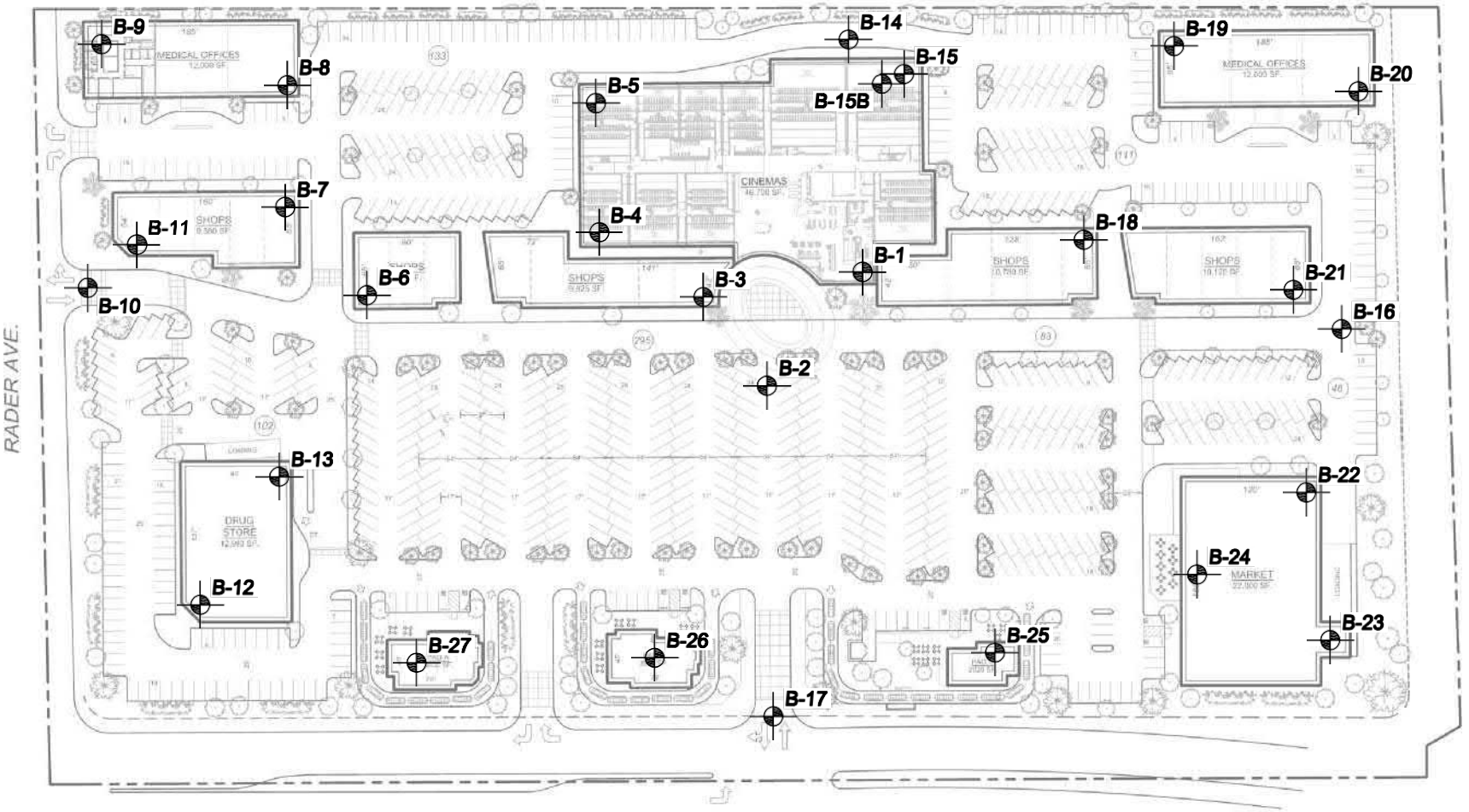


APPROXIMATE TEST BORING LOCATION

0 N 140

APPROXIMATE SCALE IN FEET

TEST BORING LOCATION MAP
THE OASIS AT CHINA LAKE

NEC SOUTH CHINA LAKE BOULEVARD AND BOWMAN ROAD
RIDGECREST, CALIFORNIA

G70401.01

DATE DRAWN: 02/14/19

APPROVED BY:

DRAWING NO 2

MOORE TWINING ASSOCIATES, INC.

FILE NO. 70401-01-02 DRAWN BY: RM PROJECT NO .

APPENDIX B

LOGS OF BORINGS

This appendix contains the final logs of borings. These logs represent our interpretation of the contents of the field logs and the results of the field and laboratory tests.

The logs and related information depict subsurface conditions only at these locations and at the particular time designated on the logs. Soil conditions at other locations may differ from conditions occurring at these test boring locations. Also, the passage of time may result in changes in the soil conditions at these test boring locations.

In addition, an explanation of the abbreviations used in the preparation of the logs and a description of the Unified Soil Classification System are provided at the end of Appendix B.

Test Boring: B-1

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

Logged By: Jovany C.

Date: 12-19-2018

Elevation: 2292

Hammer Type: 140 LB Auto Trip

Depth to Groundwater

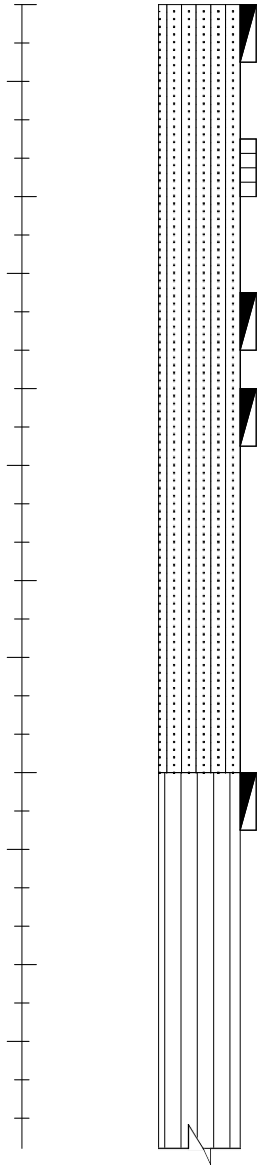
First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	3/6 11/6 11/6	SM	SILTY SAND; medium dense, damp, fine to medium grained, reddish-brown, trace gravel		22	1.5
2290			Very dense, strongly cemented	DD = 119.5 pcf	93	2.8
5	50/6 47/6 46/6					
2285					50/4	
	2265					
					27/6 37/6 50/3	
				25		
2280			10		31/6 48/6 49/6	21/6 46/6 50/4
2275			15		33/6 50/4	
2270			20		24/6 43/6	

	o n	brown, calcification	>87	6.2	
			97	5.2	
		Reddish-brown, non plastic	>50		
ML	SANDY SILT; hard, damp, slight plasticity, light-		>93		
			>96		

Notes:

Figure Number



Test Boring: B-1

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

Logged By: Jovany C.

Date: 12-19-2018

Elevation: 2292

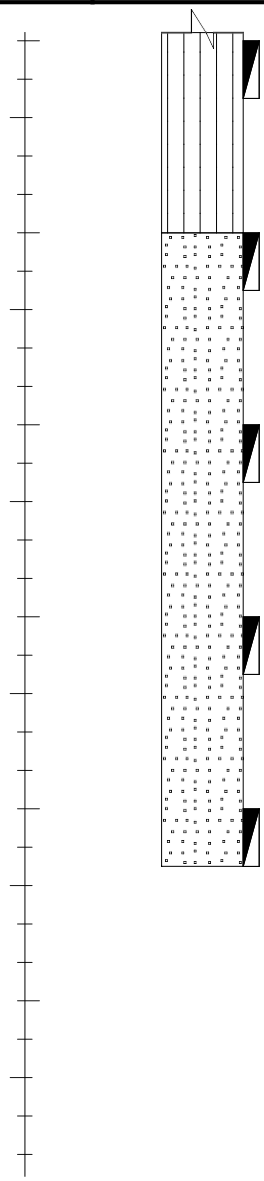
Hammer Type: 140 LB Auto Trip

Depth to Groundwater

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
30	12/6 13/6 7/6	ML	Seam of silty sand SANDY SILT; very stiff, damp, non plastic, brown		20	
2260						
35	6/6 6/6 6/6	SP	POORLY GRADED SAND; Loose, damp, medium to coarse grained, light-brown, calcification, trace gravel (Logged from cuttings)	No recovery	12	
2255						
40	4/6 4/6 6/6		subangular gravel	Gravel= 9.2% Sand = 87% -200 = 3.8%	10	
2250						
45	7/6 11/6 10/6		POORLY GRADED SAND (Logged from cuttings)	No Recovery	21	
2245						
50			Dense, light-gray		35	
2240	7/6 15/6 20/6		Bottom of boring			

552235 **Notes:** **Figure Number**



Test Boring: B-2

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

Logged By: Jovany C.

Date: 12-19-2018

Elevation: 2292.5

Hammer Type: 140 LB Auto Trip

Depth to Groundwater
First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0		SM	SILTY SAND; damp, fine to medium grained, brown, with rootlets, trace gravel	R-Value = 48 MR = 3802 Ohm-cm		
2290						
5			Bottom of boring			
2285						
10						
2280						
15						
2275						
20						
2270						

25 2265 **Notes:** **Figure Number**

Test Boring: B-3

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

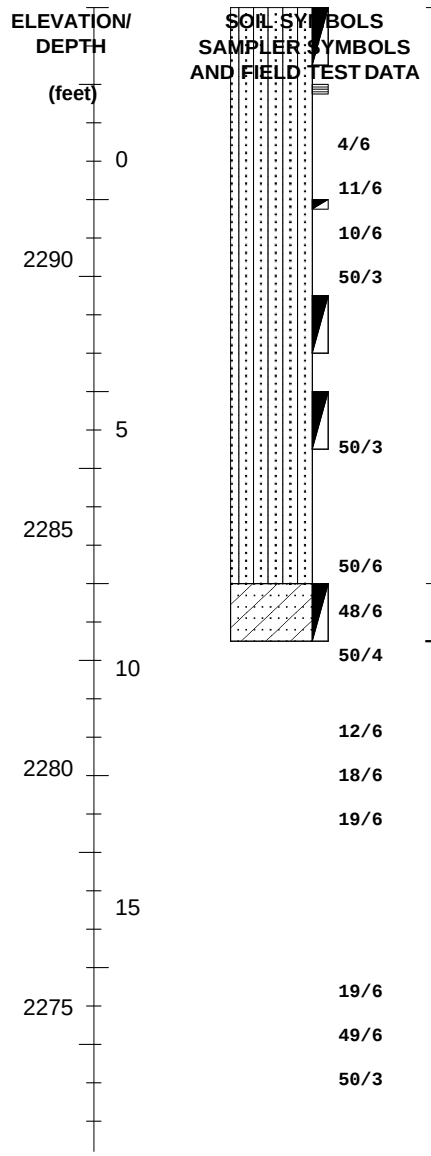
Logged By: Jovany C.

Date: 12-19-2018

Elevation: 2292

Hammer Type: 140 LB Auto Trip

Depth to Groundwater
First Encountered During Drilling: N/E



USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
SM	SILTY SAND; medium dense, damp, fine to medium grained, brown, trace subangular gravel	No Recovery	21 >50	0.9
	SILTY SAND; very dense, damp, fine to medium grained, brown		>50	2.2
	Strongly cemented		>98	5.0
	Dense, reddish-brown		37	
SC	CLAYEY SAND; very dense, damp, fine to medium grained, light-brown, weak cementation		>99	
	Bottom of boring			

25 2265 **Notes: Figure Number**

Test Boring: B-4

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

Logged By: Jovany C.

Date: 12-19-2018

Elevation: 2291

Hammer Type: 140 LB Auto Trip

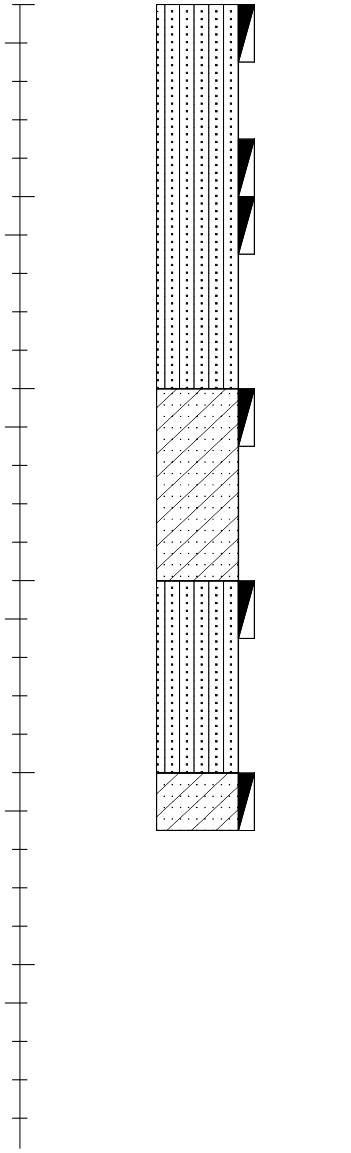
Depth to Groundwater

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	3/6	SM	SILTY SAND; medium dense, damp, fine to medium grained, reddish-brown, very dense, weakly cemented		21	1.4
2290	9/6					
	12/6					
	13/6		Very dense, weakly cemented		56	3.2
5	25/6		Dense, not cemented			
	31/6				32	2.8
2285	14/6					
	18/6					
	14/6					
10	17/6	SC	CLAYEY SAND; very			
	22/6					
2280	29/6					
	45/6					
	50/4					
15						
2275	10/6					
	13/6					
	26/6					
20						
2270	3/6					

	medium grained, strongly cemented, light-brown	SC	CLAYEY SAND; dense, damp, fine to medium grained, light-brown	m of boring	>95	6.6
					39	
					46	
SM	SILTY SAND; dense, damp, fine to medium grained, light-brown to brown, trace fine gravel					
			Bottom of boring			

25 2265 **Notes:** **Figure Number**



Test Boring: B-5

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Logged By: Jovany C.

Drilled By: James C.

Date: 12-19-2018

Drill Type: CME 75

Elevation: 2290

Auger Type: 6-5/8" H.S.A.

Depth to Groundwater

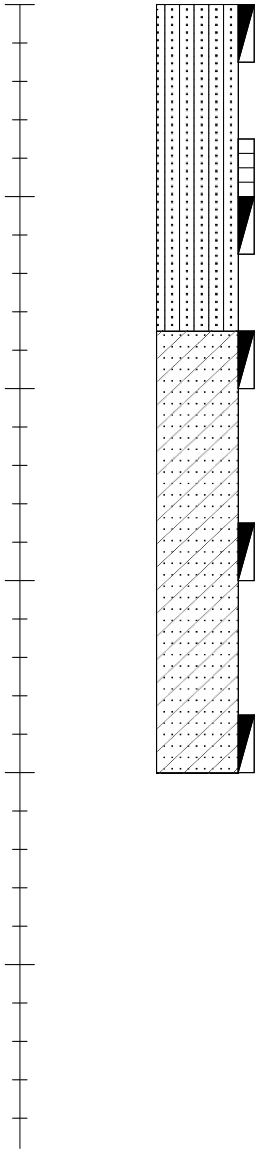
Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)		SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
2290	0	3/6 8/6 11/6	SM	SILTY SAND; medium dense, damp, fine to medium grained, reddish-brown, trace gravel		19	
2285	5	2/6 19/6 32/6 28/6 28/6 30/6		Very dense, weakly cemented Strongly cemented	DD = 112.8 pcf	51 58	3.0 4.0
2280	10	50/3 13/6 45/6 50/3	SC	CLAYEY SAND; very dense, fine to medium			
2275	15	17/6 40/6 50/4					
2270	20	34/6					

own to reddish-brown, weakly cemented	SAND= 57.2% -200 = 42.8% LL = 28 PI = 8	>95	6.5
		>90	
Strongly cemented		>50	
Increasent Bottom of boring			

2265 25 **Notes:** **Figure Number**



Test Boring: B-6

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

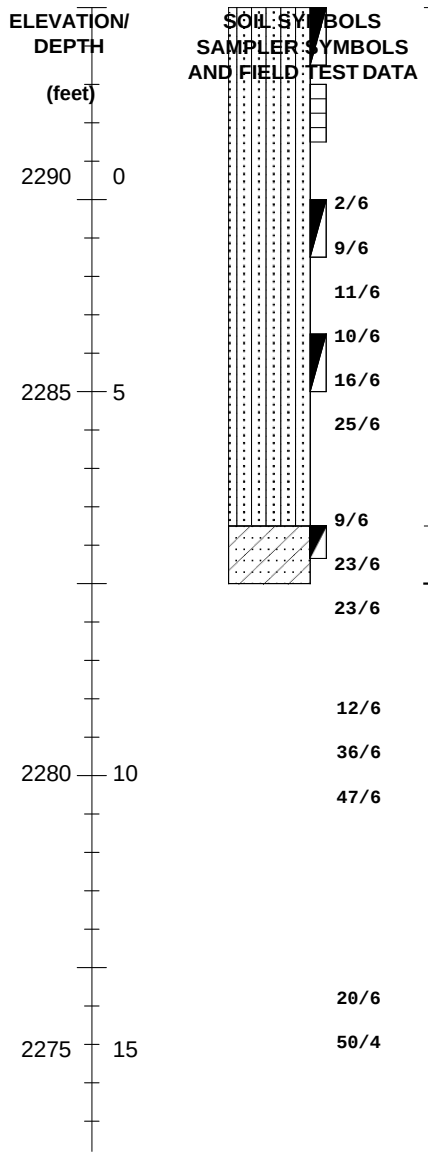
Logged By: Jovany C.

Date: 12-19-2018

Elevation: 2290

Hammer Type: 140 LB Auto Trip

Depth to Groundwater First Encountered During Drilling: N/E



USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
SM	SILTY SAND; medium dense, damp, fine to medium grained, brown		20	1.4
	Dense	DD = 111.6 pcf	41	2.1
	Weakly cemented		46	3.2
	Very dense		83	
SC	CLAYEY SAND; very dense, damp, fine to medium grained, light-brown, slightly cemented		>50	
	Bottom of boring			

Notes: **Figure Number**

Test Boring: B-7

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

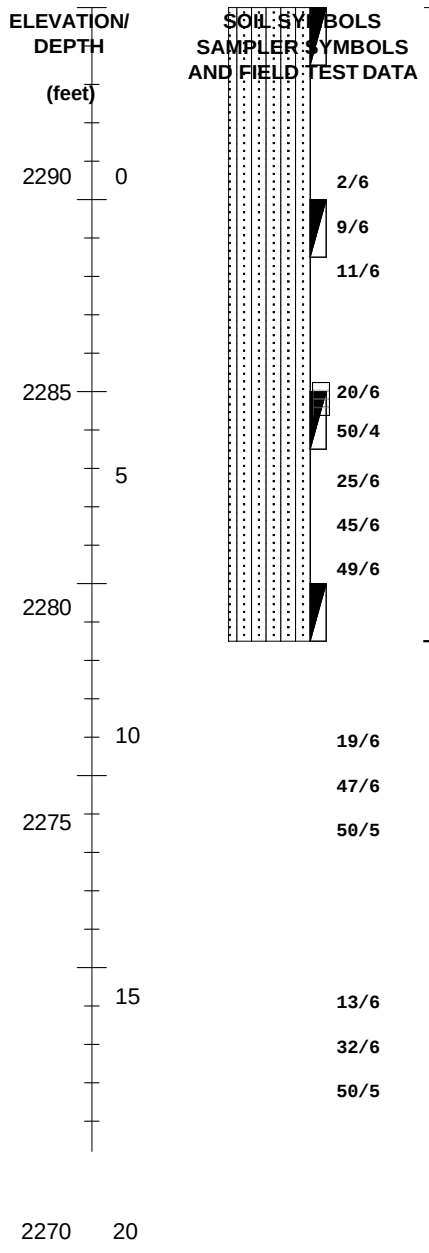
Logged By: Jovany C.

Date: 12-19-2018

Elevation: 2290

Hammer Type: 140 LB Auto Trip

Depth to Groundwater
First Encountered During Drilling: N/E



USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
SM	SILTY SAND; medium dense, damp, fine to medium grained, brown		20	1.0
	Very dense, weaklycemented	DD = 109.1 pcf	>50	2.3
			94	2.2
			>97	
	Trace gravel			
	Bottom of boring		>82	

2265 25 **Notes:** **Figure Number**

Test Boring: B-8

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Logged By: Jovany C.

Drill Type: CME 75

Date: 12-19-2018

Auger Type: 6-5/8" H.S.A.

Elevation: 2290

Depth to Groundwater

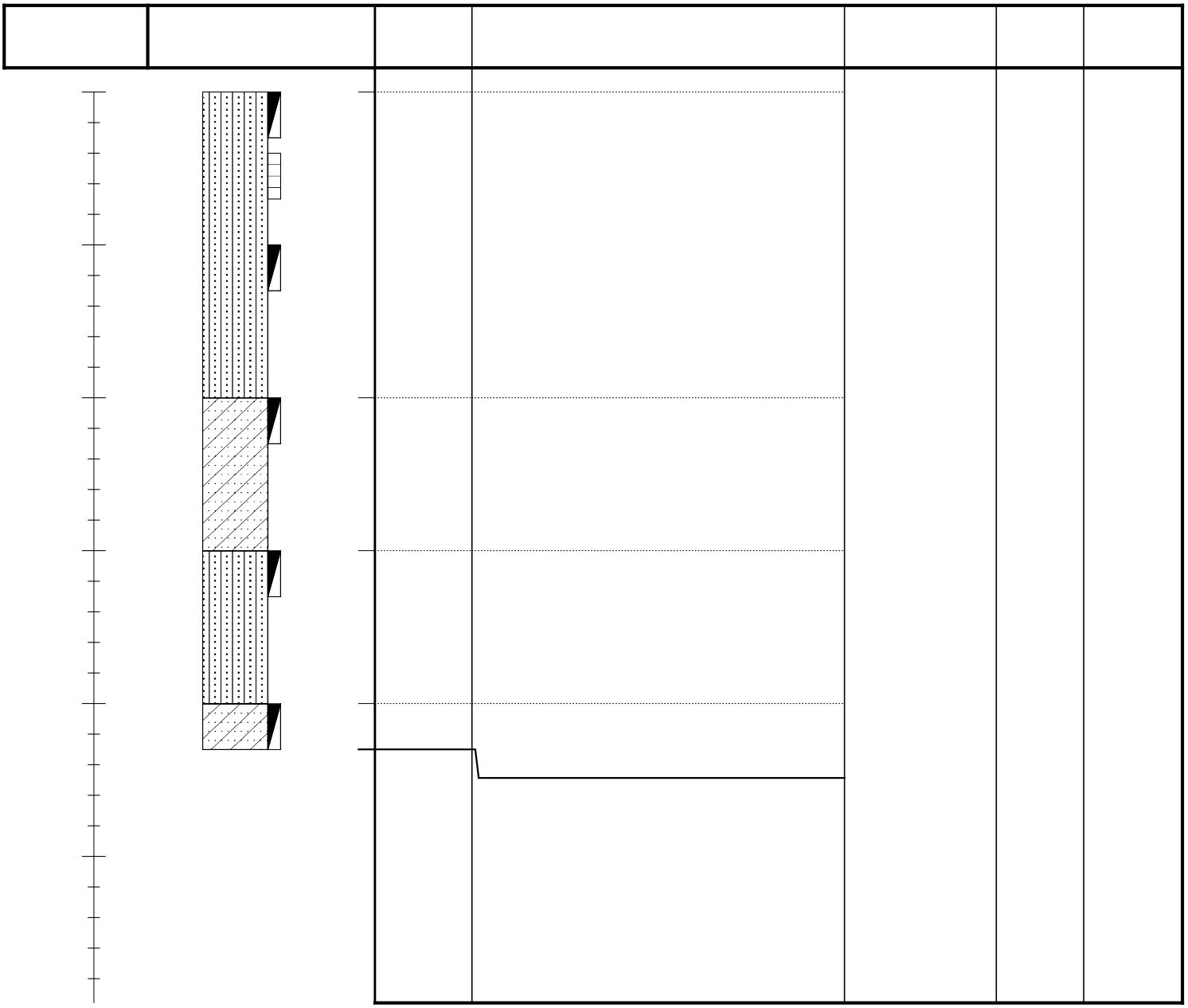
Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)		SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
2290	0	3/6 9/6 13/6 23/6 18/6 19/6	SM	SILTY SAND; medium dense, damp, fine to medium grained, brown, trace gravel At 2 feet - dense	DD =109.8 pcf -200 = 15.4% SAND = 84.6% c = 580 psf	22 37	0.9 1.4
2285	5	23/6 36/6 50/5			50/5		ø = 42° Very dense, light-brown, calcification,
2280	10	20/6 45/6 38/6					strongly cemented
2275	15	28/6 39/6 50/5				SC	CLAYEY SAND;
2270	20	27/6					

very dense, damp, fine to medium grained, light-brown, calcification, strongly cemented				rained, light- brown, iron oxide staining	>86
			SC	CLAYEY SAND; very dense, damp, fine to medium grained, light-brown, calcification, strongly cemented Bottom of boring	83
					>89
	S	MSILTY SAND; very dense, damp, fine to medium grained, light-brown, calcification			>50

2265 25 **Notes:** **Figure Number**



Test Boring: B-9

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

Logged By: Jovany C.

Date: 12-19-2018

Elevation: 2289

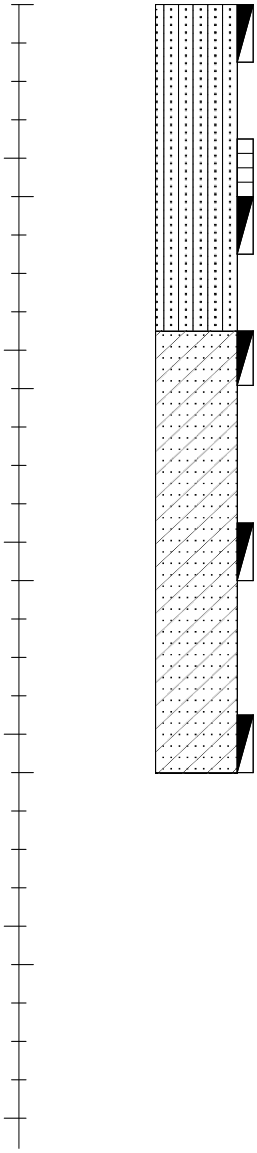
Depth to Groundwater

Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	5/6 9/6 14/6	SM	SILTY SAND; medium dense, damp, fine to medium grained, brown		23	1.2
2285	2/6 39/6		Very dense, dark-brown, weakly cemented	DD = 120.6 pcf	82	2.6
5	43/6 18/6 20/6 24/6		Dense, trace gravel		44	2.8
2280		SC	CLAYEY SAND; very dense, damp, fine to medium grained, light-brown, moderately cemented		>90	
10	11/6 40/6 50/5					
2275					>88	
15	22/6 38/6 50/5					
2270					>50	
20			Bottom of boring			
	15/6 50/4					

2265 25 2260 **Notes:** **Figure Number**



Test Boring: B-10

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Logged By: Jovany C.

Drilled By: James C.

Date: 12-19-2018

Drill Type: CME 75

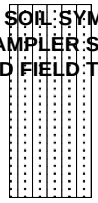
Elevation: 2290

Auger Type: 6-5/8" H.S.A

Depth to Groundwater

Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
2290 0		SM	SILTY SAND; damp, fine to medium grained, brown, with rootlets	R-Value = 61		
2285 5			Bottom of boring			
2280 10						
2275 15						
2270 20						
2265 25						

Notes: **Figure Number**

Test Boring: B-11

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

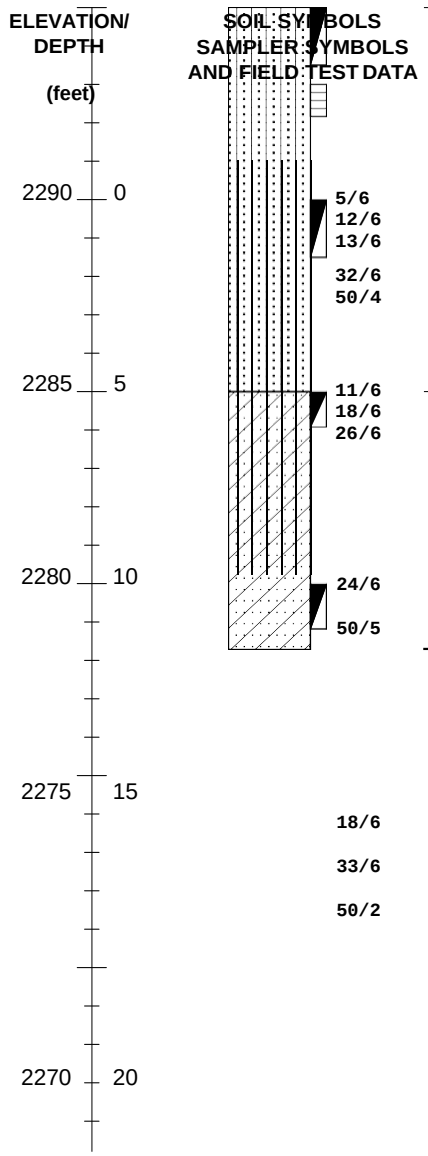
Logged By: Jovany C.

Date: 12-20-2018

Elevation: 2290

Hammer Type: 140 LB Auto Trip

Depth to Groundwater
First Encountered During Drilling: N/E



USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
SM	SILTY SAND; medium dense, damp, fine to medium grained, brown		25	2.0
	Very dense, moderately cemented	DD = 126.8 pcf	>50	2.1
	Dense		44	2.5
SC	CLAYEY SAND; verydense, damp, fine to medium grained, brown		>50	4.2
			>83	
	Bottom of boring			

Notes: **Figure Number**

Test Boring: B-12

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Logged By: Jovany C.

Drill Type: CME 75

Date: 12-20-2018

Auger Type: 6-5/8" H.S.A.

Elevation: 2293

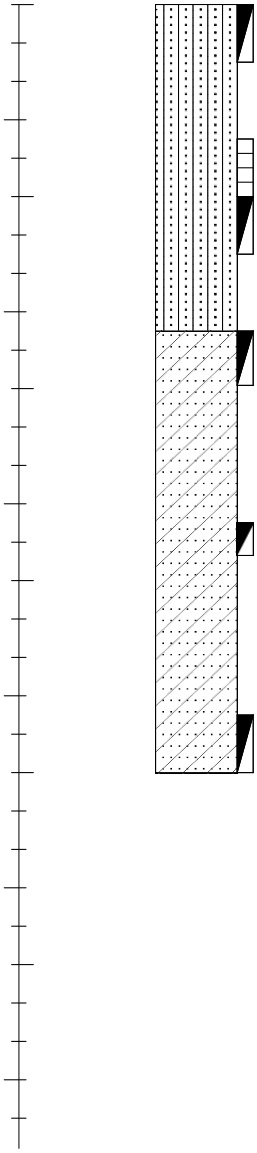
Depth to Groundwater

Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	9/6 9/6 10/6	SM	SILTY SAND; medium dense, damp, fine to medium grained, brown, trace subangular gravel		19	1.4
2290			Very dense, weakly cemented	DD = 120.5 pcf	85	1.7
5	13/6 37/6 48/6 17/6 24/6 40/6		Reddish-brown, calcification		64	3.1
2285						
10	15/6 39/6 50/5	SC	CLAYEY SAND; verydense, damp, fine to medium grained, reddish-brown, iron oxide staining, strongly cemented		>89	7.2
2280			Weakly cemented		>50	
15	28/6 50/4					
2275			Strongly cemented		>50	
20	17/6 50/2		Bottom of boring			

2270 25 2265 **Notes:** **Figure Number**



Test Boring: B-13

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Logged By: Jovany C.

Drill Type: CME 75

Date: 12-20-2018

Auger Type: 6-5/8" H.S.A.

Elevation: 2292.5

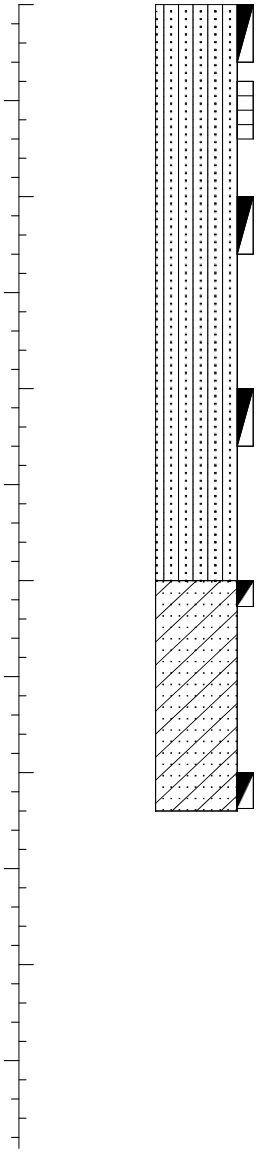
Depth to Groundwater

Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	4/6 7/6	SM	SILTY SAND; medium dense, damp, fine to medium grained, brown		18	1.4
2290	11/6 8/6 15/6		At 2 feet - dense, weakly cemented	DD=117.2 pcf c = 200 psf ø = 49°	47	2.2
5	32/6		Very dense, weakly cemented		83	3.4
2285	24/6 38/6 45/6					
10	18/6 38/6 48/6				86	
2280						
15	25/6 50/2	SC	CLAYEY SAND; very dense, damp, fine to medium grained, light-brown, calcification		>50	
2275						
20	20/6 50/5		Bottom of boring		>50	
2270						

25 2265 **Notes:** **Figure Number**



Test Boring: B-14

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

Logged By: Jovany C.

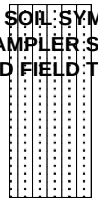
Date: 12-20-2018

Elevation: 2291

Hammer Type: 140 LB Auto Trip

Depth to Groundwater

First Encountered During Drilling: N/E



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0		SM	SILTY SAND; damp, fine to medium grained, brown, some cemented fragments	R-Value = 48		
2290						
5			Bottom of boring			
2285						
10						
2280						
15						
2275						
20						
2270						

25

2265

Notes: **Figure Number**

Test Boring: B-15

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Logged By: Jovany C.

Drill Type: CME 75

Date: 1-2-2019

Auger Type: 6-5/8" H.S.A.

Elevation: 2291

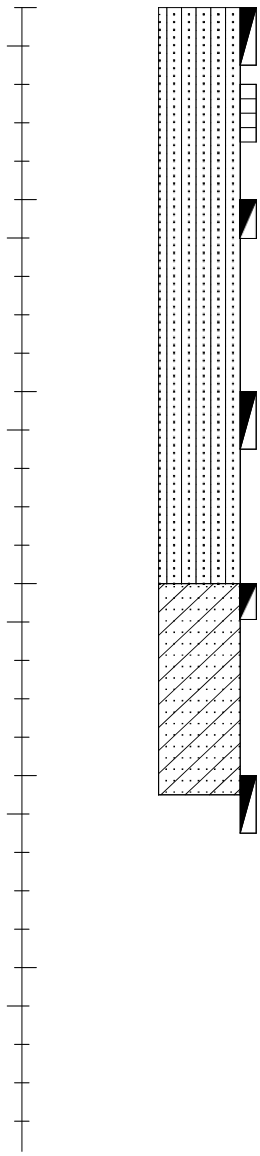
Hammer Type: 140 LB Auto Trip

Depth to Groundwater

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	6/6 10/6 11/6 19/6 25/6 25/6	SM	SILTY SAND; medium dense, damp, fine to medium grained, reddish-brown, trace gravel		21	
2290			Dense		50	
5	37/6 50/6		Weakly cemented		>50	
2285						
10	22/6 20/6 38/6		Very dense, moderately cemented		58	
2280						
15	39/6 50/5	SC	CLAYEY SAND; very dense, dry, fine to medium grained, light-brown, strongly cemented		>50	
2275						
20	50/5		Bottom of boring		>50	
2270						

25 2265 **Notes:** **Figure Number**



Test Boring: B-16

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: James C.

Drill Type: N/A

Auger Type: Hand Auger

Logged By: Jovany C.

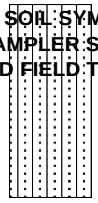
Date: 12-20-2018

Elevation: 2293.5

Hammer Type: N/A

Depth to Groundwater

First Encountered During Drilling: N/E



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0		SM	SILTY SAND; damp, fine to medium grained, brown, slight resistance to hand augering	R-Value = 51 MR = 3935 Ohm-cm		
2290			At 1.5 feet - hard to hand auger			
5			Bottom of boring			
2285						
10						
2280						
15						
2275						
20						
2270						

25	2265	**Notes:**	**Figure Number**

Test Boring: B-17

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Logged By: Jovany C.

Drilled By: James C.

Date: 12-20-2018

Drill Type: N/A

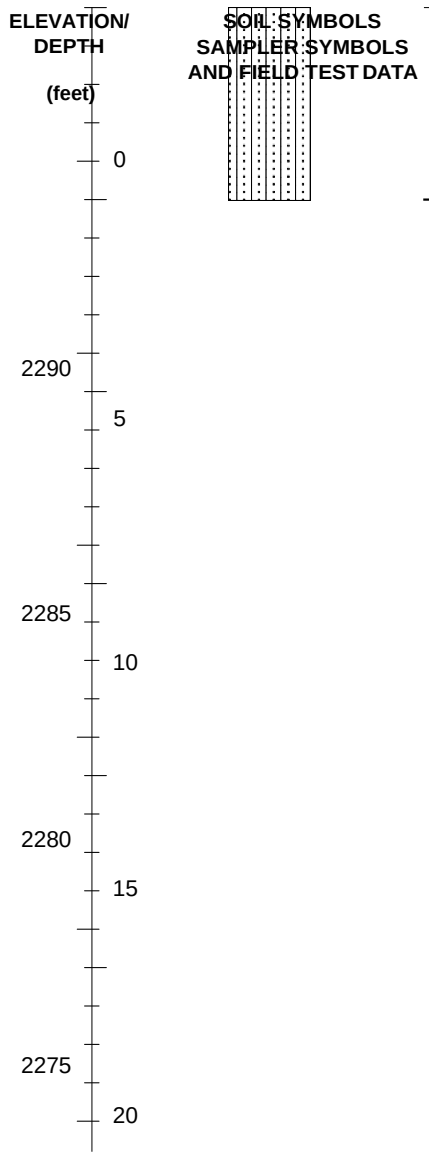
Elevation: 2294

Auger Type: Hand Auger

Hammer Type: N/A

Depth to Groundwater

First Encountered During Drilling: N/E



USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
SM	SILTY SAND; damp, fine to medium grained, brown, moderate resistance to hand augering	R-Value = 53 MR = 3802 Ohm-cm		
	Bottom of boring			

Notes: **Figure Number**

Test Boring: B-18

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Logged By: Jovany C.

Drill Type: CME 75

Date: 1-2-2019

Auger Type: 6-5/8" H.S.A.

Elevation: 2292

Depth to Groundwater

Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

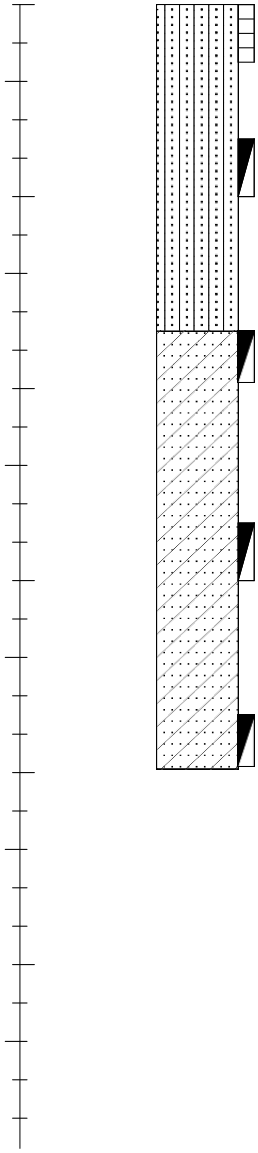
ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	4/6 14/6 17/6	SM	SILTY SAND; dense, damp, fine to medium grained, reddish-brown, with roots, trace subangular gravel		31	
2290						
	20/6 30/6 38/6		Very dense, weakly cemented		68 >50	
5	18/6 50/5					
2285		SC	CLAYEY SAND; very dense, damp, fine to medium grained, brown		>92	
10	29/6 42/6 50/4					
2280						
	18/6 37/6		Strongly cemented		>87	
15	50/4.5					
2275						
	38/6 42/6					
20	50/4					

Brown, calcification >9
2

Bottom of boring

2270 25

2265 **Notes:** **Figure Number**



Test Boring: B-19

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Logged By: Jovany C.

Drill Type: CME 75

Date: 1-2-2019

Auger Type: 6-5/8" H.S.A.

Elevation: 2292

Depth to Groundwater

Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

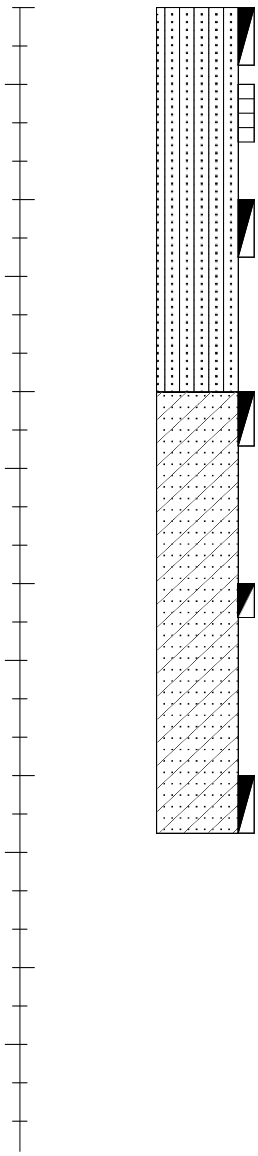
ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	3/6 8/6	SM	SILTY SAND; medium dense, damp, fine-grained, reddish-brown		16	
2290	8/6 23/6 21/6 27/6		Dense		48	
5	21/6 23/6 25/6		Weakly cemented		48	
2285	227 0					
10	20/6 30/6 50/5	SC	CLAYEY SAND; hard, damp, fine to medium grained, reddish-brown, strongly cemented			
2280						
15	35/6 50/4					
2275						
20	28/6 50/5					

Browning, calcification Bottom of borin		>80
		>50
		>50

25 2265

Notes:

Figure Number



Test Boring: B-20

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Logged By: Jovany C.

Drill Type: CME 75

Date: 1-3-2019

Auger Type: 6-5/8" H.S.A.

Elevation: 2292

Depth to Groundwater

Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	6/6 10/6 9/6	SM	SILTY SAND; medium dense, damp, fine-grained, brown		19	
2290						
	45/6 50/5		Very dense, moderately cemented		>50	
5	18/6		Strongly cemented		90	
	42/6 48/6					
2285		SC	CLAYEY SAND; very dense, dry, fine to medium grained, brown, calcification, strongly cemented		>98	
10	21/6 48/6 50/5					
2280						
	23/6 35/6				69	
15	34/6					
2275						
20	227 0	50/5	SM	SILTY SAND; very dense, dry, fine to medium grained, brown, calcification,		

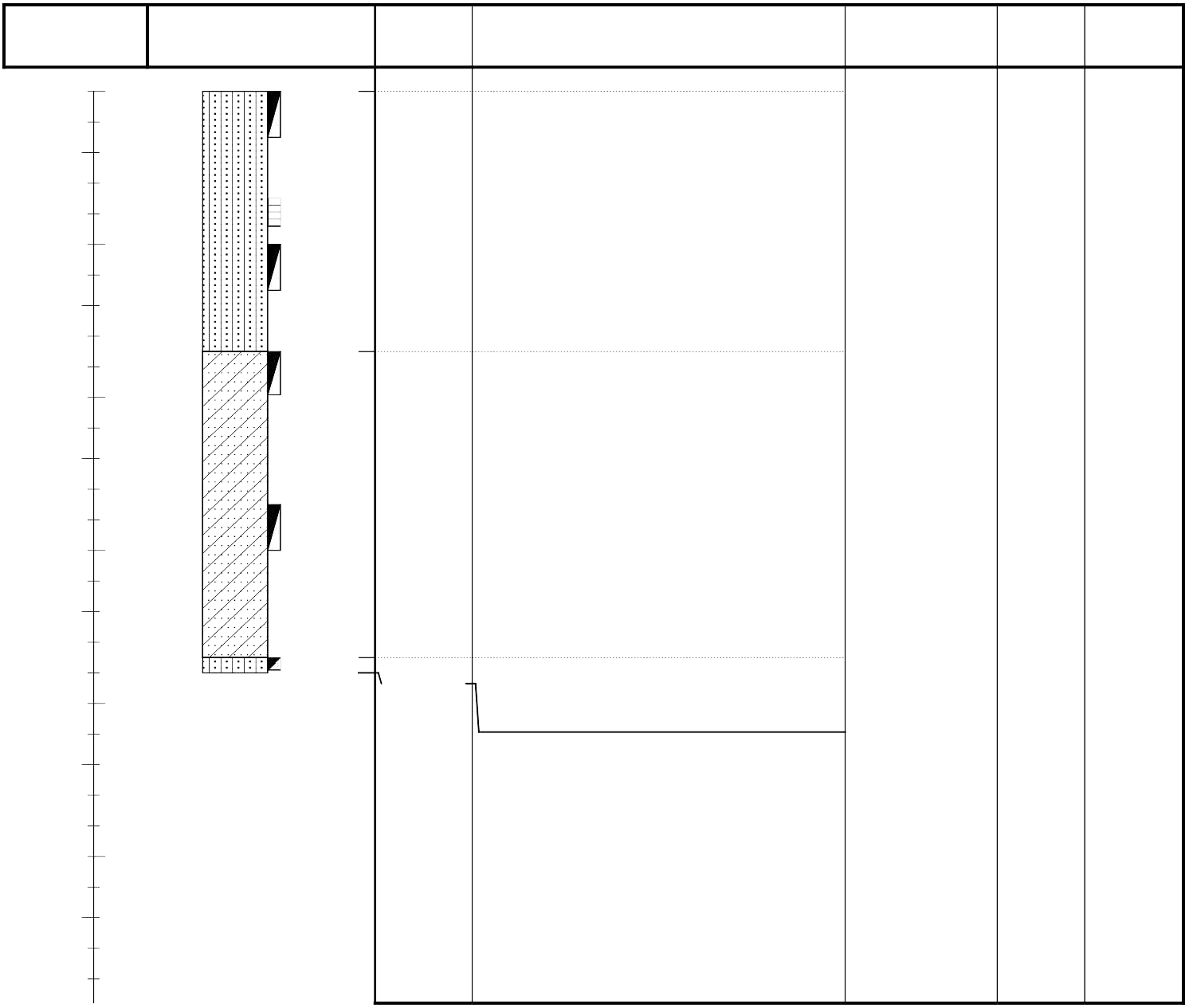
strongly cemented
Bottom of boring

25 2265

MOORE TWINING ASSOCIATES, INC.

Notes:

Figure Number



Test Boring: B-21

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Logged By: Jovany C.

Drill Type: CME 75

Date: 1-3-2019

Auger Type: 6-5/8" H.S.A.

Elevation: 2293

Depth to Groundwater

Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	7/6 10/6	SM	SILTY SAND; damp, medium dense, fine to medium grained	Sand = 82% -200 = 18%	23	
	13/6 20/6		Dense		40	
2290	30/6					
5	10/6 50/5		Very dense, strongly cemented		>50	
2285						
10	13/6 21/6 27/6	SC	CLAYEY SAND; dense, dry, fine to medium grained, reddish-brown, weakly cemented		48	
2280						
15	28/6 44/6 50/5		Very dense		>94	
2275						
20	15/6		50/5			

Bottom of boring

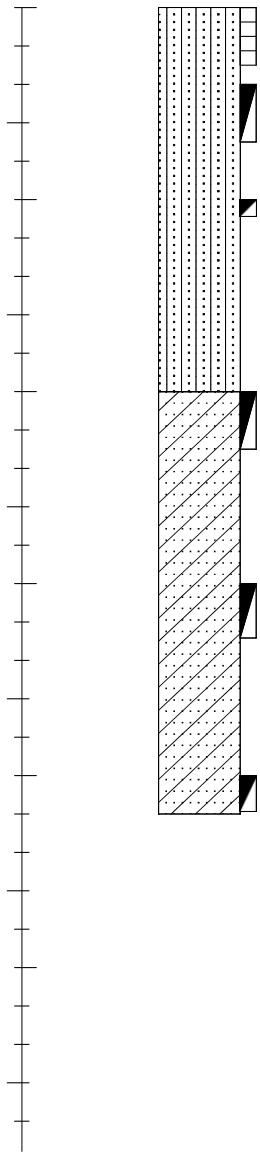
>
5
0

2270 25

2265

Notes:

Figure Number



Test Boring: B-22

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Logged By: Jovany C.

Drill Type: CME 75

Date: 1-3-2019

Auger Type: 6-5/8" H.S.A.

Elevation: 2294

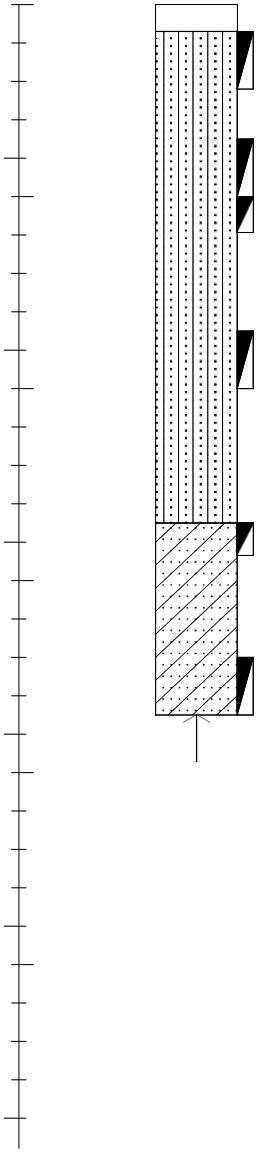
Depth to Groundwater

Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	6/6 9/6 8/6	AB SM	GRAVEL = 8 INCHES THICK SILTY SAND; medium dense, damp, fine to medium grained, brown, weakly cemented		17	
2290	7/6		Dense		42	
5	15/6 27/6 27/6 50/5		Very dense, cemented		>50	
2285	20/6 15/6		Dense, weakly cemented		31	
10	16/6					
2280	33/6 50/4	SC	CLAYEY SAND; very dense, dry , fine to medium grained, brown, calcification		>50	
15						
2275	50/5		Auger refusal, cemented Clayey Sands in cuttings Bottom of boring		>50	
20						

2270 25 2265 **Notes:** **Figure Number**



Test Boring: B-23

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Logged By: Jovany C.

Drill Type: CME 75

Date: 1-3-2019

Auger Type: 6-5/8" H.S.A.

Elevation: 2294

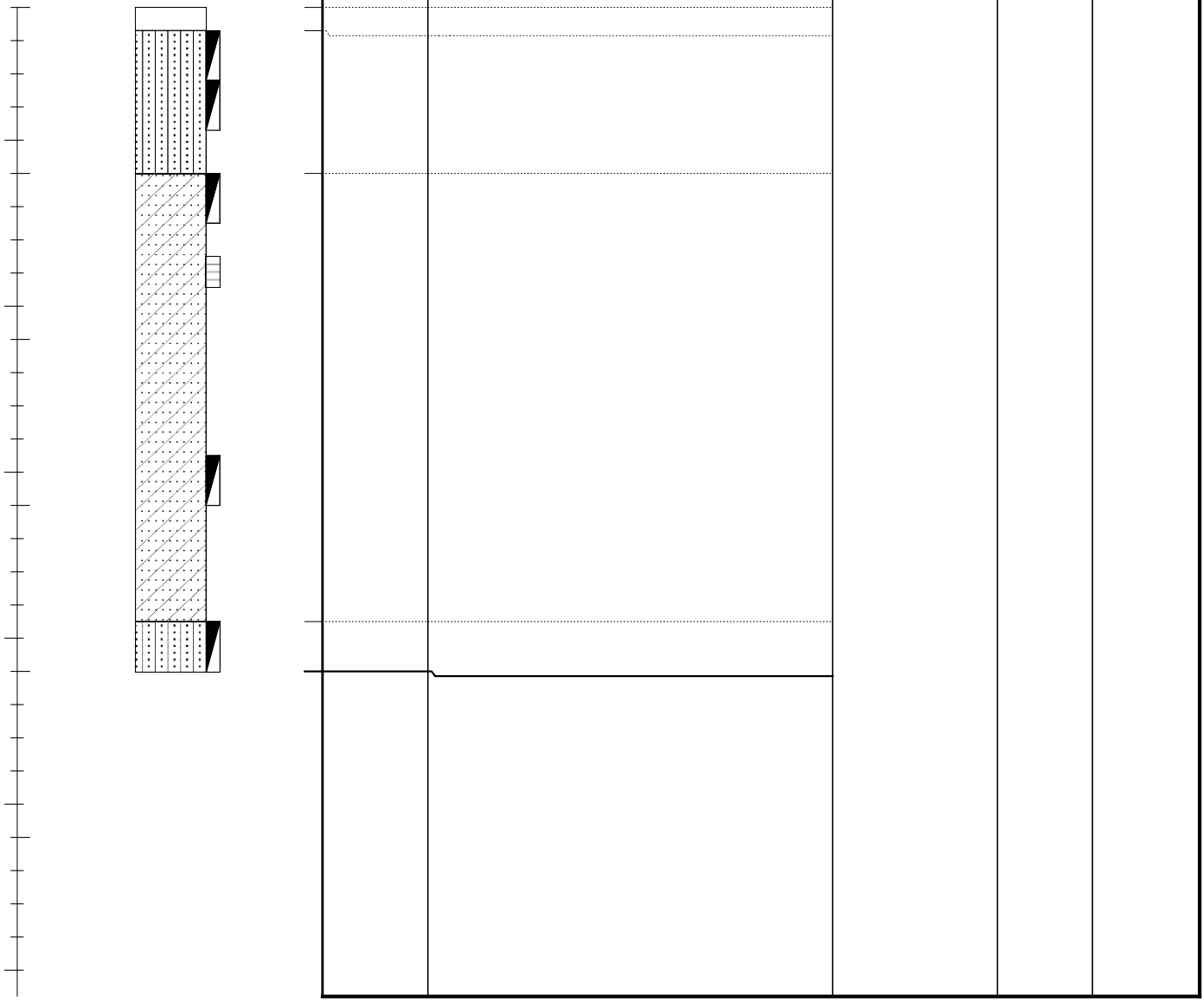
Hammer Type: 140 LB Auto Trip

Depth to Groundwater

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
0	6/6 7/6	AB SM	Gravel = 8 INCHES THICK SILTY SAND; medium dense, damp, fine to medium grained,		19	
	12/6				42	
2290	20/6 20/6 22/6		Dense, moderately cemented			
5	15/6 20/6	SC	CLAYEY SAND; very dense, dry, fine	At 5 feet: Sand = 58.2%	61	7.6
	41/6		to medium grained, dark-brown, calcification, moderately cemented Moist, reddish-brown	-200 = 41.8%		
	17/6			At 7.5 feet: DD=108.6 pcf LL=27	>50	4.3
2285 10	50/5			PI=9		
2280			Damp, brown, calcification, moderately cemented		59	
15	9/6 21/6 38/6					
2275		SM	SILTY SAND; very dense, damp, fine to medium grained, brown		81	
20	18/6 35/6 46/6		Bottom of boring			

2270 25 2265 **Notes:** **Figure Number**



Test Boring: B-24

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Logged By: Jovany C.

Drill Type: CME 75

Date: 1-3-2019

Auger Type: 6-5/8" H.S.A.

Elevation: 2295

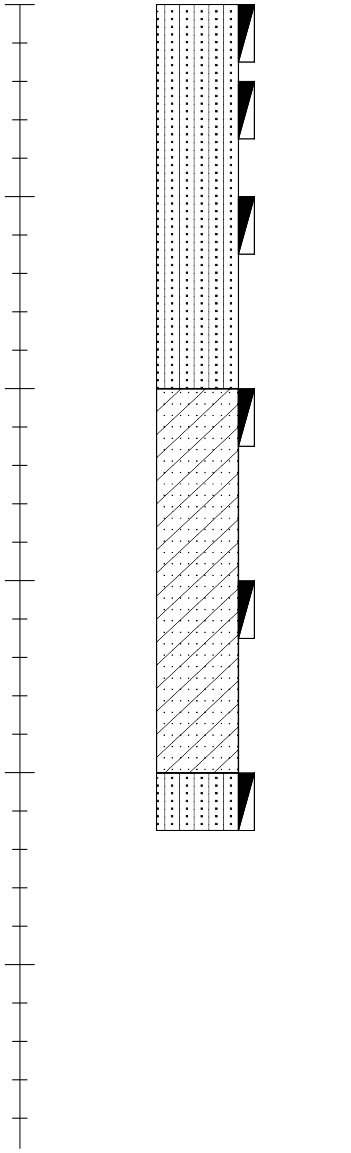
Depth to Groundwater

Hammer Type: 140 LB Auto Trip

First Encountered During Drilling: N/E

ELEVATION/ DEPTH (feet)		SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
2295	0	7/6 10/6 9/6	SM	SILTY SAND; medium dense, damp, fine to medium grained brown, weakly cemented		19	2.6
		5/6 8/6 12/6		Reddish-brown		20	2.1
2290	5	31/6 35/6 35/6		Moderately cemented		70	5.0
2285	10	23/6 25/6 42/6	SC	CLAYEY SAND; very dense, dry, fine to medium grained, light-brown, calcification, moderately cemented		67	
2280	15	19/6 27/6 33/6				60	
2275	20	19/6 22/6 29/6	SM	SILTY SAND; very dense, damp, fine grained, reddish-brown Bottom of boring		51	

2270 25 **Notes:** **Figure Number**



Test Boring: B-25

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

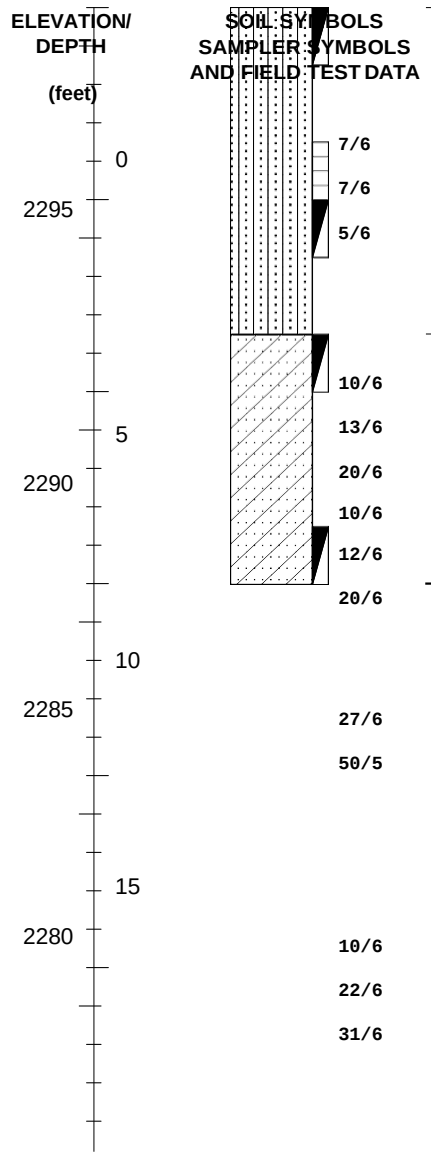
Logged By: Jovany C.

Date: 1-3-2019

Elevation: 2296

Hammer Type: 140 LB Auto Trip

Depth to Groundwater First Encountered During Drilling: N/E



USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
SM	SILTY SAND; medium dense, damp, fine to medium grained, brown		12	2.5
	Medium dense, reddish-brown	DD = 110.2pcf Sand = 86.5%	33	3.6
	Increase in grain size	-200 = 13.5% c = 590 psf ø = 38°	32	4.6
SC	CLAYEY SAND; very dense, dry, fine to medium grained, brown, calcification		>50	
			53	
	Bottom of boring			

25	2270	**Notes:**	**Figure Number**

Test Boring: B-26

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

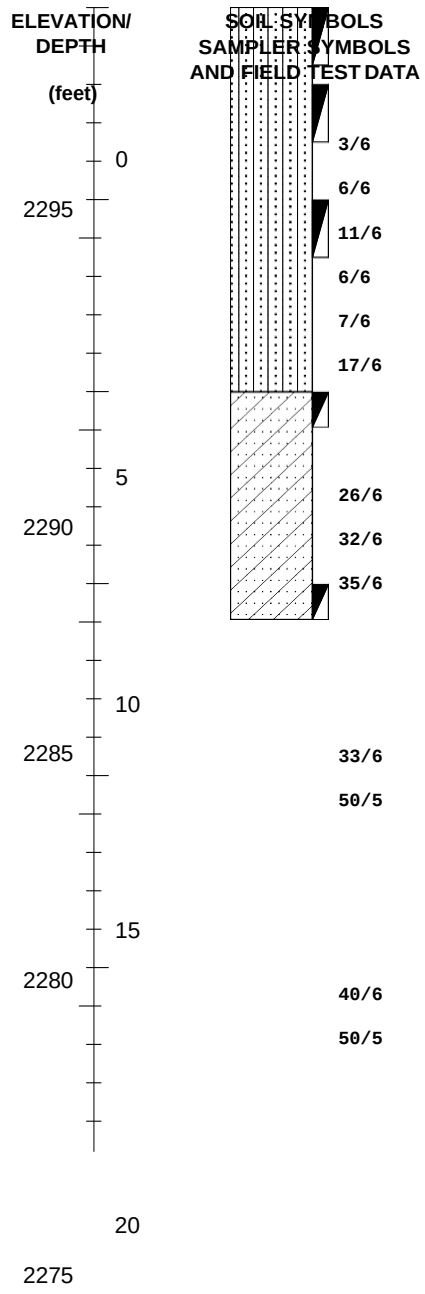
Logged By: Jovany C.

Date: 1-3-2019

Elevation: 2296

Hammer Type: 140 LB Auto Trip

Depth to Groundwater
First Encountered During Drilling: N/E



USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
SM	SILTY SAND; medium dense, damp, fine to medium grained, brown, trace gravel		17	1.5
			24	2.2
	Very dense, moderately cemented, light-brown		67	3.0
SC	CLAYEY SAND; very dense, dry, fine to medium grained, light- brown		>50	
	Moderately cemented Bottom of boring		>50	

25 2270 **Notes:** **Figure Number**

Test Boring: B-27

Project: The Oasis (Commerial Development), Ridgecrest, CA

Project Number: G70401.01

Drilled By: Allen B.

Drill Type: CME 75

Auger Type: 6-5/8" H.S.A.

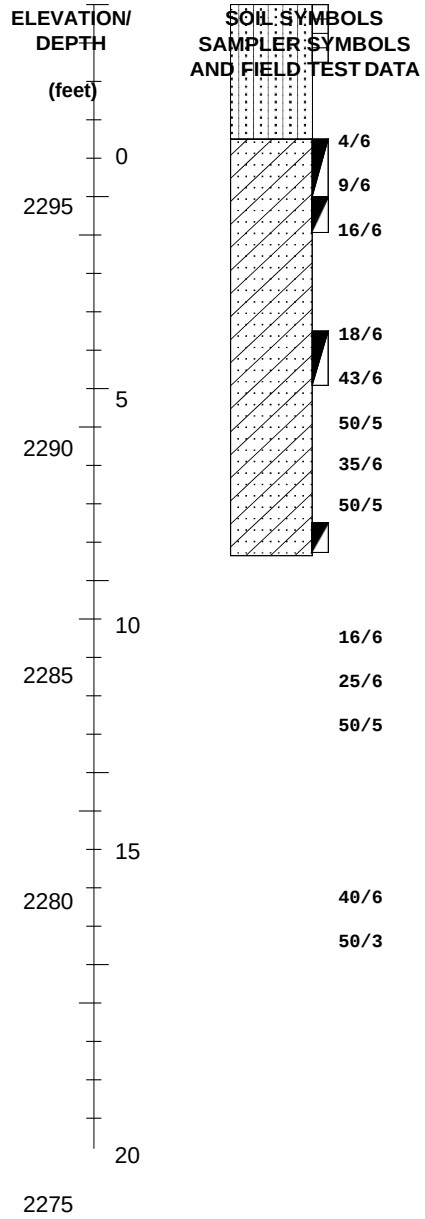
Logged By: Jovany C.

Date: 1-3-2019

Elevation: 2296

Hammer Type: 140 LB Auto Trip

Depth to Groundwater
First Encountered During Drilling: N/E



USCS	Soil Description	Remarks	N-Values blows/ft.	Moisture Content %
SM	SILTY SAND; medium dense, damp, fine to medium grained, reddish-brown, trace subangular gravel	DD = 101.3 pcf	25	1.6
SC	CLAYEY SAND; very dense, dry, fine to medium grained, light- brown, moderately cemented		>93	2.9
			>50	2.8
	Brown, calcification		>75	
	no calcification, some moderately cemented fragments		>50	
	Bottom of boring			

25 2270 **Notes:** **Figure Number**

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Silty sand
	Silt

Symbol	Description
	Poorly graded sand
	Clayey sand
	Blank

Notes:

1. Exploratory borings were drilled on 12/19/18, 12/20/18, 1/2/19 and 1/3/19 using a CME 75 drill rig equipped with 6-5/8" outside diameter hollow stem augers and hand auger equipment.
2. Groundwater was not encountered in any of the borings.
3. Boring locations were loacted from existing features.
4. These logs are subject to the limitations, conclusions, and recommendations in this report.
5. Elevations at the test boring locations were interpolated to the nearest 1/2 foot and are reported on the boring logs based on our review of the ALTA Survey prepared by Cornerstone Engineering, Inc., dated January 18, 2017.
6. The "N-value" reported for the California Modified Split Barrel Sampler is the uncorrected field blow count. This value should not be interpreted as an SPT equivalent N-value.
7. Results of tests conducted on samples recovered are reported on the logs.

DD = Natural dry density (pcf)
LL = Liquid Limit (%)

Sand= Percent retained on the No. 4 sieve (%)
PI = Plasticity Index (%)

-200 = Percent passing the No. 200 sieve (%)
pH = Soil pH

SR = Soil resistivity (ohms-cm)
SS = Soluble sulfates (%)

Cl = Soluble chlorides (%)

ø = Internal Angle of Friction (degrees)
c = Cohesion (psf)

pcf = Pounds per cubic foot
psf = Pounds per square foot

O.D. = Outside diameter
AMSL = Above mean sea level

N/A = Not applicable
N/E = Not encountered

KEY TO SYMBOLS

Symbol Description

Misc. Symbols

Boring continues

Drill rejection

Soil Samplers

Standard penetration test

California Modified split barrel ring sampler

APPENDIX C

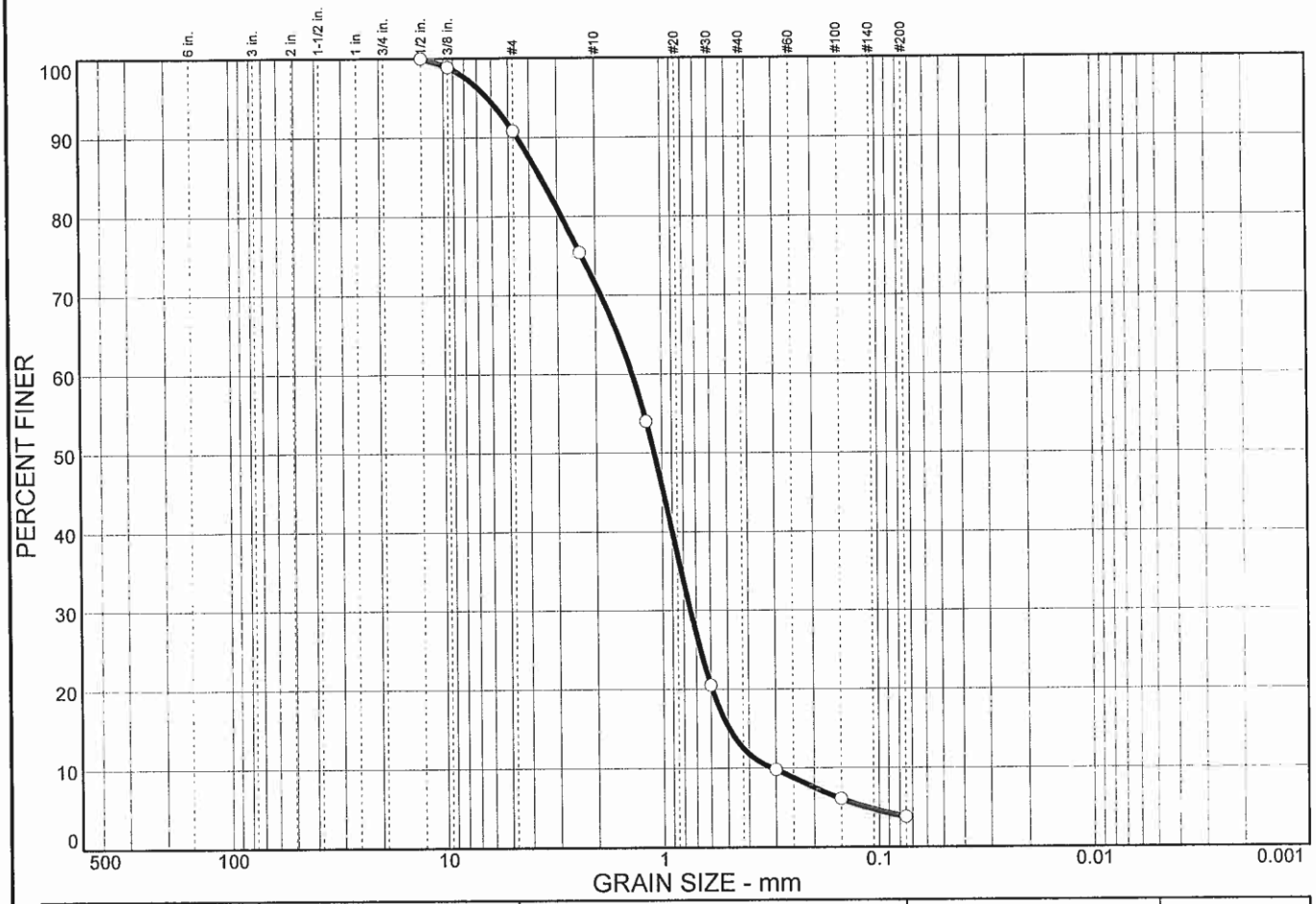
RESULTS OF LABORATORY TESTS

This appendix contains the individual results of the following tests. The results of the moisture content and dry density tests are included on the test boring logs in Appendix B. These data, along with the field observations, were used to prepare the final test boring logs in Appendix B.

These Included:	**To Determine:**
Moisture Content (ASTM D2216)	Moisture contents representative of field conditions at the time the sample was taken.
Dry Density (ASTM D2216)	Dry unit weight of sample representative of in-situ or in-place undisturbed condition.
Grain-Size Distribution (ASTM D422)	Size and distribution of soil particles, i.e., sand, gravel and fines (silt and clay).
Atterberg Limits (ASTM D4318)	Determines the moisture content where the soil behaves as a viscous material (liquid limit) and the moisture content at which the soil reaches a plastic state
Consolidation (ASTM 2435)	The amount and rate at which a soil sample compresses when loaded, and the influence of saturation on its behavior.
Direct Shear (ASTM D3080)	Soil shearing strength under varying loads and/or moisture
R-Value (ASTM D2844)	The capacity of a subgrade or subbase to support a pavement section designed to carry a specified traffic load.
Sulfate Content (ASTM D4327)	Percentage of water-soluble sulfate as (SO4) in soil samples. Used as an indication of the relative degree of sulfate attack on concrete and for selecting the cement type.
Chloride Content (ASTM D4327)	Percentage of soluble chloride in soil. Used to evaluate the potential attack on encased reinforcing steel.
Resistivity (ASTM G187)	The potential of the soil to corrode metal.

pH (ASTM D4972)	The acidity or alkalinity of subgrade material.

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	9.2	87.0	3.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2 in.	100.0		
3/8 in.	98.9		
#4	90.8		
#8	75.4		
#16	54.0		
#30	20.5		
#50	9.8		
#100	6.1		
#200	3.8		

* (no specification provided)

Material Description

Poorly graded sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 3.56 D_{60}= 1.37 D_{50}= 1.09
D_{30}= 0.744 D_{15}= 0.494 D_{10}= 0.311
C_u= 4.39 C_c= 1.30

Classification

USCS= SP AASHTO=

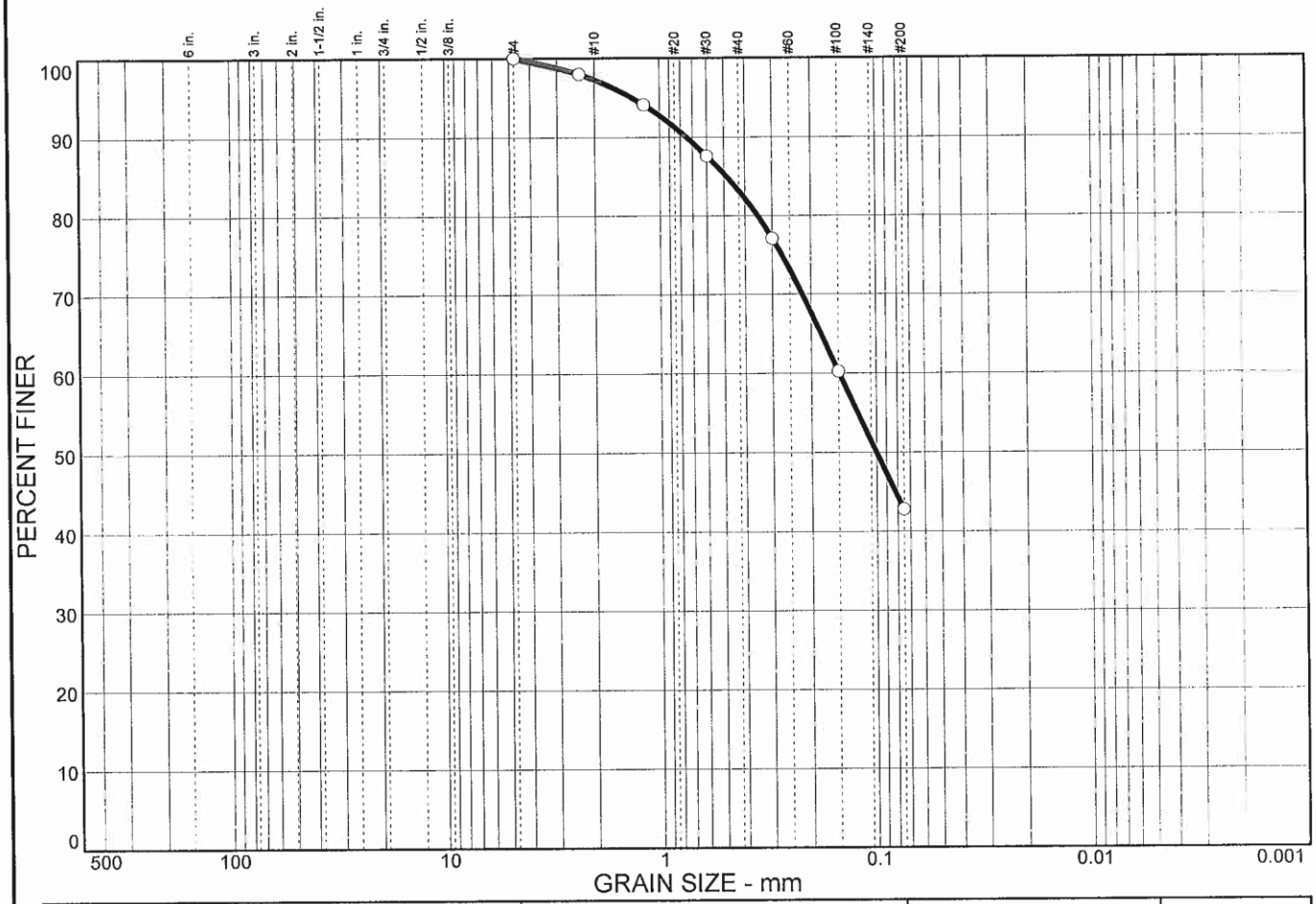
Remarks

Sample No.: B-1 **Source of Sample:** **Date:** 12/19/18
Location: **Elev./Depth:** 40-41.5'

Moore Twining Associates, Inc.
Fresno, CA

Client:
Project: The Oasis at China Lake
Project No: G70401.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	57.2	42.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	98.0		
#16	94.1		
#30	87.6		
#50	77.1		
#100	60.2		
#200	42.8		

* (no specification provided)

Material Description

Clayey sand

Atterberg Limits

PL= 20 LL= 28 PI= 8

Coefficients

D_{85}= 0.486 D_{60}= 0.149 D_{50}= 0.100
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SC AASHTO=

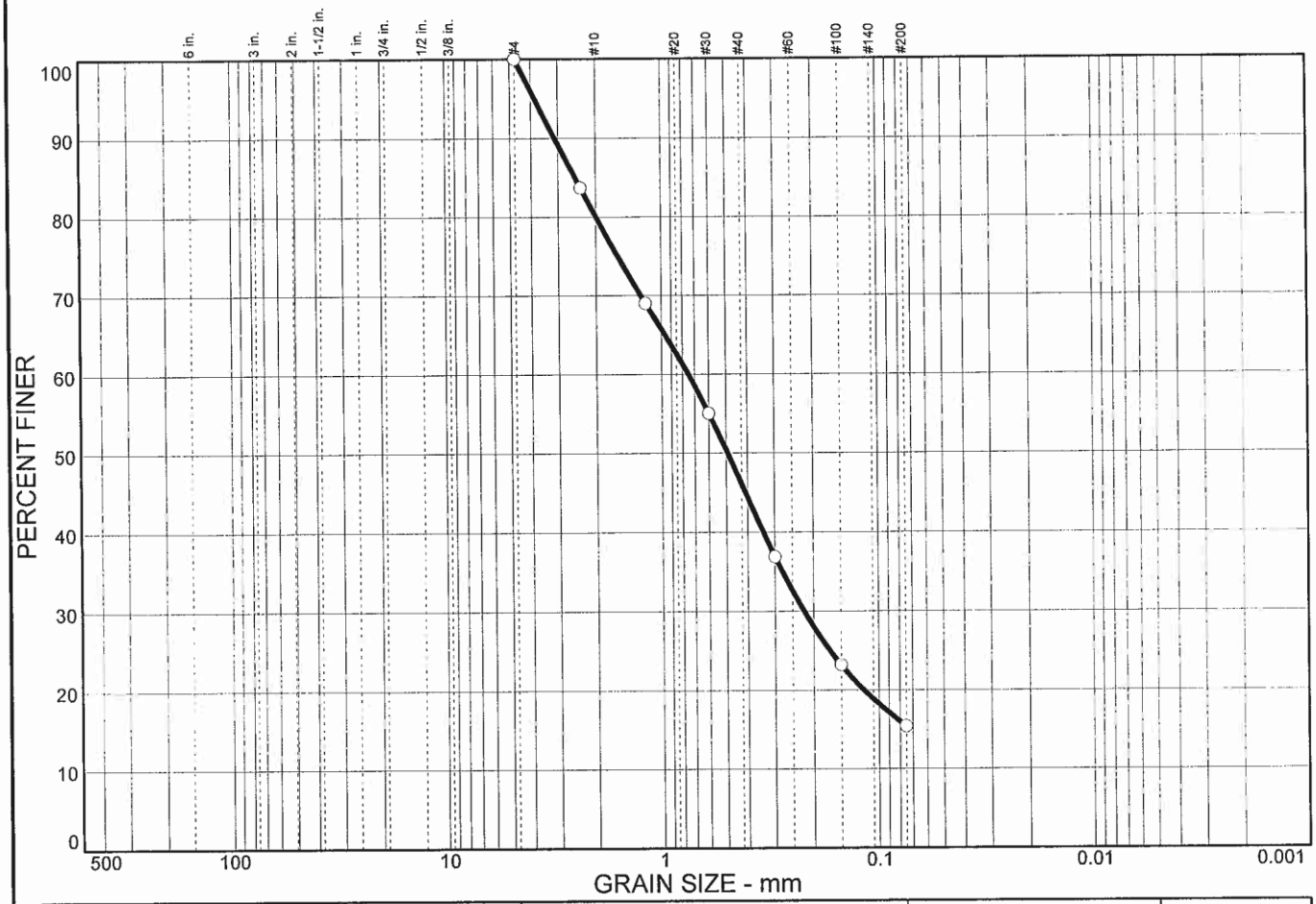
Remarks

Sample No.: B-5 **Source of Sample:** **Date:** 12/19/18
Location: **Elev./Depth:** 8.5-10'

Moore Twining Associates, Inc.
Fresno, CA

Client:
Project: The Oasis at China Lake
Project No: G70401.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	84.6	15.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	83.7		
#16	69.0		
#30	55.0		
#50	36.9		
#100	23.2		
#200	15.4		

* (no specification provided)

Material Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 2.50 D_{60}= 0.750 D_{50}=
D_{30}= 0.221 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

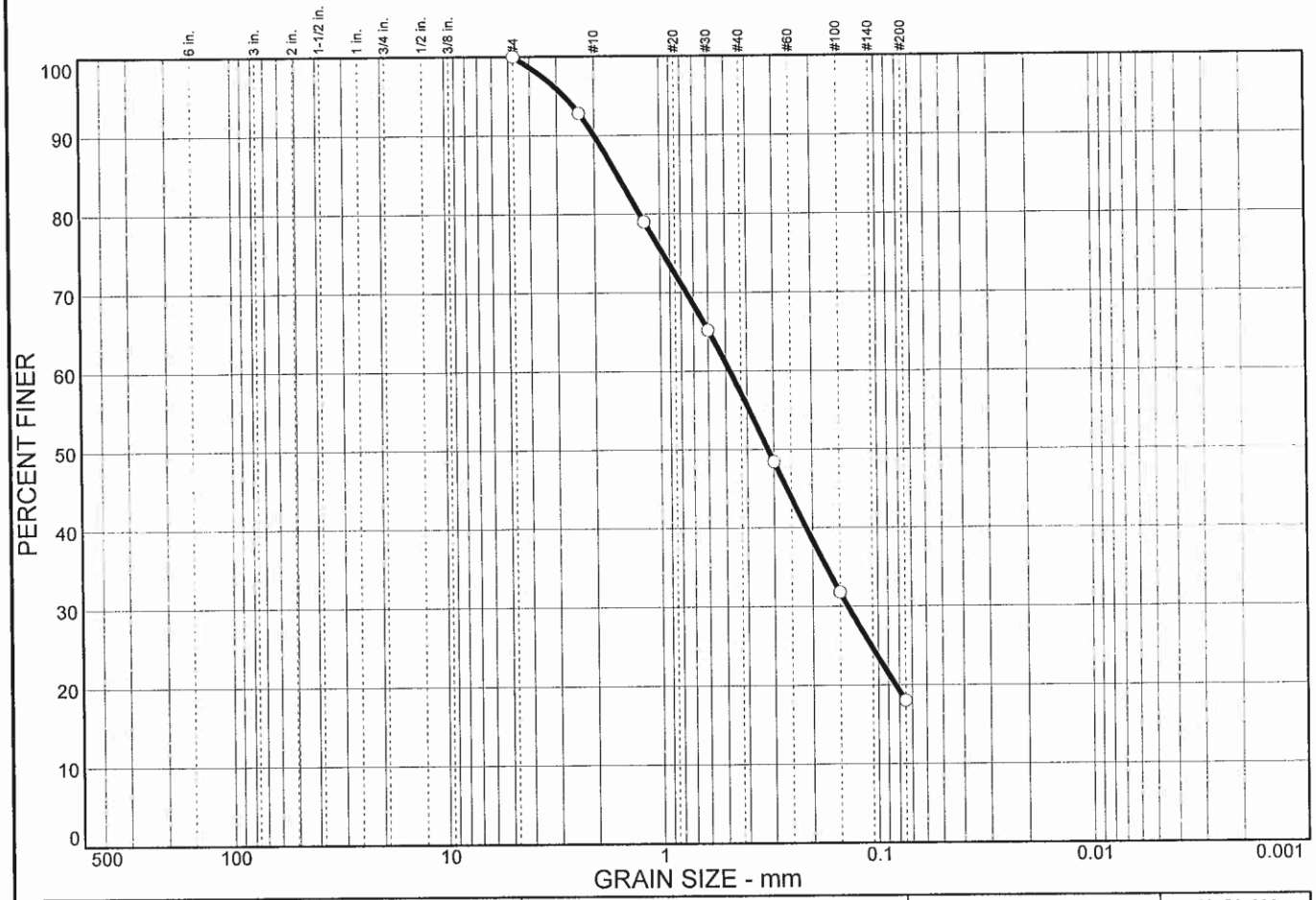
Remarks

Sample No.: B-8 **Source of Sample:** **Date:** 12/19/18
Location: **Elev./Depth:** 2-3.5'

Moore Twining Associates, Inc.
Fresno, CA

Client:
Project: The Oasis at China Lake
Project No: G70401.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	82.0	18.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	92.8		
#16	79.0		
#30	65.2		
#50	48.4		
#100	31.8		
#200	18.0		

* (no specification provided)

Material Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 1.56 D_{60}= 0.479 D_{50}=
D_{30}= 0.138 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

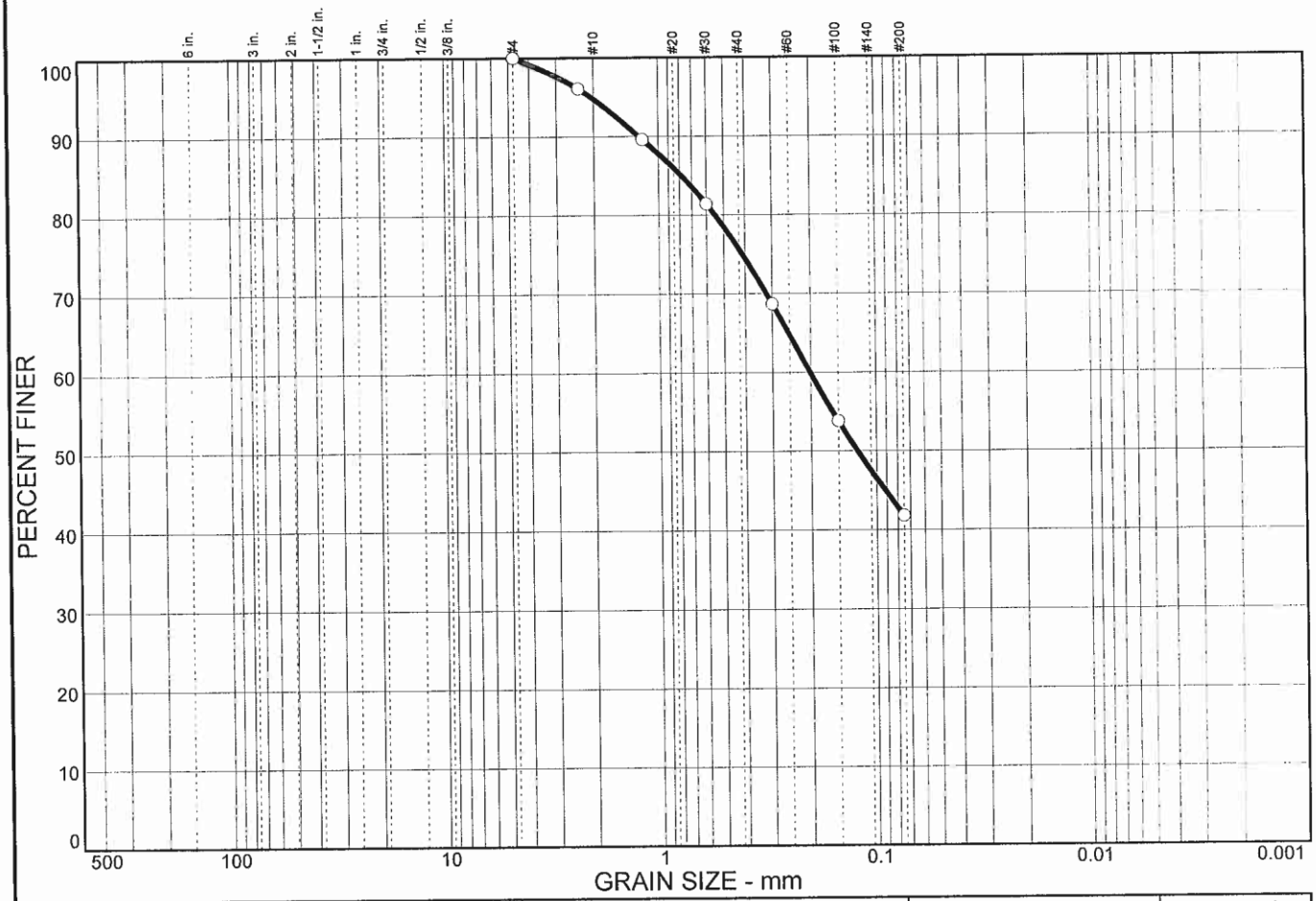
Remarks

Sample No.: B-21 **Source of Sample:** **Date:** 1/2/19
Location: **Elev./Depth:** 0-1.5'

Moore Twining Associates, Inc.
Fresno, CA

Client:
Project: The Oasis at China Lake
Project No: G70401.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	58.2	41.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	96.1		
#16	89.6		
#30	81.4		
#50	68.7		
#100	53.8		
#200	41.8		

* (no specification provided)

Material Description

Clayey sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.783 D_{60}= 0.202 D_{50}= 0.123
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SC AASHTO=

Remarks

Sample No.: B-23 **Source of Sample:** **Date:** 1/2/19
Location: **Elev./Depth:** 5-6.5'

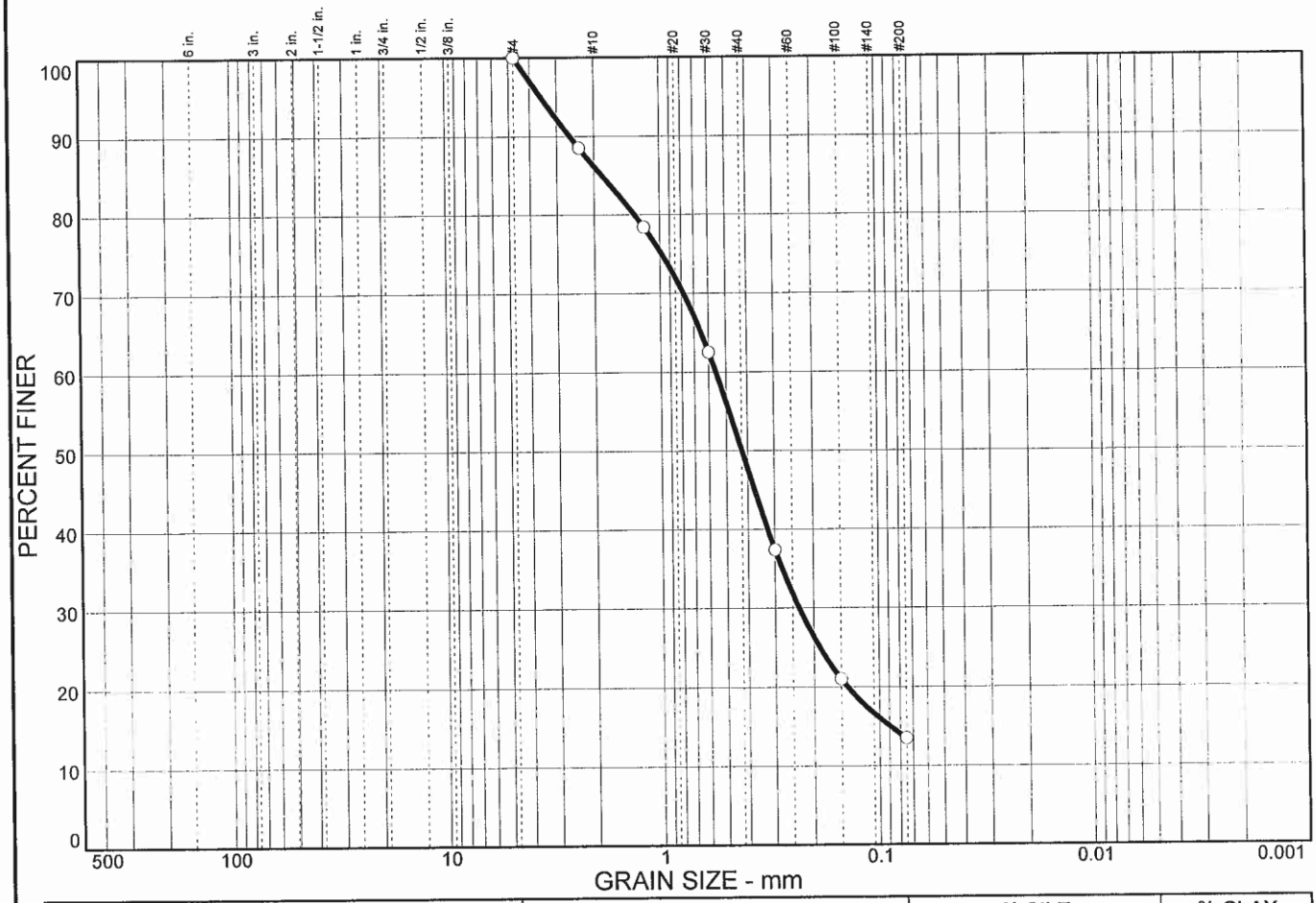
Moore Twining Associates, Inc.

Fresno, CA

Client:
Project: The Oasis at China Lake

Project No: G70401.01 **Figure**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	86.5	13.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	88.5		
#16	78.4		
#30	62.5		
#50	37.4		
#100	21.0		
#200	13.5		

* (no specification provided)

Material Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 1.84 D_{60}= 0.557 D_{50}= 0.424
D_{30}= 0.233 D_{15}= 0.0892 D_{10}=
C_u= C_c=

Classification

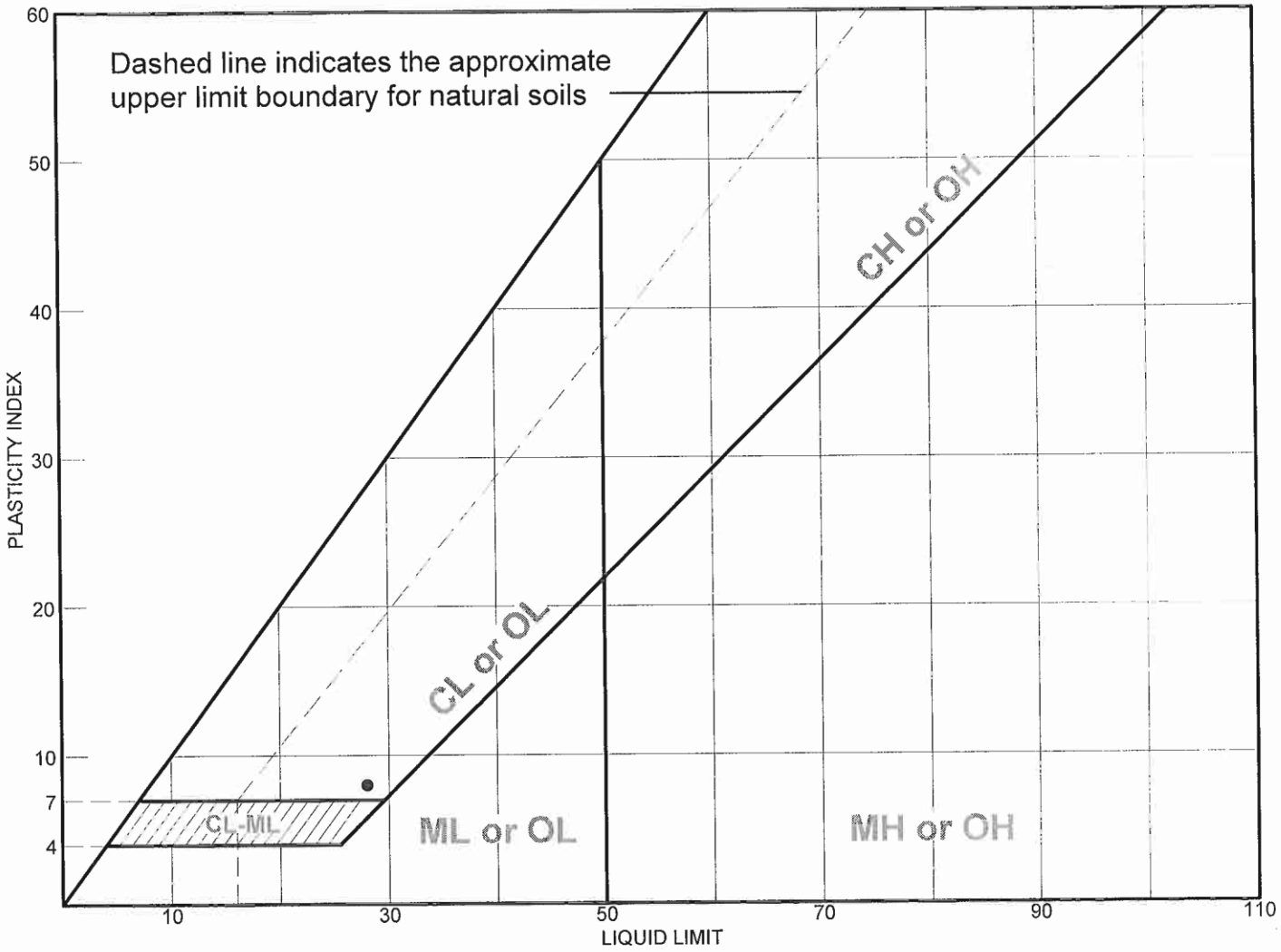
USCS= SM AASHTO=

Remarks

Sample No.: B-25 **Source of Sample:** **Date:** 1/2/19
Location: **Elev./Depth:** 3.5-5'

Moore Twining Associates, Inc. **Fresno, CA**	**Client:** **Project:** The Oasis at China Lake **Project No:** G70401.01 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey sand	28	20	8	83.1	42.8	SC

Project No. G70401.01 **Client:**

Project: The Oasis at China Lake

● **Source:** **Sample No.:** B-5 **Elev./Depth:** 8.5-10'

Remarks:

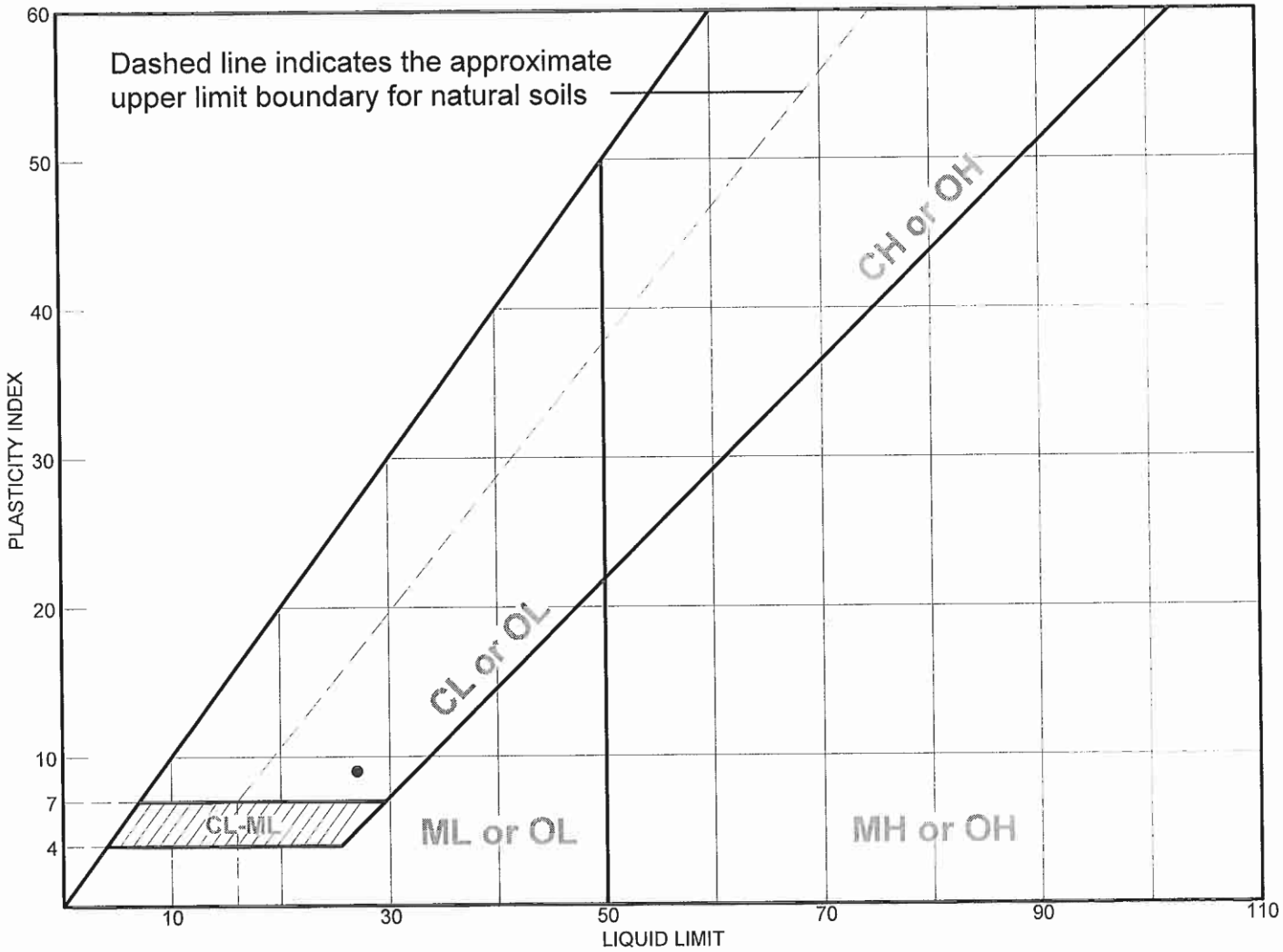
●

Moore Twining Associates, Inc.

Fresno, CA

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey sand	27	18	9			SC

Project No. G70401.01 **Client:**

Project: The Oasis at China Lake

● **Source:** **Sample No.:** B-23 **Elev./Depth:** 7.5-9'

Remarks:

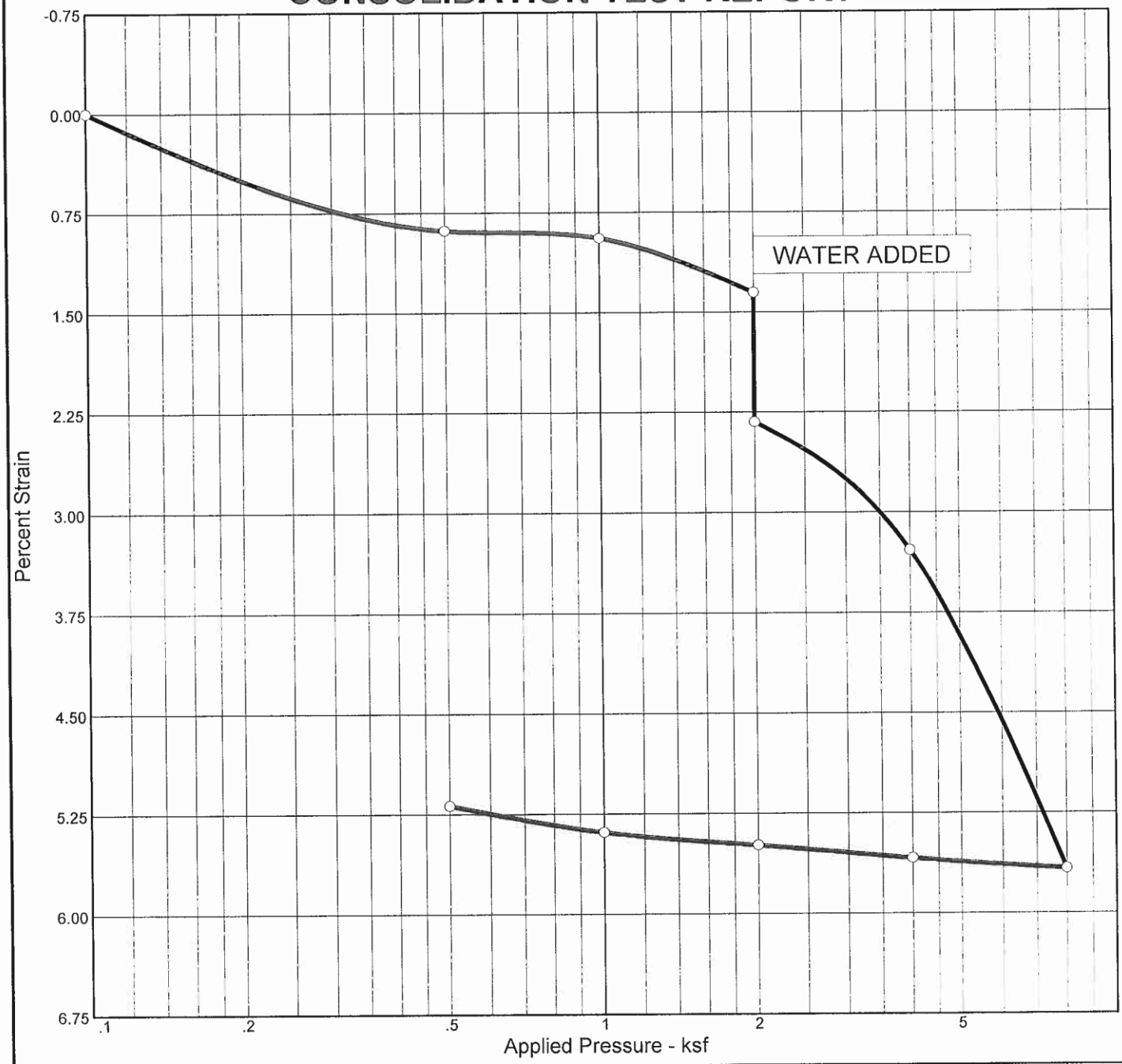
●

Moore Twining Associates, Inc.

Fresno, CA

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
11.5 %	2.0 %	113.7			2.65		7.92	0.12	0.01		0.9	0.455

MATERIAL DESCRIPTION	USCS	AASHTO
Silty sand	SM	

Project No. G70401.01 **Client:**

Project: The Oasis at China Lake

Source: **Sample No.:** B-6 **Elev./Depth:** 2-3.5'

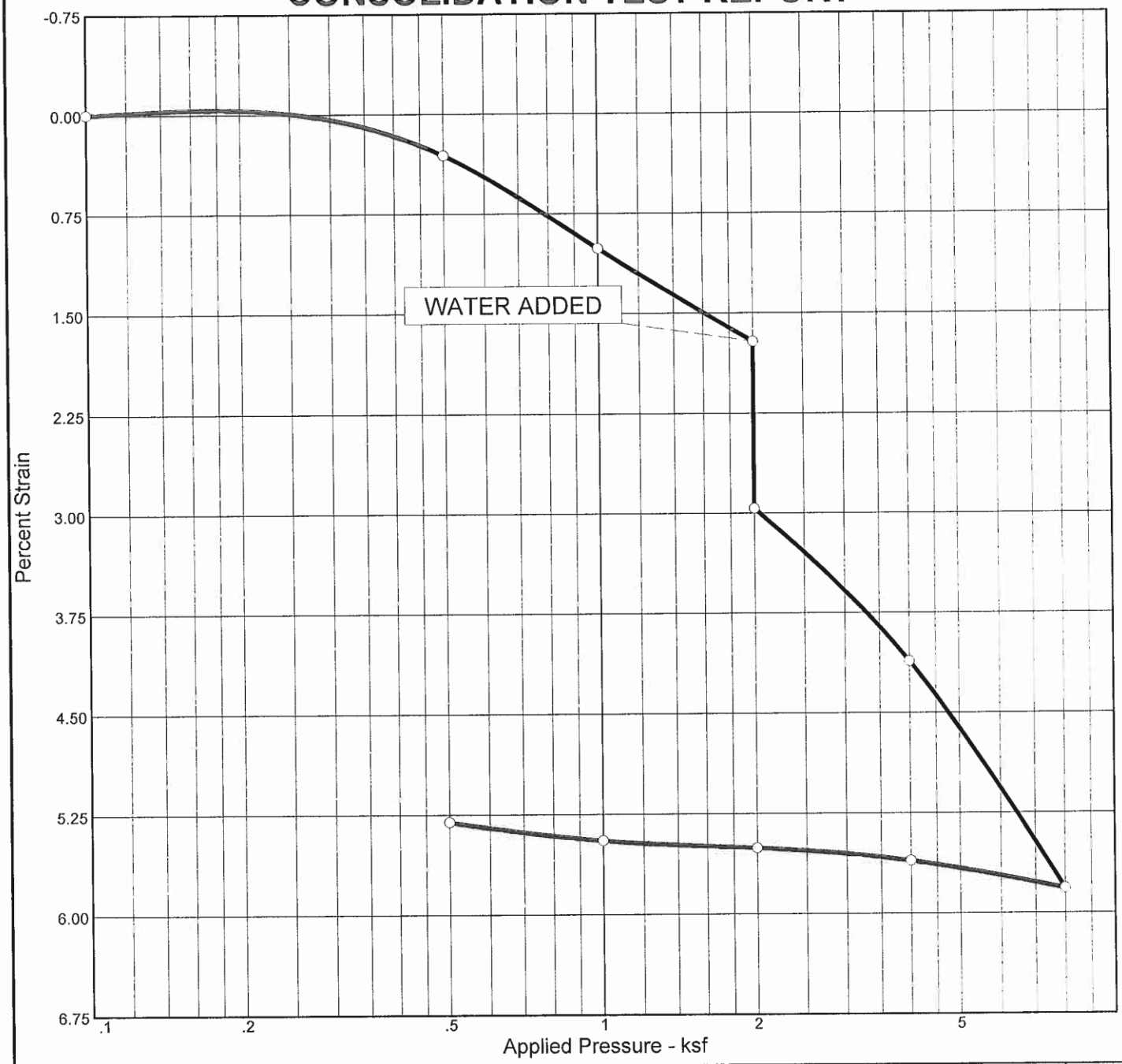
Moore Twining Associates, Inc.

Fresno, CA

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
8.7 %	1.6 %	112.0			2.65		1.00	0.09	0.01		1.3	0.476

MATERIAL DESCRIPTION	USCS	AASHTO
Silty sand	SM	

Project No. G70401.01 **Client:**

Project: The Oasis at China Lake

Source: **Sample No.:** B-8 **Elev./Depth:** 2-3.5'

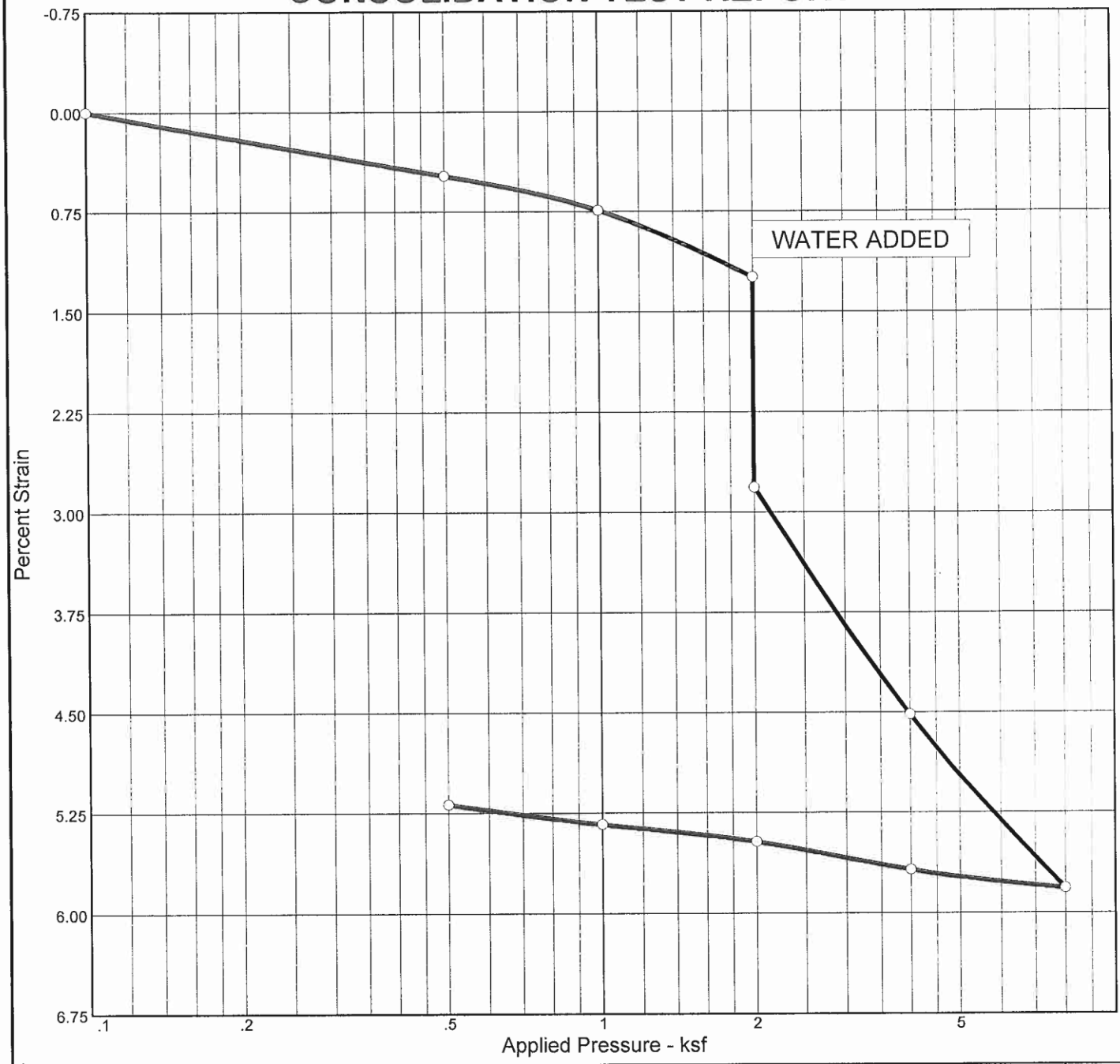
Remarks:

Moore Twining Associates, Inc.

Fresno, CA

Figure

CONSOLIDATION TEST REPORT



Natural Sat.	Natural Moist.	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Clpse. %	e_o
10.9 %	1.4 %	122.9			2.65		0.89	0.06	0.01		1.6	0.347

MATERIAL DESCRIPTION	USCS	AASHTO
Silty sand	SM	

Project No. G70401.01 **Client:**

Project: The Oasis at China Lake

Source: **Sample No.:** B-12 **Elev./Depth:** 3.5-5'

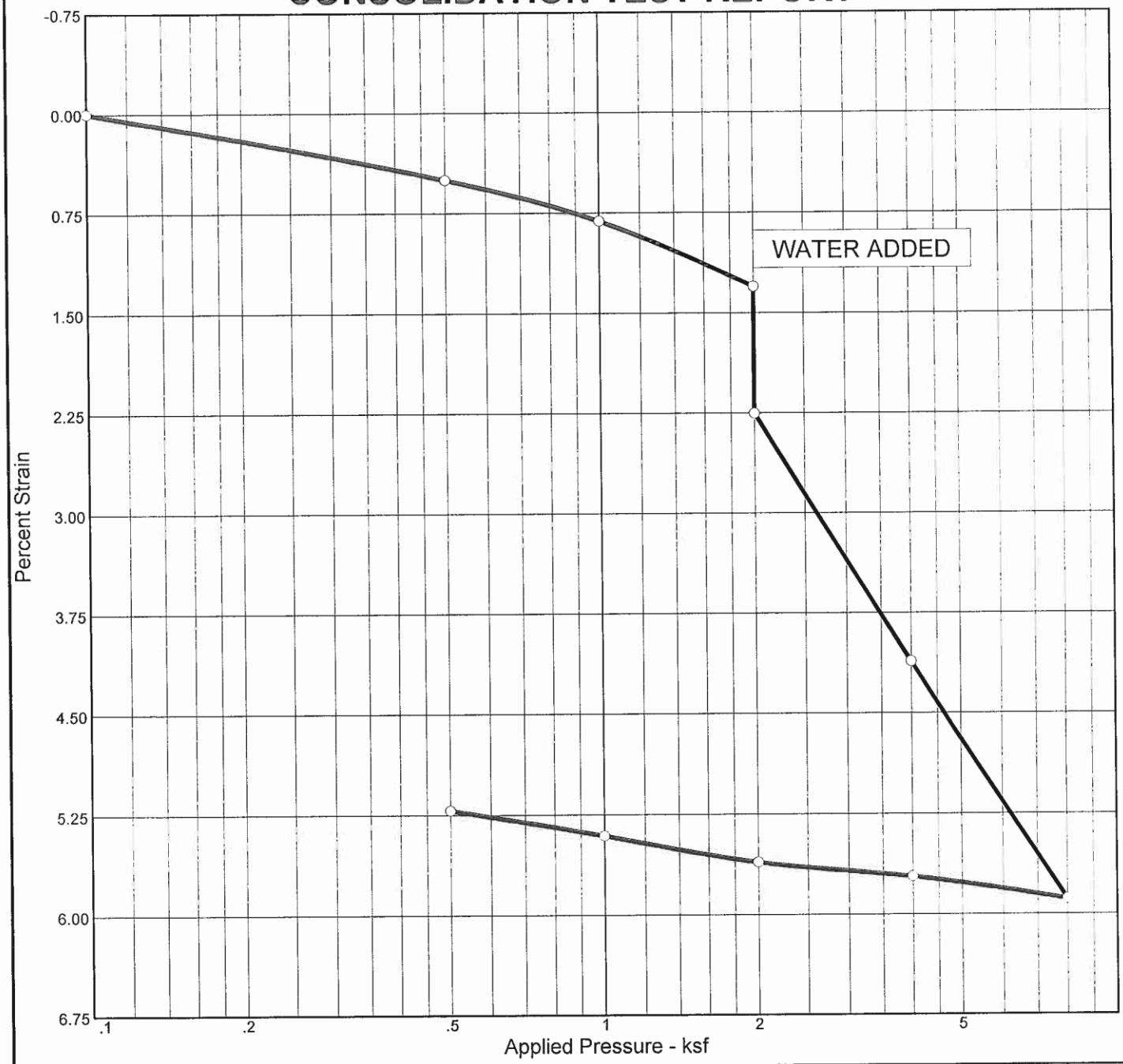
Moore Twining Associates, Inc.

Fresno, CA

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
18.0 %	3.9 %	105.3			2.65		1.10	0.09	0.01		1.0	0.571

MATERIAL DESCRIPTION	USCS	AASHTO
Silty sand	SM	

Project No. G70401.01 **Client:**

Project: The Oasis at China Lake

Source: **Sample No.:** B-21 **Elev./Depth:** 0-1.5'

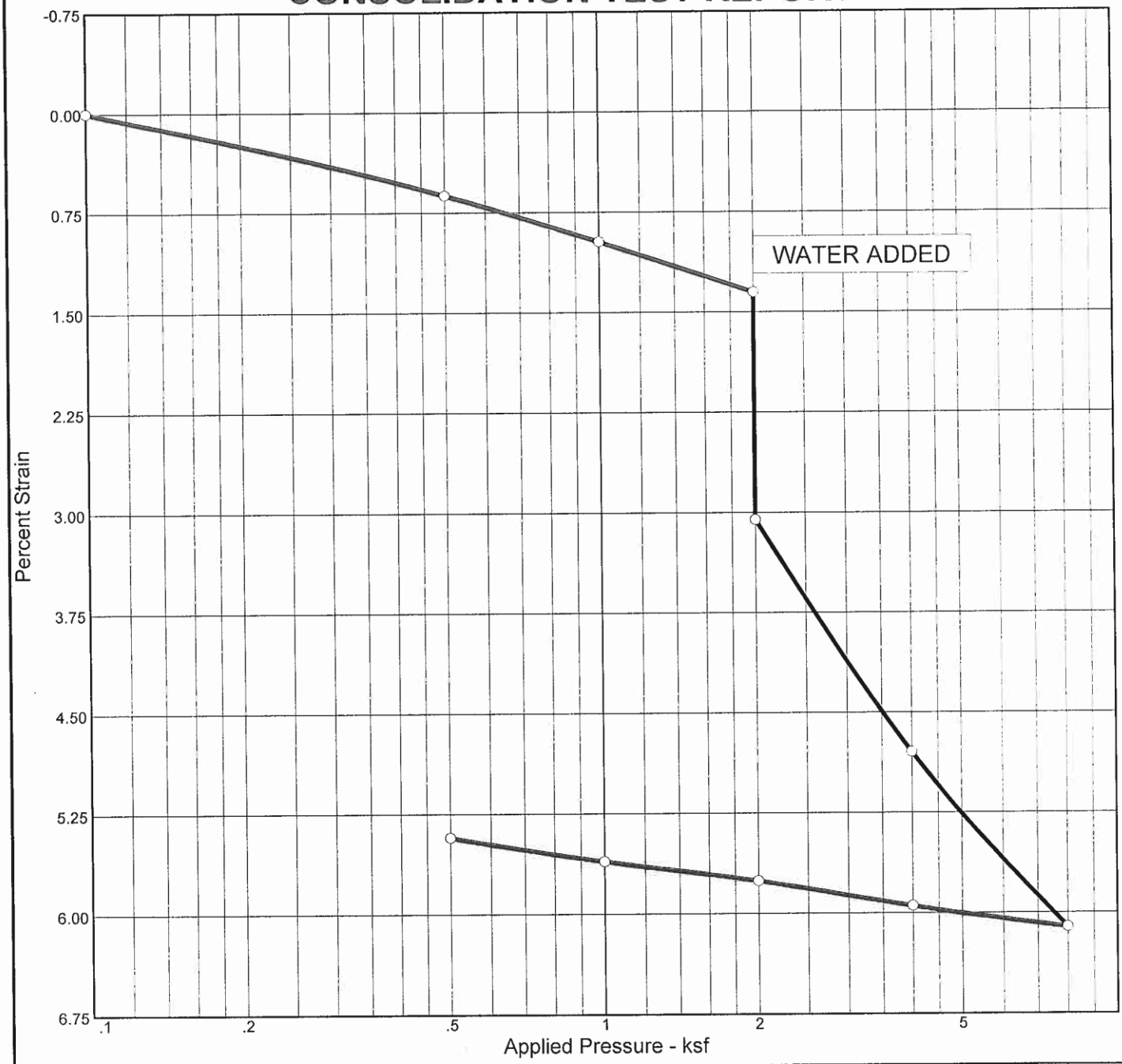
Moore Twining Associates, Inc.

Fresno, CA

Remarks:

Figure

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
6.7 %	1.5 %	102.9			2.65		3.72	0.07	0.01		1.7	0.608

MATERIAL DESCRIPTION	USCS	AASHTO
Silty sand	SM	

Project No. G70401.01 **Client:**

Project: The Oasis at China Lake

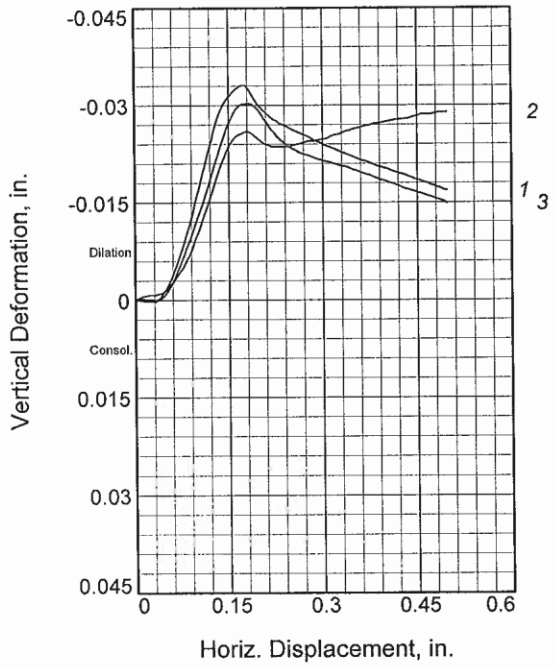
Source: **Sample No.:** B-27 **Elev./Depth:** 0-1.5'

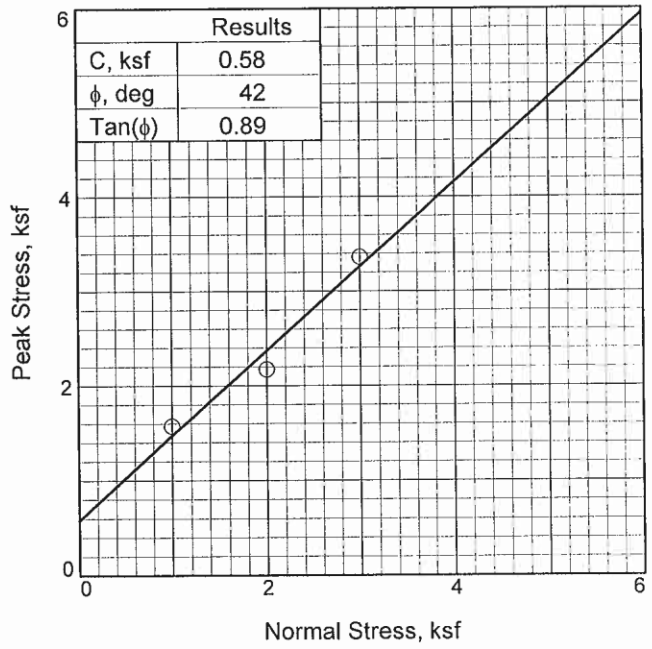
Moore Twining Associates, Inc.

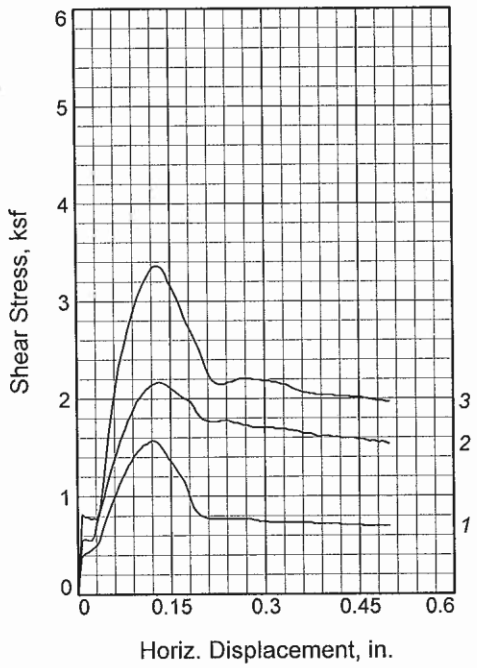
Fresno, CA

Remarks:

Figure







Sample No.		1	2	3
Initial	Water Content, %	1.3	1.2	1.4
	Dry Density, pcf	111.2	111.4	109.1
	Saturation, %	6.9	6.5	7.0
	Void Ratio	0.4879	0.4857	0.5162
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	17.9	17.4	18.1
	Dry Density, pcf	111.9	112.5	110.5
	Saturation, %	99.3	97.8	96.3
	Void Ratio	0.4788	0.4711	0.4965
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.99	0.99	0.99
Normal Stress, ksf		1.00	2.00	3.00
Peak Stress, ksf		1.57	2.17	3.36
Displacement, in.		0.12	0.13	0.13
Ultimate Stress, ksf				
Displacement, in.				
Strain at peak, %		5.0	5.5	5.3

Sample Type:

Description: Silty sand

Specific Gravity= 2.65

Remarks:

Figure _____

Client:

Project: The Oasis at China Lake

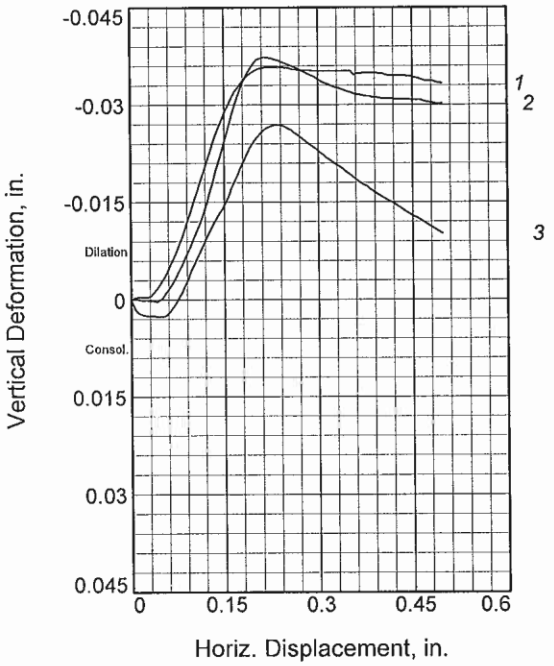
Sample Number: B-8 **Depth:** 2-3.5'

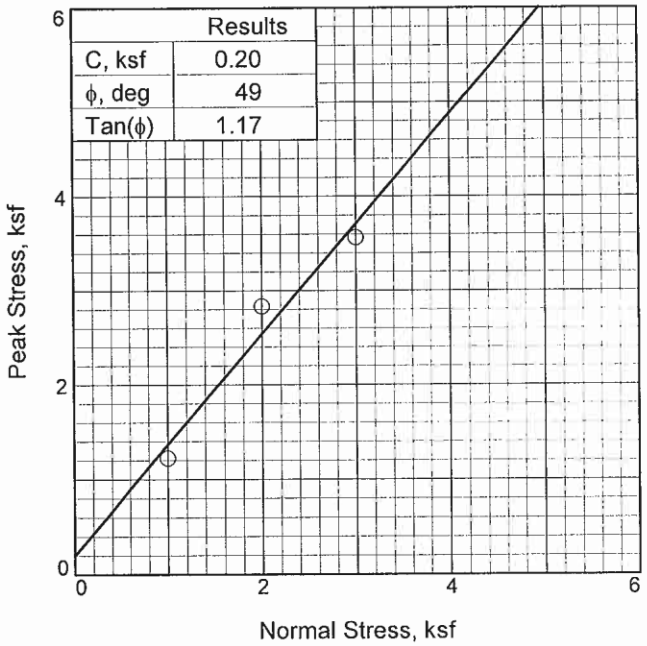
Proj. No.: G70401.01 **Date Sampled:** 12/19/18

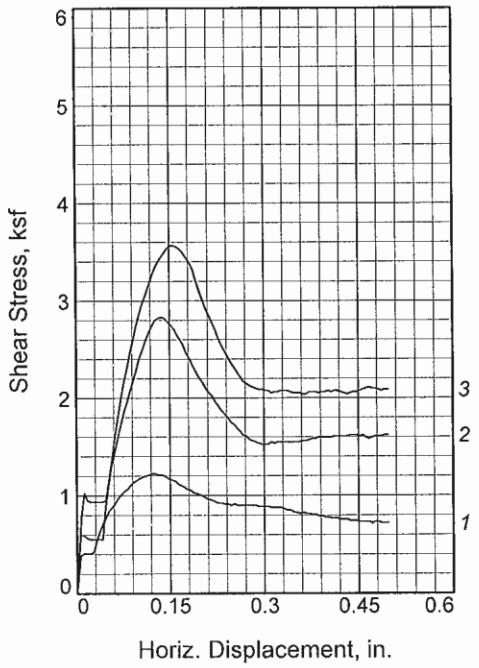
DIRECT SHEAR TEST REPORT

Moore Twining Associates, Inc.

Fresno, CA







Sample No.		1	2	3
Initial	Water Content, %	2.0	1.9	1.4
	Dry Density, pcf	121.2	119.6	119.4
	Saturation, %	14.5	13.0	9.6
	Void Ratio	0.3645	0.3835	0.3854
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	13.3	13.6	13.4
	Dry Density, pcf	122.1	120.6	120.6
	Saturation, %	99.2	96.6	95.6
	Void Ratio	0.3554	0.3717	0.3722
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.99	0.99	0.99
Normal Stress, ksf		1.00	2.00	3.00
Peak Stress, ksf		1.22	2.83	3.56
Displacement, in.		0.12	0.14	0.15
Ultimate Stress, ksf				
Displacement, in.				
Strain at peak, %		5.0	5.7	6.3

Sample Type:
Description: Silty sand

Specific Gravity= 2.65
Remarks:

Figure _____

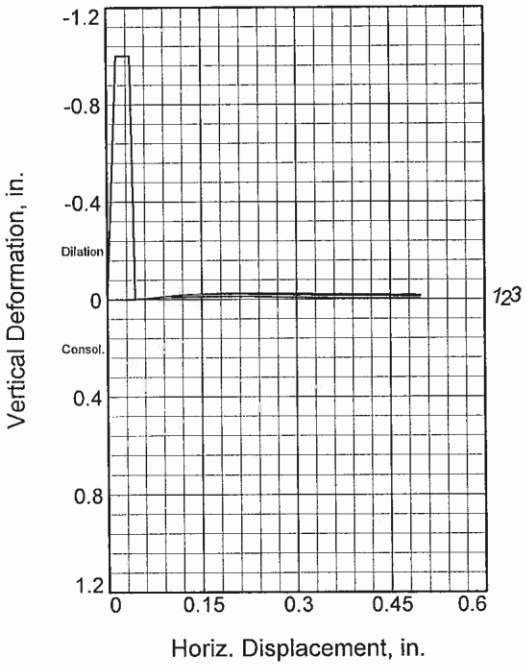
Client:

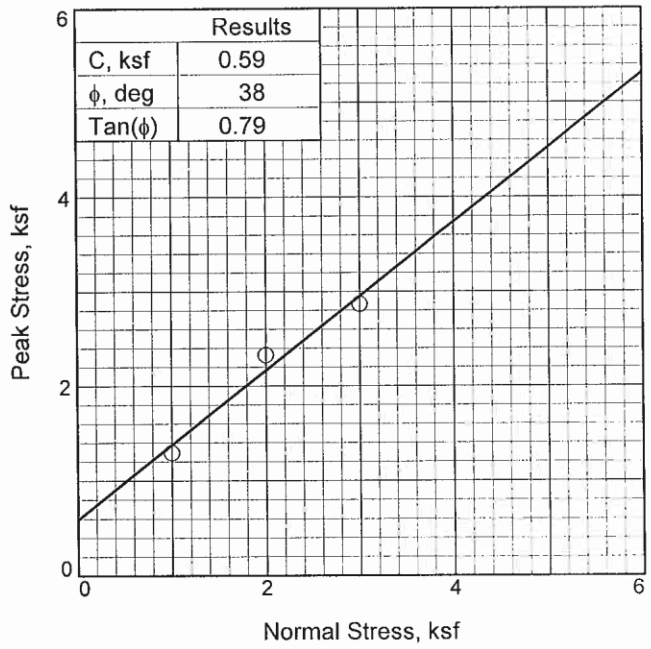
Project: The Oasis at China Lake

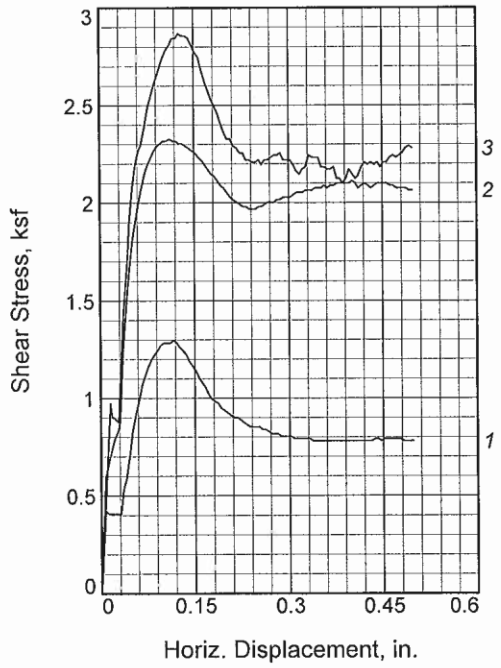
Sample Number: B-13 **Depth:** 2-3.5'

Proj. No.: G70401.01 **Date Sampled:** 12/19/18

DIRECT SHEAR TEST REPORT
Moore Twining Associates, Inc.
Fresno, CA







Sample No.		1	2	3
Initial	Water Content, %	4.4	4.4	4.5
	Dry Density, pcf	110.9	110.4	110.6
	Saturation, %	23.8	23.6	24.1
	Void Ratio	0.4924	0.4991	0.4957
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	17.4	17.6	17.2
	Dry Density, pcf	111.7	111.5	112.0
	Saturation, %	95.9	96.5	95.6
	Void Ratio	0.4804	0.4841	0.4770
	Diameter, in.	2.42	2.42	2.42
	Height, in.	0.99	0.99	0.99
Normal Stress, ksf		1.00	2.00	3.00
Peak Stress, ksf		1.30	2.33	2.87
Displacement, in.		0.12	0.11	0.13
Ultimate Stress, ksf				
Displacement, in.				
Strain at peak, %		4.8	4.6	5.3

Sample Type:
Description: Silty sand

Specific Gravity= 2.65
Remarks:

Figure _____

Client:

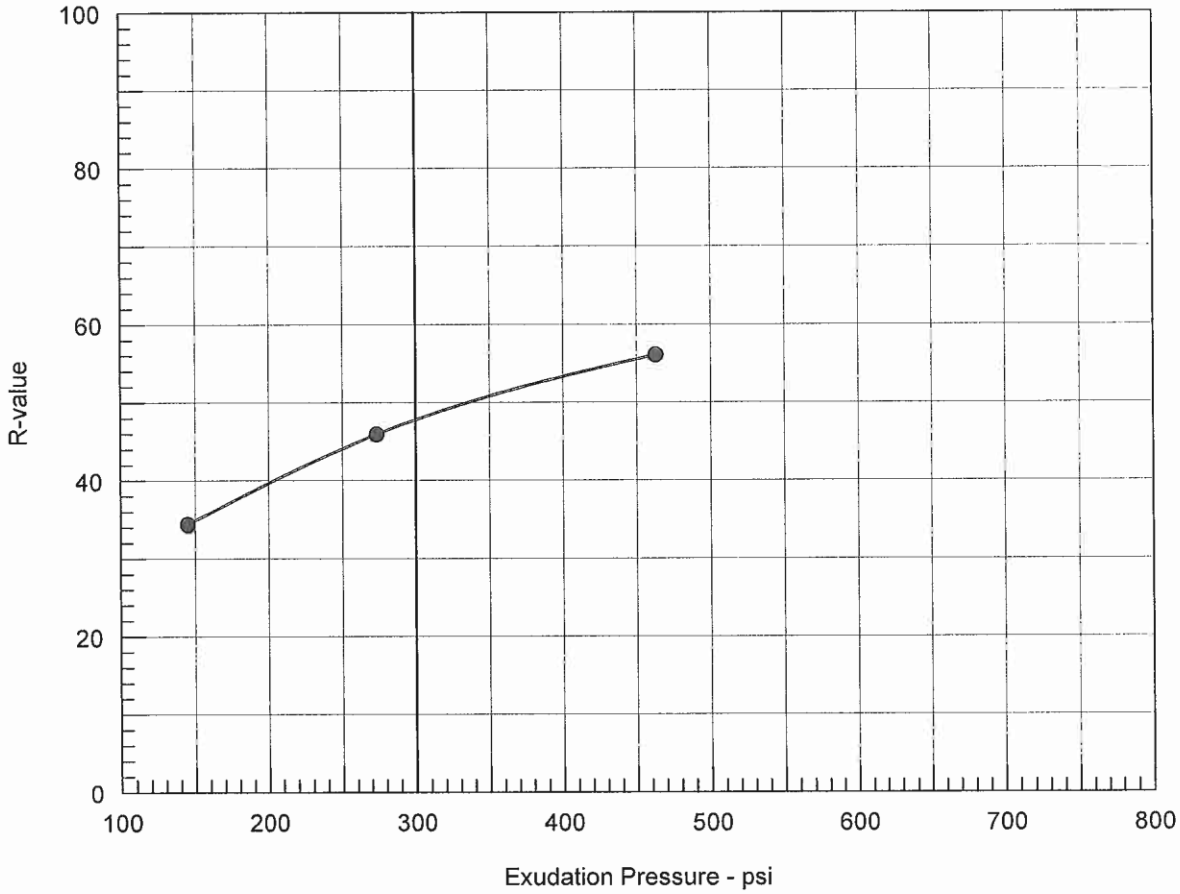
Project: The Oasis at China Lake

Sample Number: B-25 **Depth:** 3.5-5'

Proj. No.: G70401.01 **Date Sampled:** 1/2/19

DIRECT SHEAR TEST REPORT
Moore Twining Associates, Inc.
Fresno, CA

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	125.2	9.0	0.00	41	2.46	463	56	56
2	350	123.1	11.0	0.00	69	2.51	145	34	34
3	350	124.0	10.0	0.00	53	2.48	274	46	46

Test Results	Material Description
R-value at 300 psi exudation pressure = 48	Silty sand

Project No.: G70401.01

Project: The Oasis at China Lake

Sample Number: B-2 **Depth:** 0-5'

Date: 2/26/2019

Tested by:

Checked by:

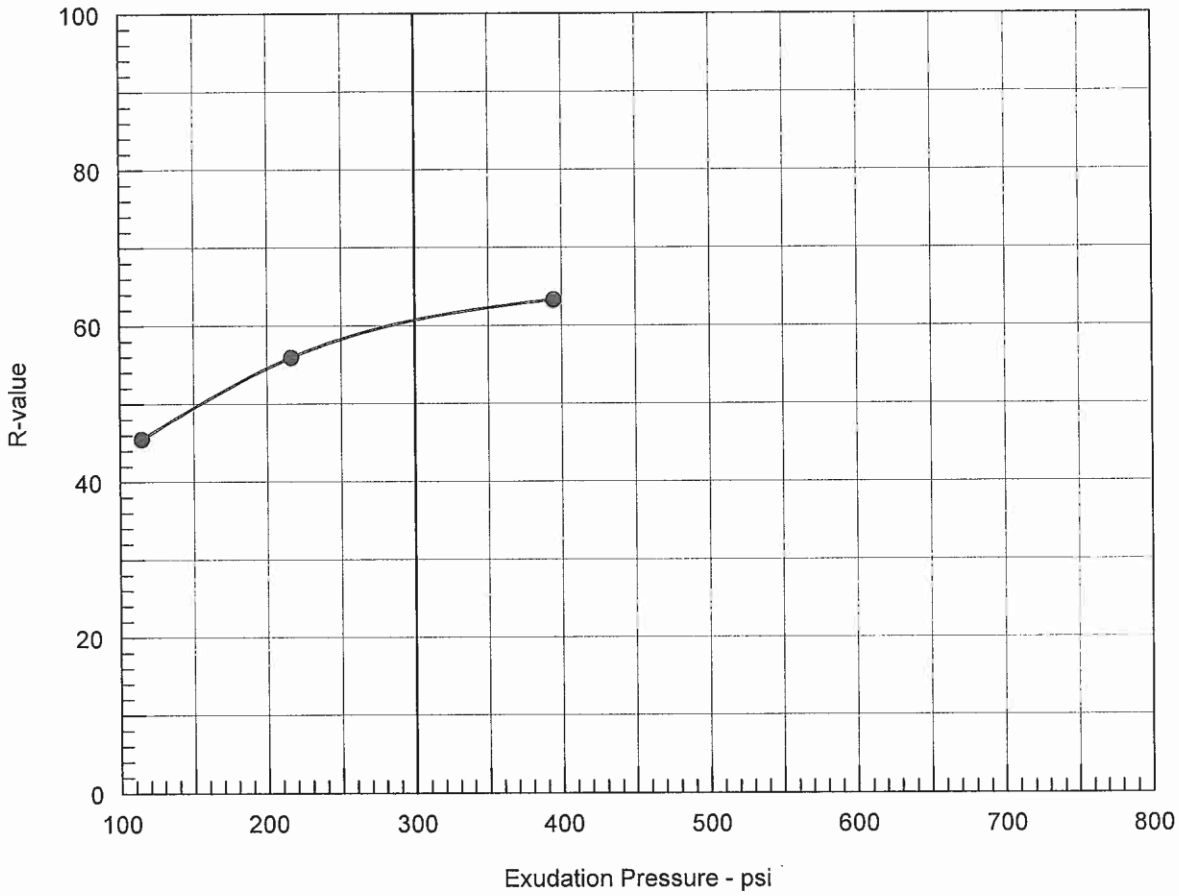
Remarks:

R-VALUE TEST REPORT

Moore Twining Associates, Inc.

Figure _____

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	125.6	9.2	0.00	36	2.47	395	63	63
2	350	122.9	11.1	0.00	55	2.53	115	45	45
3	350	125.0	10.2	0.00	43	2.49	216	56	56

Test Results	Material Description
R-value at 300 psi exudation pressure = 61	Silty sand

Project No.: G70401.01
Project: The Oasis at China Lake
Sample Number: B-10 **Depth:** 0-5'
Date: 2/26/2019

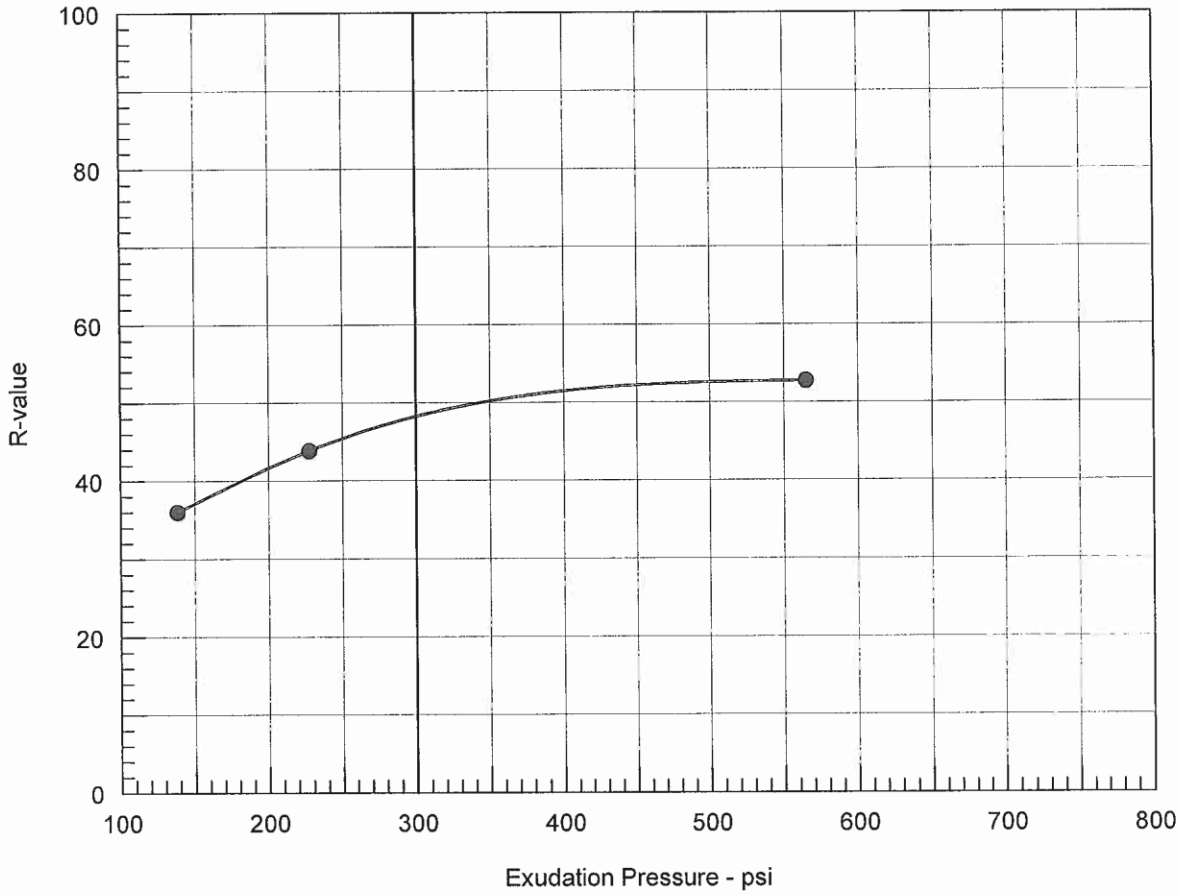
Tested by:
Checked by:
Remarks:

R-VALUE TEST REPORT

Moore Twining Associates, Inc.

Figure _____

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	132.4	8.8	0.00	42	2.44	565	54	53
2	350	129.2	10.7	0.00	66	2.50	138	36	36
3	350	130.5	9.8	0.00	55	2.47	228	44	44

Test Results	Material Description
R-value at 300 psi exudation pressure = 48	Silty sand

Project No.: G70401.01
Project: The Oasis at China Lake
Sample Number: B-14 **Depth:** 0-5'
Date: 2/26/2019

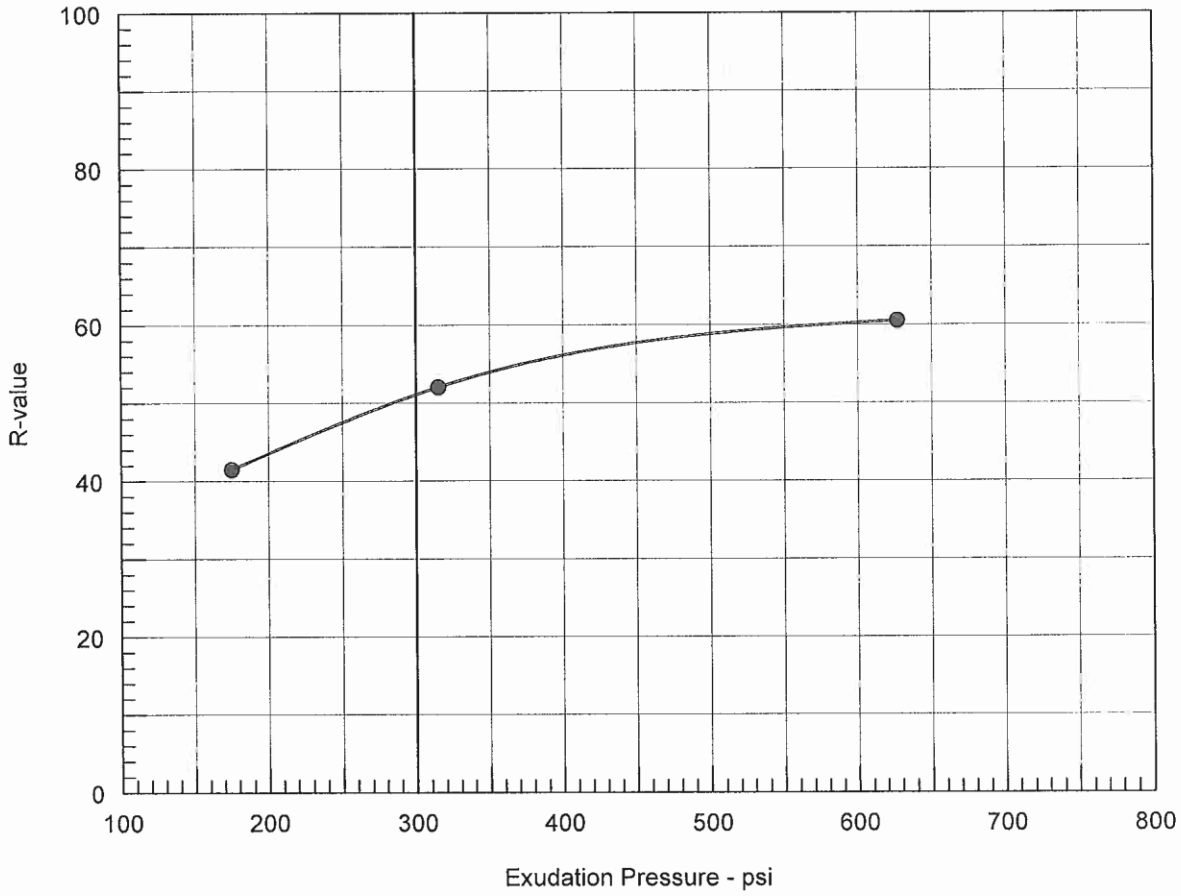
Tested by:
Checked by:
Remarks:

R-VALUE TEST REPORT

Moore Twining Associates, Inc.

Figure _____

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	129.6	8.3	0.00	35	2.42	627	62	61
2	350	126.3	10.2	0.00	59	2.48	175	41	41
3	350	128.0	9.2	0.00	46	2.45	315	52	52

Test Results	Material Description
R-value at 300 psi exudation pressure = 51	Silty sand

Project No.: G70401.01
Project: The Oasis at China Lake
Sample Number: B-16 **Depth:** 0-5'
Date: 2/26/2019

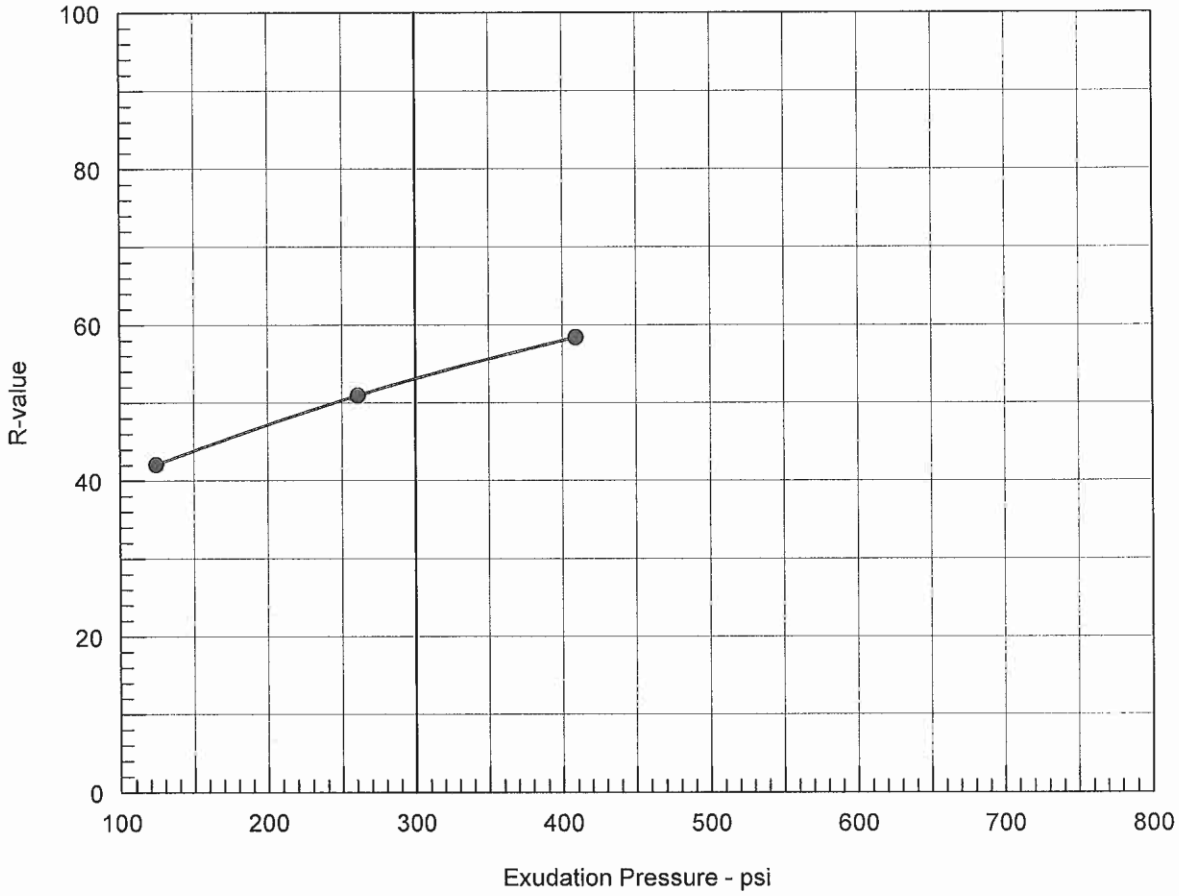
Tested by:
Checked by:
Remarks:

R-VALUE TEST REPORT

Moore Twining Associates, Inc.

Figure _____

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	126.3	9.2	0.00	41	2.41	409	61	58
2	350	123.1	11.2	0.00	63	2.48	124	42	42
3	350	125.2	10.2	0.00	50	2.44	261	53	51

Test Results	Material Description
R-value at 300 psi exudation pressure = 53	Silty sand

Project No.: G70401.01
Project: The Oasis at China Lake
Sample Number: B-17 **Depth:** 0-5'
Date: 2/26/2019

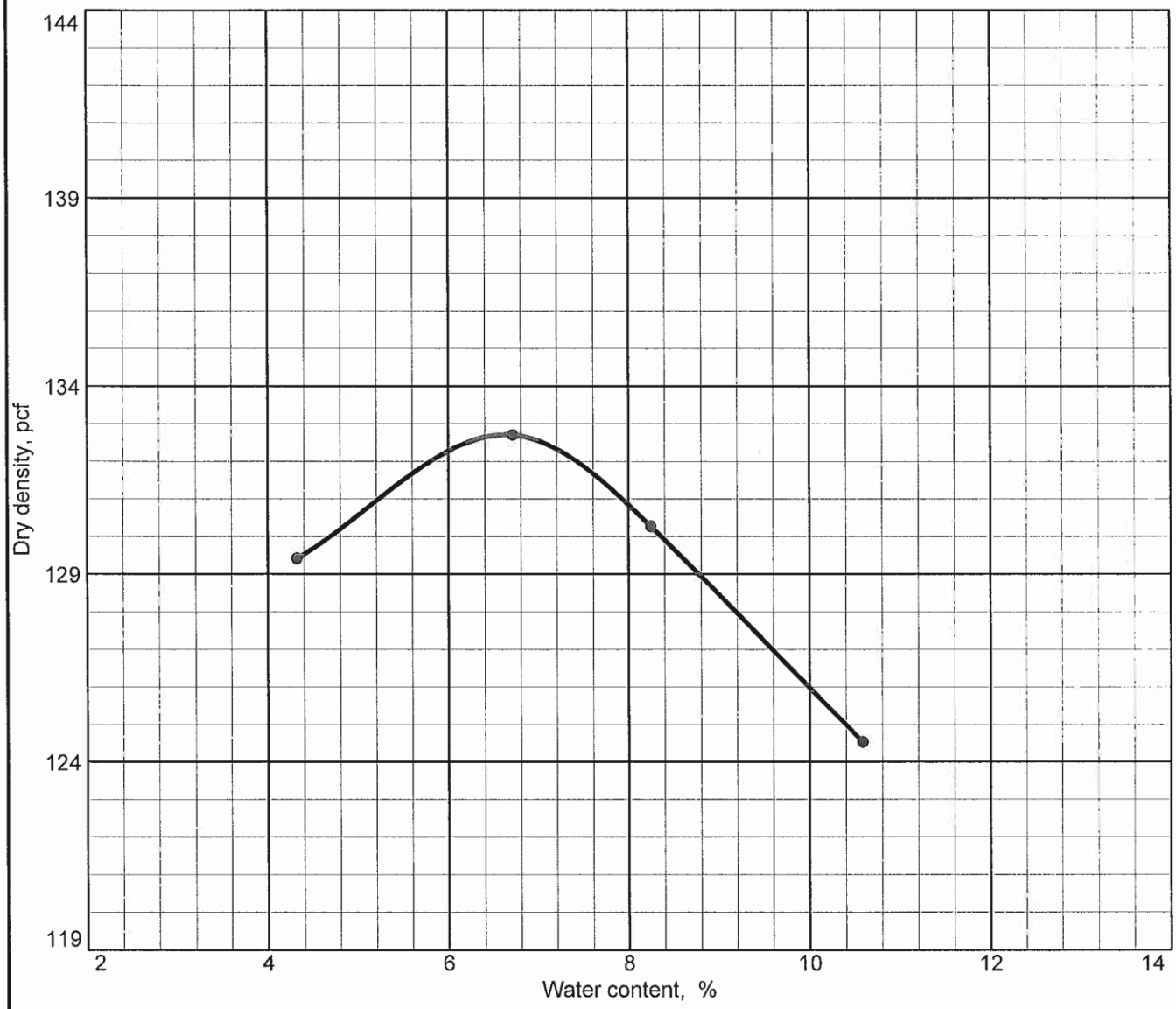
Tested by:
Checked by:
Remarks:

R-VALUE TEST REPORT

Moore Twining Associates, Inc.

Figure ____

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0-5'	SM						0.3	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 132.7 pcf Optimum moisture = 6.6 %	Silty sand

Project No. G70401.01 **Client:**

Project: The Oasis at China Lake

● **Source:** **Sample No.:** B-2 **Elev./Depth:** 0-5'

Remarks:

Moore Twining Associates, Inc.

Fresno, CA

Figure

MOORE TWINING ASSOCIATES, INC.
California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

January 11, 2019

Work Order #: **FA02043**

Scott Krauter
MTA Geotechnical Division
2527 Fresno Street
Fresno, CA 93721

RE: The Oasis at China Lake

Enclosed are the analytical results for samples received by our laboratory on **01/02/19** . For your reference, these analyses have been assigned laboratory work order number **FA02043**.

All analyses have been performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, Moore Twining Associates, Inc. (MTA) is not responsible for use of less than complete reports. Results apply only to samples analyzed.

If you have any questions, please feel free to contact us at the number listed above.

Sincerely,

Moore Twining Associates, Inc.

Susan Federico
Client Services Representative

MOORE TWINING ASSOCIATES, INC.
California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

MTA Geotechnical Division 2527 Fresno Street Fresno CA, 93721	**Project:** The Oasis at China Lake **Project Number:** G70401.01 **Project Manager:** Scott Krauter	**Reported:** 01/11/2019

Analytical Report for the Following Samples

Sample ID	Notes	Laboratory ID	Matrix	Date Sampled	Date Received
B-2 @ 0-5		FA02043-01	Soil	12/20/18 00:00	01/02/19 14:44
B-16 @ 0-5		FA02043-02	Soil	12/20/18 00:00	01/02/19 14:44
B-17 @ 0-5		FA02043-03	Soil	12/20/18 00:00	01/02/19 14:44

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California ELAP Certificate #1371

2527 Fresno Street
Fresno, CA 93721
(559) 268-7021 Phone
(559) 268-0740 Fax

MTA Geotechnical Division 2527 Fresno Street Fresno CA, 93721	**Project:** The Oasis at China Lake **Project Number:** G70401.01 **Project Manager:** Scott Krauter	**Reported:** 01/11/2019

B-2 @ 0-5

FA02043-01 (Soil) Sampled: 12/20/18 00:00

Analyte	Flag	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Inorganics									
Chloride		**60**	6.0	mg/kg	3	B9A0817	01/08/19	01/09/19	ASTM D4327-84
Chloride		**0.006**	0.00060	% by Weight	3	[CALC]	01/09/19	01/09/19	ASTM D4327-84
Sulfate as SO4		**0.002**	0.00060	% by Weight	3	[CALC]	01/09/19	01/09/19	ASTM D4327-84
pH		**7.9**	0.10	pH Units	1	B9A0817	01/08/19	01/08/19	ASTM D4972-89 Mod
Sulfate as SO4		**20**	6.0	mg/kg	3	B9A0817	01/08/19	01/09/19	ASTM D4327

B-16 @ 0-5

FA02043-02 (Soil) Sampled: 12/20/18 00:00

Analyte	Flag	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Inorganics									
Chloride		**6.9**	6.0	mg/kg	3	B9A0817	01/08/19	01/09/19	ASTM D4327-84
Chloride		**0.00069**	0.00060	% by Weight	3	[CALC]	01/09/19	01/09/19	ASTM D4327-84
Sulfate as SO4		ND	0.00060	% by Weight	3	[CALC]	01/09/19	01/09/19	ASTM D4327-84
pH		**7.9**	0.10	pH Units	1	B9A0817	01/08/19	01/08/19	ASTM D4972-89 Mod
Sulfate as SO4		ND	6.0	mg/kg	3	B9A0817	01/08/19	01/09/19	ASTM D4327

B-17 @ 0-5

FA02043-03 (Soil) Sampled: 12/20/18 00:00

Analyte	Flag	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Inorganics									
Chloride		**220**	6.0	mg/kg	3	B9A0817	01/08/19	01/09/19	ASTM D4327-84
Chloride		**0.022**	0.00060	% by Weight	3	[CALC]	01/09/19	01/09/19	ASTM D4327-84
Sulfate as SO4		**0.013**	0.00060	% by Weight	3	[CALC]	01/09/19	01/09/19	ASTM D4327-84
pH		**7.8**	0.10	pH Units	1	B9A0817	01/08/19	01/08/19	ASTM D4972-89 Mod
Sulfate as SO4		**130**	6.0	mg/kg	3	B9A0817	01/08/19	01/09/19	ASTM D4327

Notes and Definitions

µg/L	micrograms per liter (parts per billion concentration units)
mg/L	milligrams per liter (parts per million concentration units)
mg/kg	milligrams per kilogram (parts per million concentration units)
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference

Analysis of pH, filtration, and residual chlorine is to take place immediately after sampling in the field. If the test was performed in the laboratory, the hold time was exceeded. **(for aqueous matrices only)**

MOORE TWINING ASSOCIATES, INC.

ANALYTICAL CHEMISTRY DIVISION
CALIFORNIA ELAP CERTIFICATION # 1371

CHAIN OF CUSTODY/ANALYSIS REQUEST

2527 FRESNO STREET • FRESNO, CA 93721 • PHONE (559) 268-7021 • FAX: (559) 268-0740

WORKORDER #: FA02043
PAGE 1 **OF** 1

REPORT TO:

ATTENTION: Scott Krauter
NAME: MTA
ADDRESS:
PHONE:
FAX:

☐ INVOICE TO:

ATTENTION:
NAME:
ADDRESS:
PHONE:
FAX:

☐ REPORT COPY TO:

REPORTING :
☒ STANDARD FORMAT
☐ EDT (STATE FORM)
☐ GEOTRACKER/COELT (LUFT)
☐ PDF ☐ EXCEL
☐ County DHS :
☐ Environmental Health Agency :
☐ OTHER :

SAMPLE INFORMATION

SAMPLED BY (PRINT):
SIGNATURE:

☐ PUBLIC SYSTEM ☐ ROUTINE
☐ PRIVATE WELL ☐ REPEAT
☐ OTHER ☐ REPLACEMENT

TURN AROUND TIME:
☒ STANDARD ☐ RUSH, DUE ON:

SAMPLE TYPES:

SOLID:
BS – BIOSOLID
CR – CERAMIC
SL – SOIL/SOLID
LIQUID:
DW - DRINKING WATER
GW - GROUND WATER
OL - OIL
SF - SURFACE WATER
ST - STORM WATER
WW– WASTE WATER

PROJECT INFORMATION

CONTRACT/P.O. NO.:
PROJECT : The Oasis At China Lake
PROJECT NUMBER: 670401.01
PROJECT MANAGER: Scott Krauter

ANALYSIS REQUESTED

LAB USE

NOTES ON RECEIVED CONDITION:
☐ CUSTODY SEAL(S) BROKEN ☐ SAMPLE(S) DAMAGED
☐ ON ICE ☐ AMBIENT TEMP. ☐ INCORRECT PRESERVATION

	CLIENT SAMPLE ID	DATE	TIME	TYPE	Corrosion										System Number / Station Code
1.	B-2 @ 0-5	12-20-18	NA	SL	X										
2.	B-16 @ 0-5	12-20-18	NA	SL	X										
3.	B-17 @ 0-5	12-20-18	NA	SL	X										

COMMENTS/ADDITIONAL INSTRUCTIONS:

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY
[signature]	MTA	1-2-19	1444	[signature]	MTA

FL-SC-0005-01

Moore Twining Associates

Sample Integrity Page 2 of 2 WO# FA0204 3 MTA Bottles: (Yes) or No

COC Info				
Was temperature within range? Chemistry ≤6°C Micro <10°C Temp____°C	(Yes) No N/A	Did all bottle labels agree with COC?	(Yes) No N/A	Were there bubbles in VOA vials? **(Volatiles Only)** Yes No N/A
If samples were taken today, is there evidence that chilling has begun? Recvd____C°	(Yes) No N/A	Was a sufficient amount of sample received?	✓Yes No N/A	Was PM notified of discrepancies? Yes No N/A
Did all bottles arrive unbroken and intact?	(Yes) No N/A	Were correct containers and preservatives received for the tests requested?	✓Yes No N/A	PM:
Do samples have a hold time <72 hours?	Yes ~~No~~ N/A			By/Time:

Bottles Received			
125ml (A) 250ml (B) 1Liter (C) 40ml VOA (V)	1-3		
Bacti $Na_2S_2O_3$			
None (P)			
Cr6 Buffer (P) Borate Carbonate Buffer			
HNO_3 (P)			
H_2SO_4 (P)			
NaOH (P)			
NaOH+ZnAc (P)			
Dissolved Oxygen 300ml (P)			
None (AG)			
None (CG) 500ml			
$Na_2S_2O_3$ 250ml (Brown P) 549			
$Na_2S_2O_3$ (AG)			
$Na_2S_2O_3$ (AG)			
Thio/K Citrate			
NH_4Cl (AG) 552			
HCl (AG)			
None (CG) 500ml			
H_3PO_4 (AG)			
Other:			
Plastic Bag	1		
Low Level Hg/Metals Double Bag			
Client Own			
Glass Jar: 125/ 250/ 500			
Soil Tube: Brass/ Steel/ Plastic			
5 g Encore			

Comments

Filter or Split	Container	Preservative	Date/Time/Initials
S P F			
S P F			
S P F			
S P F			
S P F			

Labeled by: M @ 1635 Labels checked by: M @ 1637

FL-SC-0003-06

MOORE TWINING ASSOCIATES, INC.

Project Name:	The Oasis at China Lake	Report Date:	1/25/2019
		Sample Date:	12/19/2018
Project Number:	G70401.01		
		Sampled By:	JC
Subject:	Minimum Resistivity, ASTM G187	Tested By:	TD
Material Description:	Silty sand	Test Date:	1/24/2019
Location:	B-2 @ 0-5'		

Laboratory Test Results, Minimum Resistivity - ASTM G187

Total Water Added, mls	Resistivity, Ohm-cm
50 mls	8,004
100 mls	5,336
150 mls	3,802
200 mls	3,869
250 mls	4,002

Remarks: Min. Resistivity is 3,802 Ohm-cm

www.mooretwining.com
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FX: 559.268.7126
2527 Fresno Street
Fresno, CA 93721

MOORE TWINING ASSOCIATES, INC.

Project Name:	The Oasis at China Lake	Report Date:	1/25/2019
		Sample Date:	12/19/2018
Project Number:	G70401.01		
		Sampled By:	JC
Subject:	Minimum Resistivity, ASTM G187	Tested By:	TD
Material Description:	Silty sand	Test Date:	1/24/2019
Location:	B-16 @ 0-5'		

Laboratory Test Results, Minimum Resistivity - ASTM G187

Total Water Added, mls	Resistivity, Ohm-cm
50 mls	5,670
100 mls	4,869
150 mls	4,402
200 mls	3,935
250 mls	4,202

Remarks: Min. Resistivity is 3,935 Ohm-cm

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Fresno, CA 93721

MOORE TWINING ASSOCIATES, INC.

Project Name:	The Oasis at China Lake	Report Date:	1/25/2019
		Sample Date:	12/19/2018
Project Number:	G70401.01		
		Sampled By:	JC
Subject:	Minimum Resistivity, ASTM G187	Tested By:	TD
Material Description:	Silty sand	Test Date:	1/24/2019
Location:	B-17 @ 0-5'		

Laboratory Test Results, Minimum Resistivity - ASTM G187

Total Water Added, mls	Resistivity, Ohm-cm
50 mls	6,670
100 mls	5,336
150 mls	4,736
200 mls	4,536
250 mls	4,135
300 mls	4,002
350 mls	4,002
400 mls	3,935
450 mls	3,802
500 mls	3,935

Remarks: Min. Resistivity is 3,802 Ohm-cm

PH: 800.268.7021
FX: 559.268.7126
2527 Fresno Street
Fresno, CA 93721

ATTACHMENT 3

TRAFFIC IMPACT STUDY

OASIS AT CHINA LAKE PROJECT
CITY OF RIDGECREST, CALIFORNIA

TRAFFIC IMPACT STUDY

November 29, 2018

ATE #18098

Prepared for:

G+L China Lake, LLC
439 N. Bedford Drive
Beverly Hills, CA 90210

REGISTERED PROFESSIONAL ENGINEER
RICHARD L. POOL
C 18030
CIVIL
STATE OF CALIFORNIA

ASSOCIATED TRANSPORTATION ENGINEERS

100 N. Hope Avenue, Suite 4, Santa Barbara, CA 93110-1686 • (805) 687-4418 • FAX (805) 682-8509

ASSOCIATED TRANSPORTATION ENGINEERS
100 N. Hope Avenue, Suite 4, Santa Barbara, CA 93110 • (805) 687-4418 • FAX (805) 682-8509

Since 1978

Richard L. Pool, P.E.
Scott A. Schell, AICP, PTP

November 29, 2018

Richard J. Gottlieb
Managing Member
G+L China Lake, LLC
439 N. Bedford Drive
Beverly Hills, CA 90210

TRAFFIC STUDY FOR THE
OASIS AT CHINA LAKE PROJECT, CITY OF RIDGECREST, CALIFORNIA

Associated Transportation Engineers (ATE) has prepared the following traffic impact study for the Oasis at China Lake Project proposed in the City of Ridgecrest. It is our understanding that the traffic study will be used for environmental review.

We appreciate the opportunity to assist you with the project.

Associated Transportation Engineers

Richard L. Pool, PE
President

CONTENTS

TABLES

FIGURES

INTRODUCTION

The following study contains an analysis of the potential traffic impacts associated with the Oasis at China Lake Project (the "Project"). The traffic analysis provides information relative to existing and future traffic conditions in the vicinity of the Project site and identifies potential impacts based on impact threshold outlined in the General Plan adopted by the City of Ridgecrest. The intersections analyzed in the study were determined based on discussions with City staff.

PROJECT DESCRIPTION

Figure 1 shows the location of the Project site within the Ridgecrest area. Figure 2 shows the Project site plan. The Project is proposing to develop a 160,510 SF shopping center that includes retail shops, restaurants, cinemas, and medical offices on a vacant site located on the southeast corner of the South China Lake Boulevard/Rader Avenue intersection. Access for the Project is proposed via 2 driveways on Rader Avenue and 2 driveways on South China Lake Boulevard. The Project is expected to be fully occupied in 2022.

IMPACT THRESHOLDS

The City's General Plan Policy C-2.4 (Level of Service for Local Streets and Intersections) states, *"The City shall strive to maintain LOS "C" or better for both daily and peak hour conditions. Exceptions to this standard may be considered for intersections where road improvements are not acceptable (i.e., due to factors such as the cost of improvements exceeding benefits achieved, results are contrary to achieving a pedestrian design, or other factors) or that based upon overriding considerations regarding project benefits, an alternate LOS may be accepted."* A significant impact occurs when a proposed project causes an intersection to operate at LOS D or worse.

EXISTING CONDITIONS

Street Network

The Project is served by arterial and collector streets, as illustrated in Figure 3. The following text provides a brief discussion of the study-area street network.

South China Lake Boulevard, which fronts the west side of the Project site, is 4-lane arterial road that runs north-south in the study area. The South China Lake Boulevard/Rader Avenue intersection and South China Lake Boulevard/Bowman Road intersection are controlled by traffic signals. Two new driveways are proposed on South China Lake Boulevard for access to the Project site.

Rader Avenue is a 2-lane collector road that extends east and west of South China Lake Boulevard. Two new driveways are proposed on Rader Avenue for Project access.

Bowman Road is a 2-lane collector road that extends east and west of South China Lake Boulevard.

N
NOT TO SCALE

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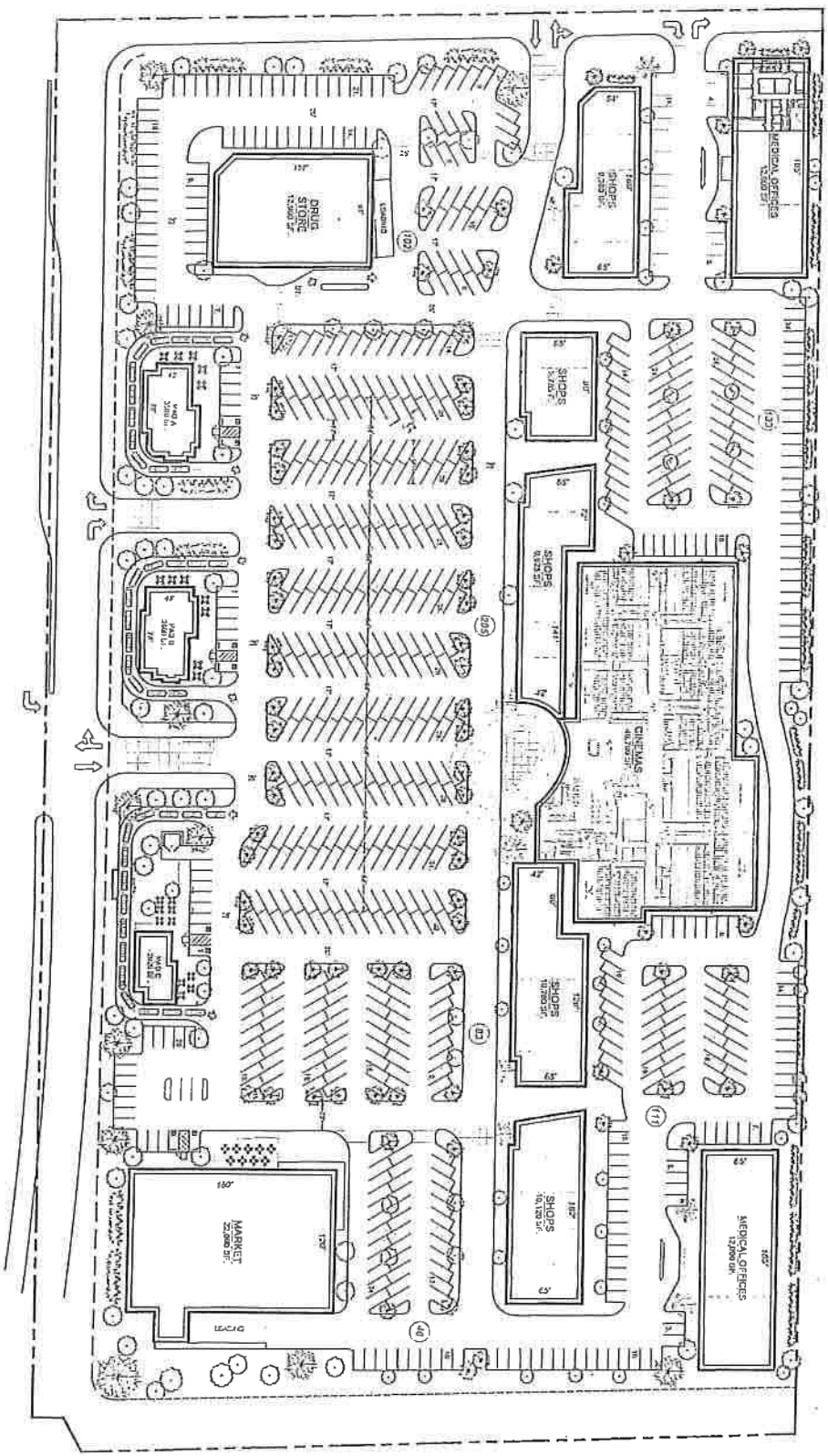
TRANSPORTATION
ENGINEERS

PROJECT SITE LOCATION

FIGURE 1

EKM - ATE#18098

RADER AVE.



SOUTH CHINA LAKE BLVD.

BOWMAN RD.

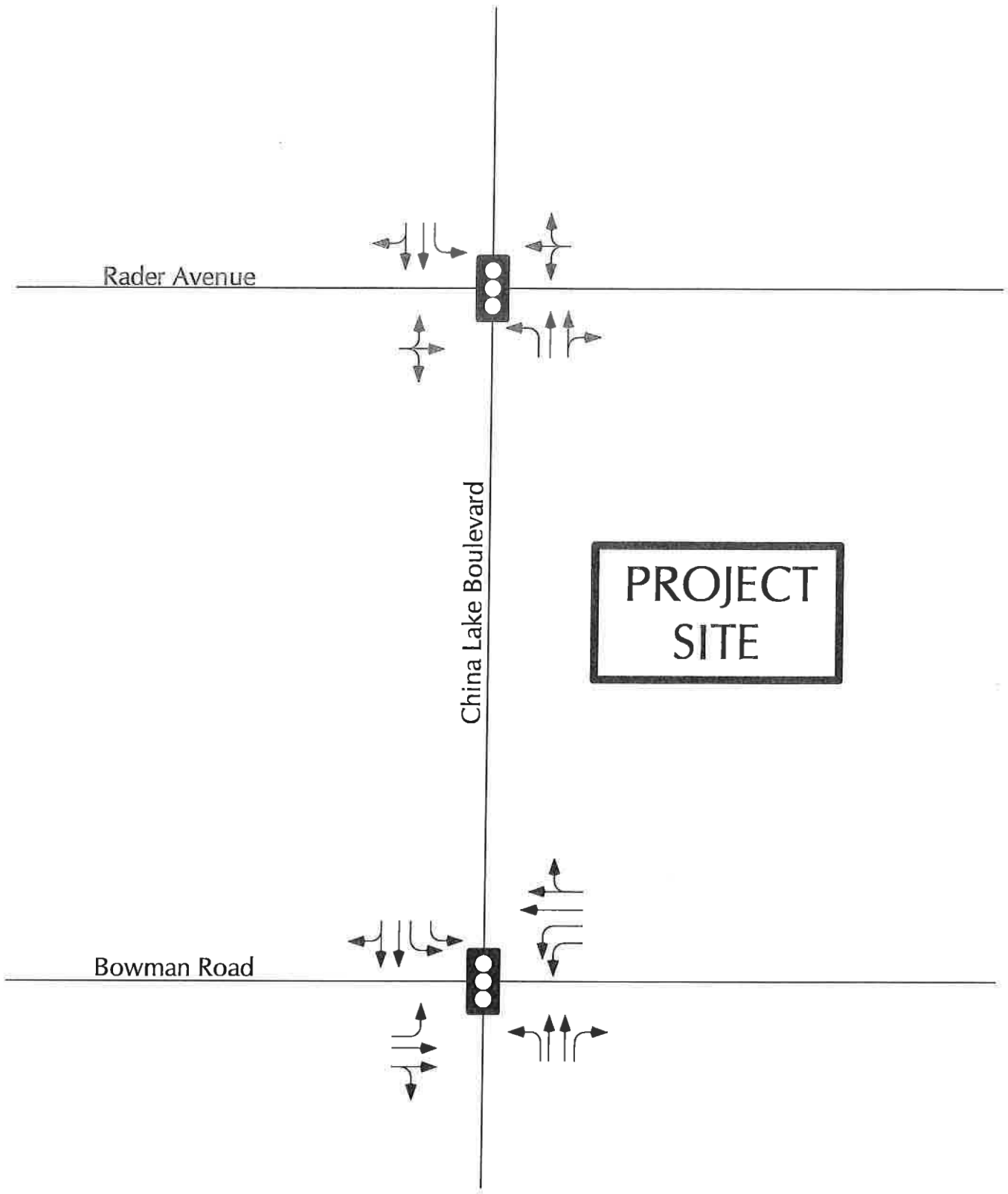
N
NOT TO SCALE

ASSOCIATED TRANSPORTATION ENGINEERS

PROJECT SITE PLAN

FIGURE 2

EKM - ATE#18098



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EXISTING STREET NETWORK

FIGURE 3

EKM - ATE#18098

Existing Intersection Operations

Since traffic flows on city street networks are most constrained at intersections, detailed traffic analyses focus on the operating conditions of critical intersections during the AM and PM peak hour commuter periods. Levels of Service (LOS) "A" through "F" are used to rate intersection operations, with LOS "A" indicating free flow with low vehicle delays and LOS "F" indicating congestion and high vehicle delays (more complete definitions are included in the Technical Appendix).

Existing traffic volumes were collected in October 2018 for this traffic study. Figure 4 illustrates the Existing AM and PM peak hour volumes at the study-area intersections. Existing levels of service were calculated for the study-area intersections using the Highway Capacity Manual (HCM).[1] As shown in Table 1, the study-area intersections currently operate at LOS C or better during the AM and PM peak hours, which meets the City's LOS C standard (LOS calculation worksheets are contained in Technical Appendix for reference).

Table 1
Existing Levels of Service

Intersection	Delay / LOS(a)	
	AM Peak Hour	PM Peak Hour
South China Lake Blvd/Rader Ave	7.2 Sec./LOS A	9.0 Sec./LOS A
South China Lake Blvd/Bowman Rd	14.3 Sec./LOS B	21.2 Sec./LOS C

(a) LOS based on average delay per vehicle in seconds pursuant to HCM procedures.

FUTURE YEAR 2022 WITHOUT PROJECT TRAFFIC CONDITIONS

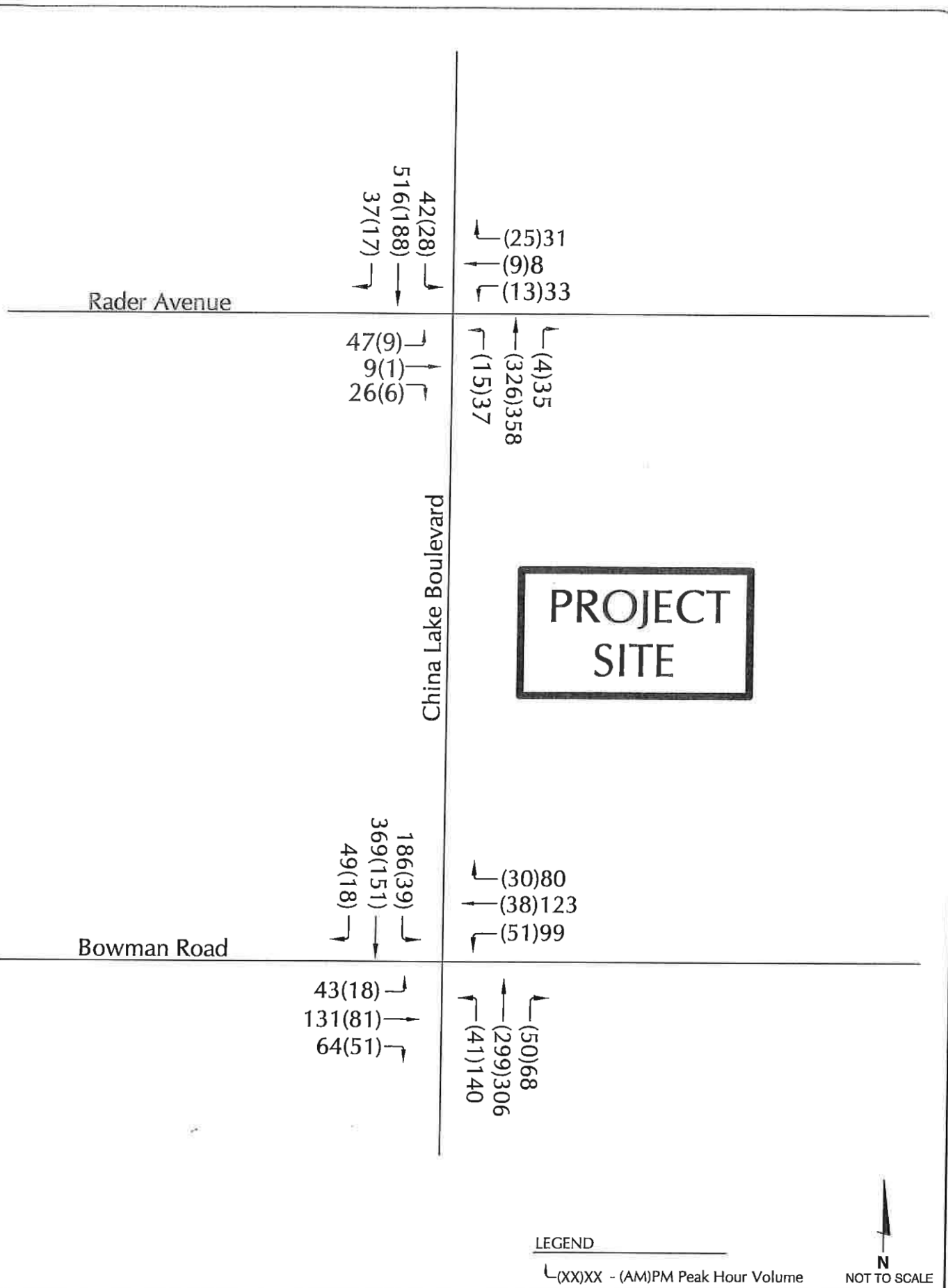
Future Year 2022 Traffic Volumes

The Project is expected to be fully occupied by 2022. Future traffic volumes were forecasts for the study-area intersections by assuming a 2% per year ambient growth rate from the 2018 base year to the 2022 completion year for the Project. Thus, the 2018 traffic volumes were factor up by 8% for the Future 2022 traffic forecasts. The Future 2022 forecasts are shown on Figure 5.

Future 2012 Intersection Operations

Levels of service were calculated for the study-area intersections assuming the Future 2022 peak hour volumes illustrated on Figure 5. As shown in Table 2, the study-area intersections are forecast to operate at LOS C or better during the AM and PM peak hours with Year 2022 traffic volumes.

1 Highway Capacity Manual, Transportation Research Board, 2016.



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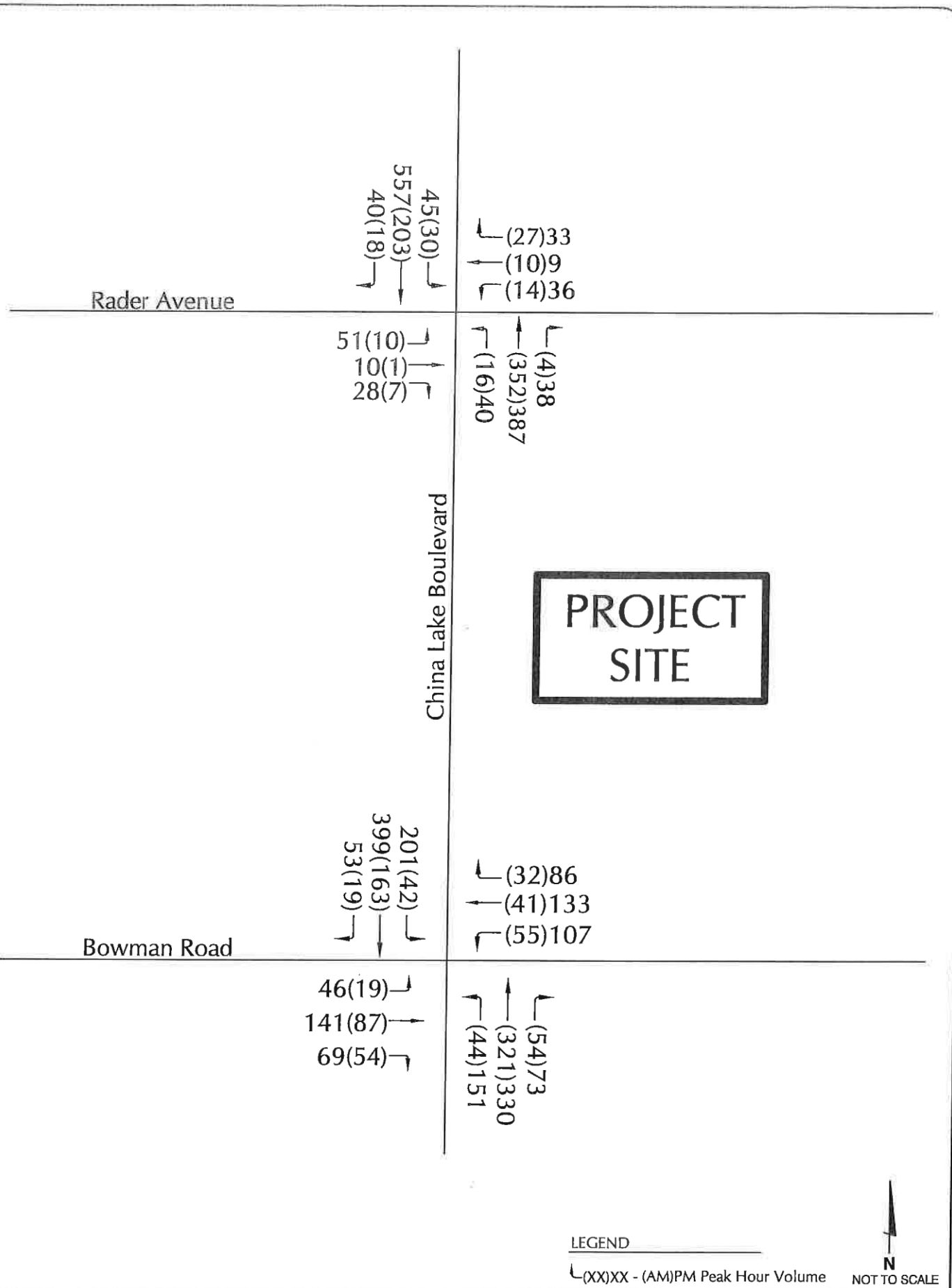
EXISTING TRAFFIC VOLUMES

FIGURE 4

EKM - ATE#18098



Associated Transportation Engineers

FUTURE 2022 TRAFFIC VOLUMES

FIGURE 7

EKM - ATE#18098

Table 2
Future 2022 Levels of Service

Intersection	Delay / LOS(a)	
	AM Peak Hour	PM Peak Hour
South China Lake Blvd/Rader Ave	7.3 Sec./LOS A	9.2 Sec./LOS A
South China Lake Blvd/Bowman Rd	14.6 Sec./LOS B	22.2 Sec./LOS C

(a) LOS based on average delay per vehicle in seconds pursuant to HCM procedures.

PROJECT-SPECIFIC IMPACT ANALYSIS

Project Trip Generation

Trip generation estimates were developed for the Project using rates presented in the Institute of Transportation Engineers (ITE) Trip Generation manual.[2] Two trip generation calculations were prepared for the Project. The first scenario is based on the ITE rates for shopping centers and are applied to the entire center. The second scenario is based on rates specific to the proposed medical offices and cinemas since those types of the uses are not typical for shopping centers. Table 3 summarizes the trip generation estimates for the Project for both scenarios (a worksheet showing the detailed calculations is attached for reference).

Table 3
Project Trip Generation

Scenario/ Land Use	Size	ADT		AM Peak Hour		PM Peak Hour	
		Rate	Trips	Rate	Trips	Rate	Trips
Shopping Center Rates							
Shopping Center	160.51 KSF	37.75	6,059	0.94	151	3.81	612
Specific Rates							
Shopping Center	89.81 KSF	37.75	3,390	0.94	84	3.81	342
Cinemas	10 Screens	15.00	150	0.00	0	13.73	137
Medial Office	24.0 KSF	34.80	835	2.78	67	3.46	83
Totals			**4,375**		**151**		**562**

As shown in Table 3, the trip generation estimates based on the shopping center rates applied to the entire center results in the higher trip generation forecasts. Based on these calculations, the Project is forecast to generate 6,059 average daily trips, with 151 trips occurring during the AM peak hour, and 612 trips occurring during the PM peak hour. These forecasts are used in the following impact analysis for the Project in order to provide a conservative analysis.

2 Trip Generation, Institute of Transportation Engineers, 10th Edition, 2017.

Pass-By Trips. Some of the Project's trips will be drawn from existing traffic on nearby roadways. "Pass-By" trips come from the existing traffic streams on roadways that provide direct access to the site (for example, people traveling along South China Lake Boulevard that decide to turn into the Project site and strop at the commercial uses as part of their longer trip). Based on the data contained in the ITE Trip Generation Handbook, 34% of shopping center trips are pass-by trips. To be conservative, the traffic study assumes that 30% of the Project trips will be pass-by trips (and the remaining 70% will be primary trips). Table 4 summarizes the breakdown of the Project's trip types for the AM and PM peak hours.

Table 4
Project Trip Types

Trip Type	AM Peak Trips	PM Peak Trips
Pass-By Trips (30%)	45	184
Primary Trips (70%)	106	428
Totals	151	612

Project Trip Distribution and Assignment

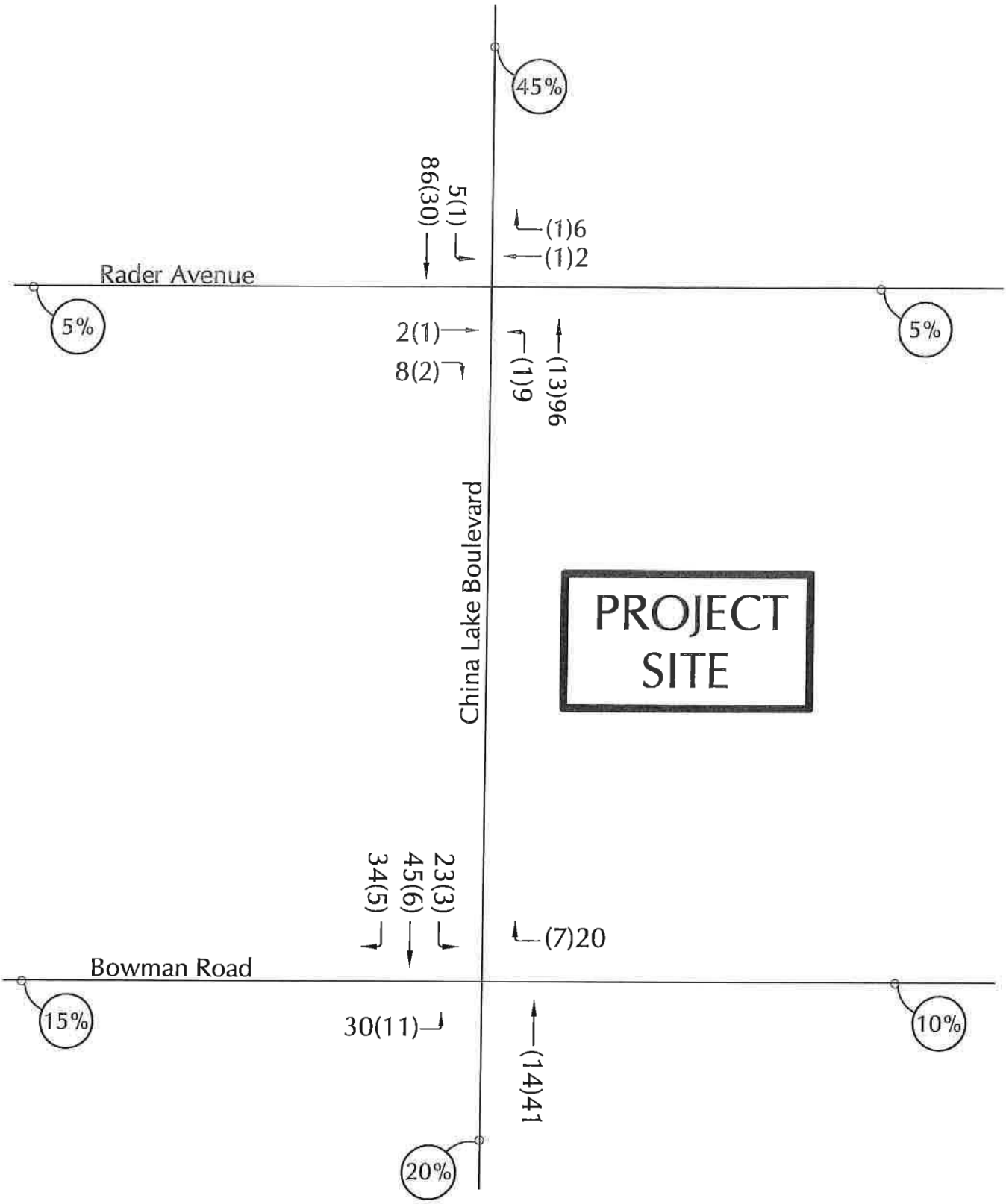
Table 5 shows the trip distribution percentages developed for assigning Project traffic to the study-area street network. The trip distribution pattern is based on the existing traffic patterns from the traffic counts and consideration of the population centers in the area. Project-generated AM and PM peak hour traffic assignments are shown on Figure 6.

Table 5
Project Trip Distribution

Origin/Destination	Direction	Percent
South China Lake Boulevard	North	45%
South China Lake Boulevard	South	20%
Rader Avenue	East	5%
Rader Avenue	West	5%
Bowman Road	East	10%
Bowman Road	West	15%
Total		**100%**

Future 2022 + Project Intersection Operations

Levels of service were calculated for the study-area intersections assuming the Future 2022 + Project traffic volumes shown on Figure 7. Future 2022 and Future 2022 + Project levels of service of compared in Tables 6 and 7. The significance of Project traffic is also shown in the tables.



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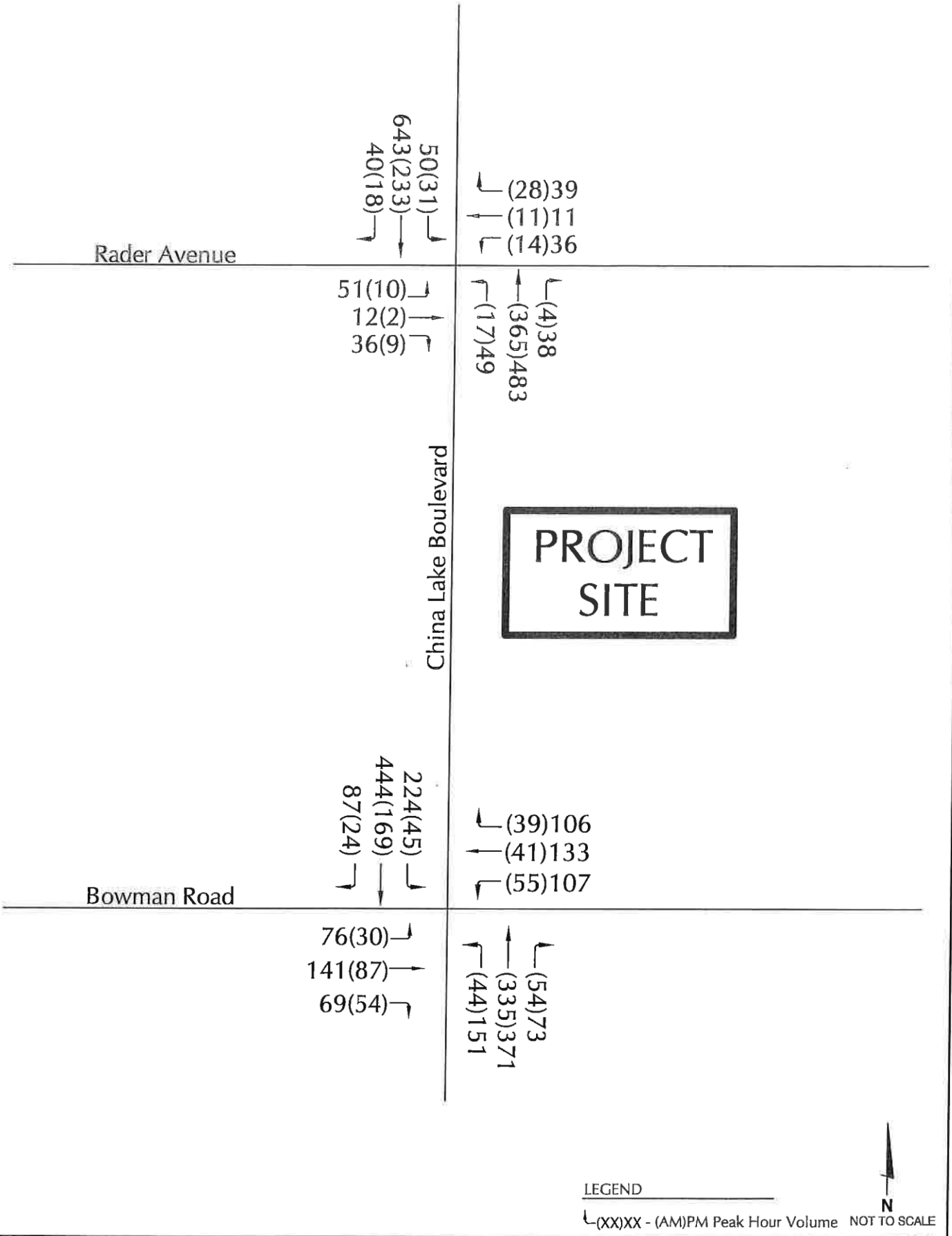
PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

FIGURE 5

EKM - ATE#18098



ASSOCIATED TRANSPORTATION ENGINEERS

FUTURE 2022 + PROJECT TRAFFIC VOLUMES

FIGURE 7

EKM - ATE#18098

Table 6
Future 2022 + Project Levels of Service – AM Peak Hour

Intersection	Delay / LOS(a)		Project Added	
	Future 2022	Future 2022 + Project	Trips	Impact?
South China Lake Blvd/Rader Ave	7.3 Sec./LOS A	7.4 Sec./LOS A	50	No
South China Lake Blvd/Bowman Rd	14.6 Sec./LOS B	14.8 Sec./LOS B	46	No

(a) LOS based on average delay per vehicle in seconds pursuant to HCM procedures.

Table 7
Future 2022 + Project Levels of Service – PM Peak Hour

Intersection	Delay / LOS(a)		Project Added	
	Future 2022	Future 2022 + Project	Trips	Impact?
South China Lake Blvd/Rader Ave	9.2 Sec./LOS A	9.8 Sec./LOS A	214	No
South China Lake Blvd/Bowman Rd	22.2 Sec./LOS C	23.6 Sec./LOS C	193	No

(a) LOS based on average delay per vehicle in seconds pursuant to HCM procedures.

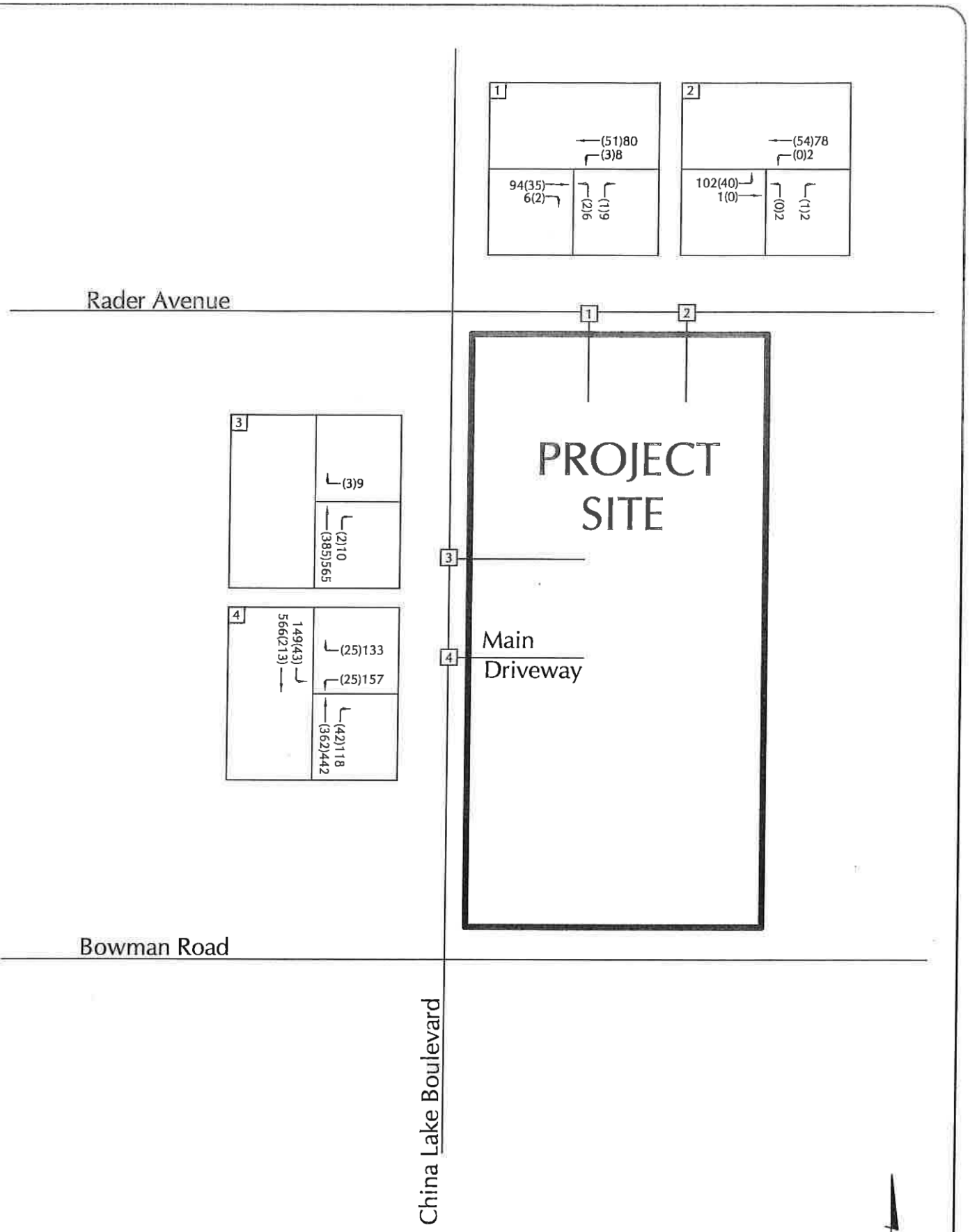
The data presented in Tables 6 and 7 indicate that the study-area intersections are forecast to operate at LOS C or better during the AM and PM peak hour periods with Future 2022 + Project traffic, which meets the City's LOS C standard. Thus, the Project would not significantly impact the study-area intersections.

SITE ACCESS

Access for the Project is proposed via 2 driveways on Rader Avenue and 2 driveways on South China Lake Boulevard (see Figure 2 – Project Site Plan). The northern driveway on South China Lake Boulevard would be limited to inbound/outbound right turns only. The southern driveway would be the main access for the Project site.

The Future 2022 + Project traffic forecasts at the Project driveways are shown on Figure 8. As shown, traffic volumes using the Rader Avenue driveways would be low. Both driveways are forecast to operate at LOS A during the AM and PM peak commuter periods. The northern driveway on South China Lake Boulevard would be limited to inbound/outbound right turns only. This driveway is also forecast to operate at LOS A during the AM and PM peak commuter periods.

The southern driveway on South China Lake Boulevard would be a full-access driveway and serve as the main access for the Project. Vehicle delays were calculated for the main access driveway using the Future 2022 + Project forecasts shown on Figure 8. Table 8 lists the delays and levels of service for turning at the main driveway during the AM and PM peak commuter periods.



ASSOCIATED TRANSPORTATION ENGINEERS

PROJECT DRIVEWAY VOLUMES

FIGURE 8

EKM - ATE#18098

Table 8
Main Driveway/South China Lake Boulevard Operations

Turning Movement	Delay / LOS(a)	
	AM Peak Hour	PM Peak Hour
Main Driveway/S. China Lake Blvd.		
Northbound Right Turn	0.0 Sec./LOS A	0.0 Sec./LOS A
Southbound Left Turn	8.2 Sec./LOS A	8.9 Sec./LOS A
Westbound Left+Right Turn	11.7 Sec./LOS B	40.8 Sec./LOS E

(a) LOS based on average delay per vehicle in seconds pursuant to HCM procedures.

As shown in Table 8, delays for turning into the shopping center (northbound right turns and southbound left turns) are forecast at less than 10 seconds per vehicle (LOS A) during the AM and PM peak hour periods. Vehicle delays for turning left and right from the shopping center onto South China Lake Boulevard are forecast at 11.7 seconds per vehicle (LOS B) during the AM peak hour and 40.8 seconds per vehicle (LOS E) during the PM peak hour. The highest delays would occur for vehicles turning left from the driveway onto South China Lake Boulevard during the PM peak commuter period (delays would be lower during all other hours). The traffic signals at the South China Lake Boulevard/Rader Avenue intersection and the South China Lake Boulevard/Bowman Road intersection will provide regular gaps in the South China Lake Boulevard traffic stream for movements to/from the driveway. It is recommended that the main access driveway include 2 outbound lanes (1 left-turn lane and 1 right-turn lane) for traffic exiting the shopping center in order to minimize vehicle delays and queuing for outbound traffic.

Vehicle queues were forecast for the southbound left turns into the shopping center from South China Lake Boulevard to determine the length of the left-turn lane needed to accommodate Project traffic. The SYNCHRO model, which implements the operations methods outlined in the Highway Capacity Manual, was used to develop the queue forecasts. The SYNCHRO queue model predicts average queues (50th percentile) and peak queues (95th percentile) during the peak 1-hour period. The 95th percentile peak queue forecasts were used for the analysis (queue forecast worksheets are included in the Technical Appendix for reference). The 95th percentile queue for the southbound left-turn lane is forecast at 1 vehicle, which indicates that adequate gaps are available in the northbound traffic flows on South China Lake Boulevard for turning into the shopping center during the PM peak commuter period with minimal delays and queuing. Based on the queue modeling, it is recommended that the southbound left-turn pocket be constructed with 100 feet of storage area plus a 90-foot bay taper (190 feet total).

CUMULATIVE ANALYSIS

The study-area intersections were analyzed assuming traffic generated by developments that have been approved and/or pending approval (cumulative conditions). City staff identified Tentative Parcel Map 12221 for the cumulative scenario. Tentative Parcel Map 12221, which was approved by the City in March 2017, is located at 899 South China Lake Boulevard directly across the street from the proposed Project. The development includes 5 lots with a total of about 30,700 SF of retail and fast-food restaurants.

Cumulative Traffic Volumes

Cumulative traffic volumes were forecast for the study-area intersections assuming the development of 30,769 SF of retail/fast-food uses. Table 9 summarizes the trip generation for Tentative Parcel Map 12221. A worksheet showing the detailed trip generation calculations is included in the Technical Appendix for reference.

Table 9
Trip Generation – Cumulative Projects

Project / Parcel #	Size	Daily Trips	AM Peak Hour Trips	PM Peak Hour Trips
Tentative Parcel Map 12221				
Lot 1 – Fast Food(a)	2,300 SF	975	83	68
Lot 2 – Retail(b)	4,700 SF	160	4	16
Lot 3 – Fast Food(a)	3,100 SF	1,314	112	91
Lot 4 – Fast Food(a)	3,800 SF	1,611	137	112
Lot 5 – Retail(b)	16,800 SF	571	14	58
Totals	**30,700 SF**	**4,631**	**350**	**345**

(a) Trip generation based on ITE rates for Fast-Food Restaurant with Drive-Through Window.
(b) Trip generation based on ITE rates for Shopping Center.

Traffic generated by Tentative Parcel Map 12221 was added to the Future 2022 traffic volumes to forecast the Cumulative traffic volumes, which are shown on Figure 9. Traffic generated by the Oasis at China Lake Project was then added to the Cumulative volumes to forecast the Cumulative + Project traffic volumes, which are shown on Figure 10.

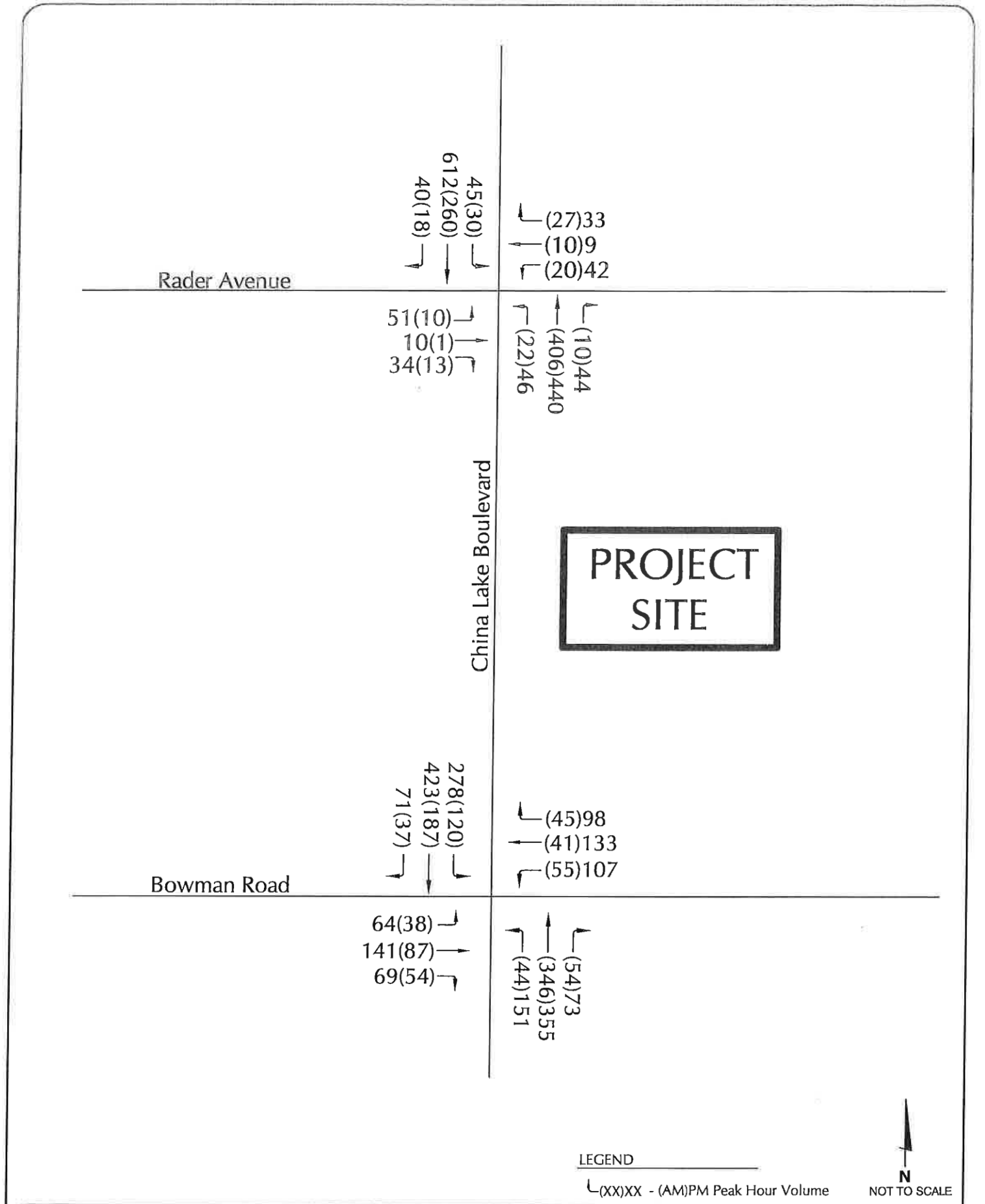
Cumulative Intersection Operations

Cumulative and Cumulative + Project levels of service are compared in Tables 10 and 11. The tables also list the Project's traffic contributions to each intersection and the significance of Project traffic based on the City's LOS C standard.

Table 10
Cumulative + Project Levels of Service – AM Peak Hour

Intersection	Delay / LOS(a)		Project Added	
	Cumulative	Cumulative + Project	Trips	Impact?
South China Lake Blvd/Rader Ave	7.5 Sec./LOS A	7.6 Sec./LOS A	50	No
South China Lake Blvd/Bowman Rd	17.3 Sec./LOS B	17.5 Sec./LOS B	46	No

(a) LOS based on average delay per vehicle in seconds pursuant to HCM procedures.

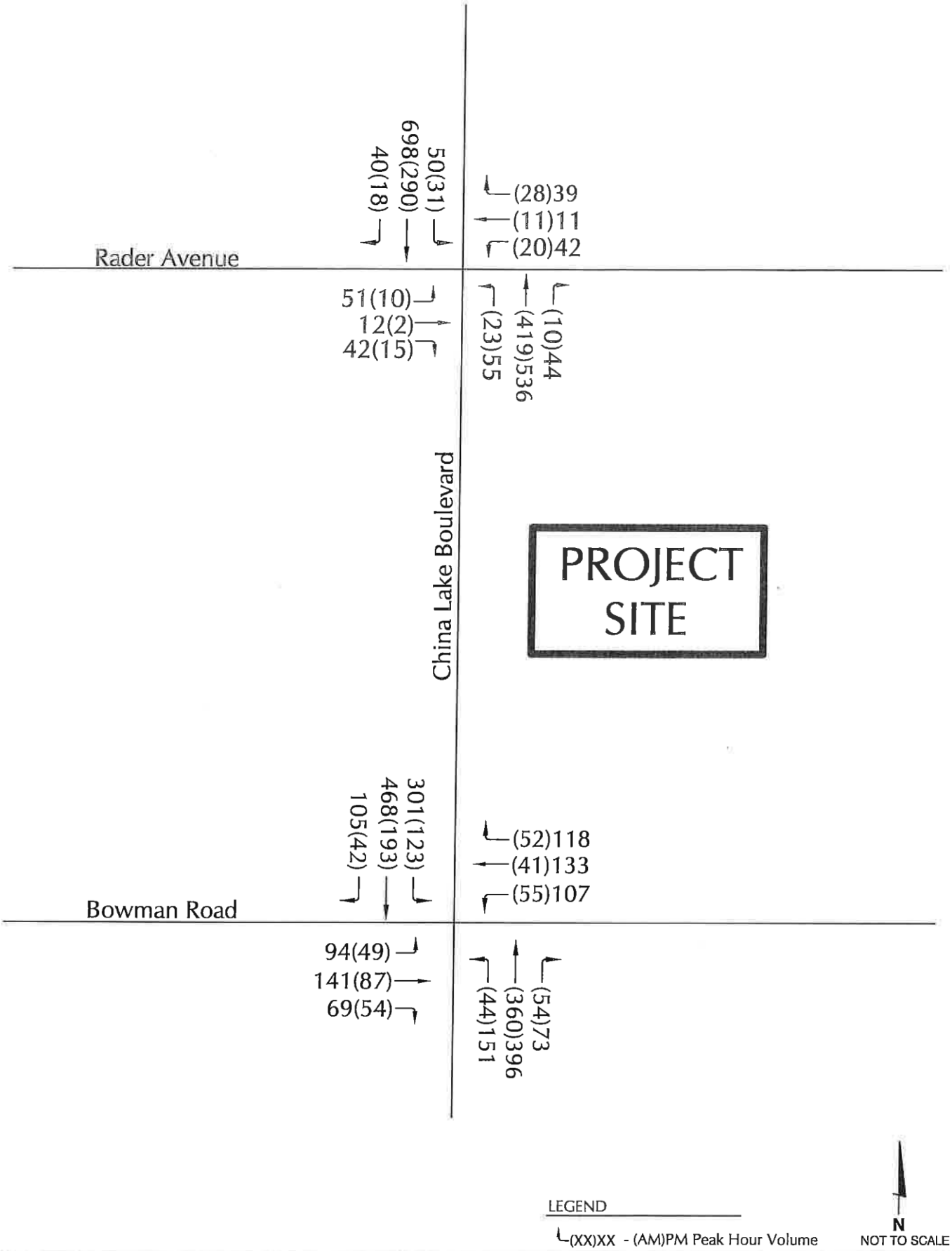


ASSOCIATED TRANSPORTATION ENGINEERS

CUMULATIVE TRAFFIC VOLUMES

FIGURE 9

EKM - ATE#18098



ASSOCIATED TRANSPORTATION ENGINEERS

CUMULATIVE + PROJECT TRAFFIC VOLUMES

FIGURE 10

EKM - ATE#18098

Table 11
Cumulative + Project Levels of Service – PM Peak Hour

Intersection	Delay / LOS(a)		Project Added	
	Cumulative	Cumulative + Project	Trips	Impact?
South China Lake Blvd/Rader Ave	9.6 Sec./LOS A	10.2 Sec./LOS B	214	No
South China Lake Blvd/Bowman Rd	27.7 Sec./LOS C	30.2 Sec./LOS C	193	No

(a) LOS based on average delay per vehicle in seconds pursuant to HCM procedures.

The data presented in Tables 10 and 11 shows that the study-area intersections are forecast to operate at LOS C or better during the AM and PM peak hour periods with Cumulative and Cumulative + Project traffic. Based on the City's adopted impact criteria the Project would not contribute to significant cumulative impacts at the study-area intersections.

■ ■ ■

REFERENCES AND PERSONS CONTACTED

Associated Transportation Engineers

Richard L. Pool, P.E., Principal Engineer
Dan Dawson, Senior Transportation Planner
Erica Monson, Transportation Planner

Persons Contacted

Heather Spurlock, City of Ridgecrest

Written Material

Highway Capacity Manual, Transportation Research Board, Sixth, 2016.

Trip Generation, Institute of Transportation Engineers, 10th Edition, 2017.

TECHNICAL APPENDIX

CONTENTS:

INTERSECTION LEVEL OF SERVICE DEFINITIONS

The ability of a roadway system to carry traffic is most often expressed in terms of "Levels of Service" (LOS) at intersections. LOS A through F are used, with LOS A indicating very good operations and LOS F indicating poor operations. More complete level of service definitions for intersections are listed in the following table.

LOS	Definition
A	Conditions of free unobstructed flow, no delays and all signal phases sufficient in duration to clear all approaching vehicles.
B	Conditions of stable flow, very little delay, a few phases are unable to handle all approaching vehicles.
C	Conditions of stable flow, delays are low to moderate, full use of peak direction signal phases is experienced.
D	Conditions approaching unstable flow, delays are moderate to heavy, significant signal time deficiencies are experienced for short durations during the peak traffic period.
E	Conditions of unstable flow, delays are significant, signal phase timing is generally insufficient, congestion exists for extended duration throughout the peak period.
F	Conditions of forced flow, travel speeds are low and volumes are well above capacity. This condition is often caused when vehicles released by an upstream signal are unable to proceed because of back-ups from a downstream signal.

TRAFFIC COUNTS

Prepared by National Data & Surveying Services

China Lake Blvd & Bowman Rd

Peak Hour Turning Movement Count

ID: 18-02108-001
City: Ridgecrest

Day: Thursday
Date: 10/18/2018

PEAK HOURS

AM	07:15 AM - 08:15 AM
NOON	NONE
PM	04:45 PM - 05:45 PM

COUNT PERIODS

AM	07:00 AM - 09:00 AM
NOON	NONE
PM	04:00 PM - 06:00 PM

China Lake Blvd — SOUTHBOUND

AM	18	151	37	2	349	AM
NOON	0	0	0	0	0	NOON
PM	49	369	181	5	433	PM

0 2 2 0

Bowman Rd — EASTBOUND

AM	NOON	PM	
92	0	285	
0	0	1	0
18	0	42	1
81	0	131	2
51	0	64	0

AM NOON PM

CONTROL

Signalized

TEV	867 AM	0 NOON	1658 PM
PHF	0.91		0.98

WESTBOUND — Bowman Rd

PM	NOON	AM	
80	0	30	0
123	0	38	2
99	0	51	2
0	0	0	0
380	0	168	

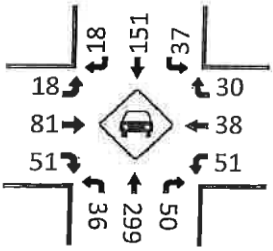
PM NOON AM

0 1 2 1

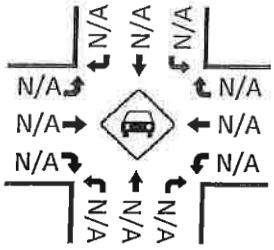
China Lake Blvd — NORTHBOUND

PM	560	28	112	306	68	PM
NOON	0	0	0	0	0	NOON
AM	258	5	36	299	50	AM

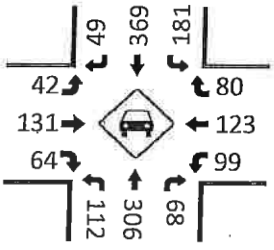
Total Vehicles (AM)



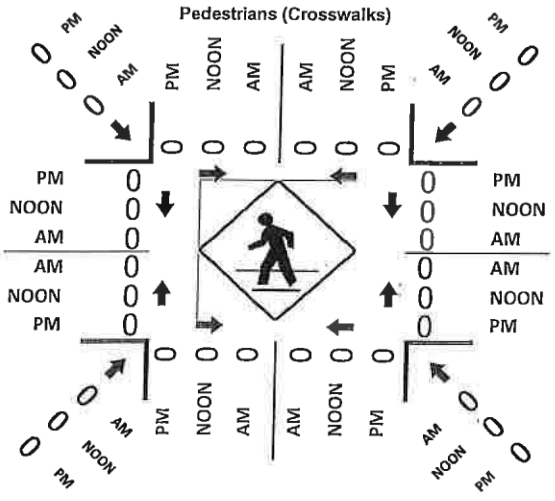
Total Vehicles (Noon)



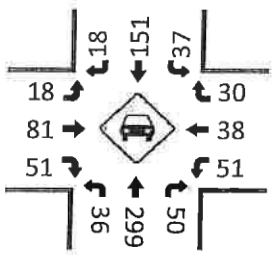
Total Vehicles (PM)



Pedestrians (Crosswalks)



Total Vehicles (AM)



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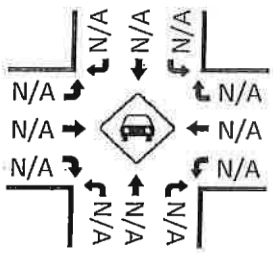

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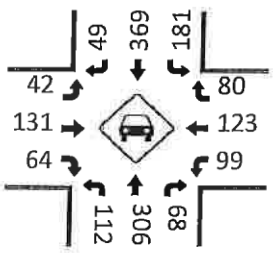


Prepared by National Data & Surveying Services

China Lake Blvd & Rader Ave

Peak Hour Turning Movement Count

ID: 18-02108-002
City: Ridgecrest

Day: Thursday
Date: 10/18/2018

PEAK HOURS

AM: 07:15 AM - 08:15 AM
NOON: NONE
PM: 04:45 PM - 05:45 PM

COUNT PERIODS

AM: 07:00 AM - 09:00 AM
NOON: NONE
PM: 04:00 PM - 06:00 PM

China Lake Blvd — SOUTHBOUND

AM	17	188	27	1	361	AM
NOON	0	0	0	0	0	NOON
PM	37	516	40	2	438	PM

0 3 1 0

Rader Ave — EASTBOUND

AM	NOON	PM	
40	0	80	⇦
0	0	0	0
9	0	47	0
1	0	9	1
6	0	26	0

AM NOON PM

CONTROL

Signalized

TEV	641 AM	0 NOON	1179 PM
PHF	0.90		0.90

Rader Ave — WESTBOUND

PM	NOON	AM	
0	0	0	0
33	0	13	0
8	0	9	1
31	0	25	0
84	0	32	⇨

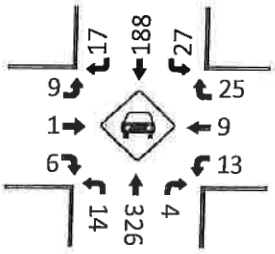
PM NOON AM

0 1 3 0

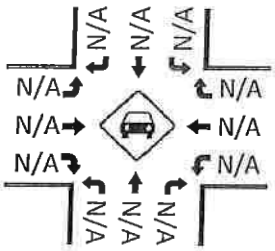
China Lake Blvd — NORTHBOUND

PM	577	2	35	358	35	PM
NOON	0	0	0	0	0	NOON
AM	208	1	14	326	4	AM

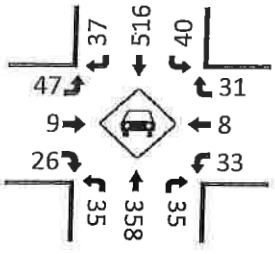
Total Vehicles (AM)



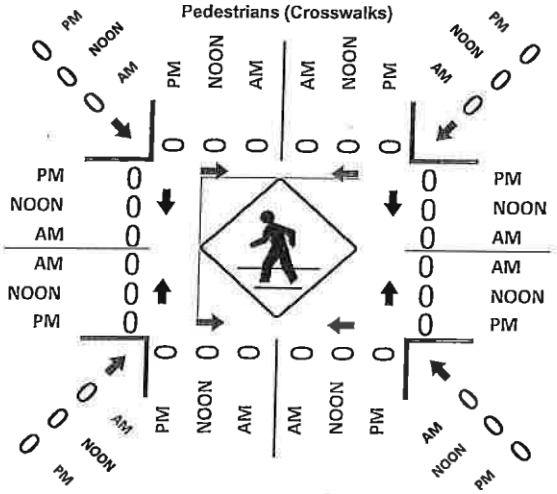
Total Vehicles (Noon)



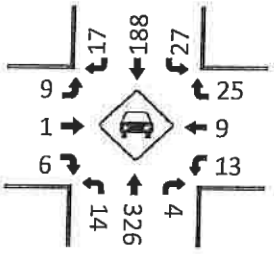
Total Vehicles (PM)



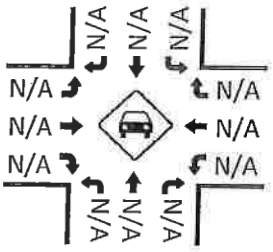
Pedestrians (Crosswalks)



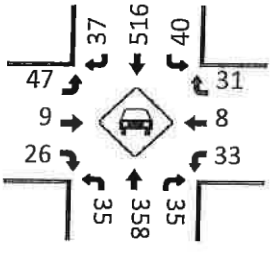
Total Vehicles (AM)



Total Vehicles (Noon)



Total Vehicles (PM)



TRIP GENERATION ESTIMATES

Associated Transportation Engineers
Trip Generation Worksheet

THE OASIS AT CHINA LAKE PROJECT

Land Use	Size	ADT		AM PEAK HOUR						PM PEAK HOUR					
		Rate	Trips	Rate	Trips	In %	Trips	Out %	Trips	Rate	Trips	In %	Trips	Out %	Trips
Shopping Center Rates															
1. Shopping Center(a)	160,510 SF	37.75	6,059	0.94	151	62%	94	38%	57	3.81	612	48%	294	52%	318
Shopping Center Rates + Cinima Rates + Medical Office Rates															
1. Shopping Center(a)	89,810 SF	37.75	3,390	0.94	84	62%	52	38%	32	3.81	342	48%	164	52%	178
2. Cinemas(b)	10 Screens	15.00	150	0.00	0	50%	0	50%	0	13.73	137	51%	70	49%	67
3. Medical Offices(c)	24,000 SF	34.80	835	2.78	67	78%	52	22%	15	3.46	83	28%	23	72%	60
Totals			**4,375**		**151**		**104**		**47**		**562**		**257**		**305**

(a) Trip generation based on ITE rates for Shopping Centers (ITE Code 820).
(b) Trip generation based on ITE rates for Multiplex Movie Theater (ITE Code 445). No AM trip rates provided since theatres are not open during 7-9 AM peak period.
(c) Trip generation based on ITE rates for Medical-Dental Office Building (ITE Code 720).

TRIP TYPE BREAKDOWN

	AM In	AM Out	PM In	PM Out
Pass-By Trips (30%)	25	25	92	92
Primary Trips (70%)	69	32	202	226
Totals (Check)	**94**	**57**	**294**	**318**

Associated Transportation Engineers
Trip Generation Worksheet

APPROVED PROJECTS - 899 SOUTH CHINA LAKE BOULEVARD

Land Use	Size	Multi-Trip Factor	ADT		AM PEAK HOUR						PM PEAK HOUR					
			Rate	Trips	Rate	Trips	In %	Trips	Out %	Trips	Rate	Trips	In %	Trips	Out %	Trips
Parcel 1 Fast Food(a)	2,300 SF	0.90	470.95	975	40.19	83	51%	42	49%	41	32.67	68	52%	35	48%	33
Parcel 2 Retail(b)	4,700 SF	0.90	37.75	160	0.94	4	62%	2	38%	2	3.81	16	48%	8	52%	8
Parcel 3 Fast Food(a)	3,100 SF	0.90	470.95	1,314	40.19	112	51%	57	49%	55	32.67	91	52%	47	48%	44
Parcel 4 Fast Food(a)	3,800 SF	0.90	470.95	1,611	40.19	137	51%	70	49%	67	32.67	112	52%	58	48%	54
Parcel 5 Retail(b)	16,800 SF	0.90	37.75	571	0.94	14	62%	9	38%	5	3.81	58	48%	28	52%	30
Totals:	30,700 SF			4,631		350		180		170		345		176		169

(a) Trip generation based on ITE rates for Fast-Food Restaurant with Drive-Through Window (ITE #934).
(b) Trip generation based on ITE rates for Shopping Center (ITE #820).

INTERSECTION LEVEL OF SERVICE WORKSHEETS

Reference 1 – South China Lake Boulevard/Rader Avenue
Reference 2 – South China Lake Boulevard/Bowman Road

EXISTING AM PEAK HOUR
1: CHINA LAKE BLVD & RADAR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	1	6	13	9	25	15	326	4	28	188	17
Future Volume (veh/h)	9	1	6	13	9	25	15	326	4	28	188	17
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	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	10	1	7	14	10	27	16	354	4	30	204	18
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	199	10	42	146	22	57	36	1990	22	63	1878	164
Arrive On Green	0.07	0.07	0.07	0.07	0.07	0.07	0.02	0.56	0.56	0.04	0.57	0.57
Sat Flow, veh/h	845	141	628	435	322	852	1774	3585	40	1774	3293	288
Grp Volume(v), veh/h	18	0	0	51	0	0	16	175	183	30	109	113
Grp Sat Flow(s),veh/h/ln	1615	0	0	1609	0	0	1774	1770	1856	1774	1770	1812
Q Serve(g_s), s	0.0	0.0	0.0	0.8	0.0	0.0	0.4	1.9	1.9	0.7	1.1	1.1
Cycle Q Clear(g_c), s	0.4	0.0	0.0	1.2	0.0	0.0	0.4	1.9	1.9	0.7	1.1	1.1
Prop In Lane	0.56		0.39	0.27		0.53	1.00		0.02	1.00		0.16
Lane Grp Cap(c), veh/h	251	0	0	224	0	0	36	982	1030	63	1009	1033
V/C Ratio(X)	0.07	0.00	0.00	0.23	0.00	0.00	0.44	0.18	0.18	0.48	0.11	0.11
Avail Cap(c_a), veh/h	839	0	0	856	0	0	247	982	1030	292	1009	1033
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	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	0.0	0.0	17.7	0.0	0.0	19.1	4.3	4.3	18.7	3.9	3.9
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.5	0.0	0.0	8.3	0.4	0.4	5.5	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(50%),veh/ln	0.2	0.0	0.0	0.6	0.0	0.0	0.3	1.0	1.1	0.4	0.6	0.6
LnGrp Delay(d),s/veh	17.5	0.0	0.0	18.2	0.0	0.0	27.4	4.7	4.7	24.2	4.1	4.1
LnGrp LOS	B			B			C	A	A	C	A	A
Approach Vol, veh/h		18			51			374			252	
Approach Delay, s/veh		17.5			18.2			5.7			6.5	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.9	26.4		7.2	5.3	27.0		7.2
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.5	21.5		18.5	5.5	22.5		18.5
Max Q Clear Time (g_c+I1), s	2.7	3.9		2.4	2.4	3.1		3.2
Green Ext Time (p_c), s	0.0	2.9		0.2	0.0	3.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	7.2
HCM 2010 LOS	A

FUTURE (2022) AM PEAK HOUR
1: CHINA LAKE BLVD & RADAR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	1	7	14	10	27	16	352	4	30	203	18
Future Volume (veh/h)	10	1	7	14	10	27	16	352	4	30	203	18
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	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	1	8	15	11	29	17	383	4	33	221	20
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	198	11	46	145	24	60	38	1975	21	68	1864	167
Arrive On Green	0.07	0.07	0.07	0.07	0.07	0.07	0.02	0.55	0.55	0.04	0.57	0.57
Sat Flow, veh/h	807	162	646	417	343	848	1774	3588	37	1774	3286	295
Grp Volume(v), veh/h	20	0	0	55	0	0	17	189	198	33	118	123
Grp Sat Flow(s),veh/h/ln	1615	0	0	1608	0	0	1774	1770	1856	1774	1770	1811
Q Serve(g_s), s	0.0	0.0	0.0	0.9	0.0	0.0	0.4	2.1	2.1	0.7	1.2	1.2
Cycle Q Clear(g_c), s	0.4	0.0	0.0	1.3	0.0	0.0	0.4	2.1	2.1	0.7	1.2	1.2
Prop In Lane	0.55		0.40	0.27		0.53	1.00		0.02	1.00		0.16
Lane Grp Cap(c), veh/h	255	0	0	229	0	0	38	974	1022	68	1004	1027
V/C Ratio(X)	0.08	0.00	0.00	0.24	0.00	0.00	0.45	0.19	0.19	0.48	0.12	0.12
Avail Cap(c_a), veh/h	834	0	0	852	0	0	246	974	1022	291	1004	1027
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	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	0.0	0.0	17.7	0.0	0.0	19.2	4.5	4.5	18.7	4.0	4.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.5	0.0	0.0	7.9	0.4	0.4	5.2	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(50%),veh/ln	0.2	0.0	0.0	0.6	0.0	0.0	0.3	1.1	1.2	0.4	0.7	0.7
LnGrp Delay(d),s/veh	17.4	0.0	0.0	18.2	0.0	0.0	27.1	4.9	4.9	23.9	4.2	4.2
LnGrp LOS	B			B			C	A	A	C	A	A
Approach Vol, veh/h		20			55			404			274	
Approach Delay, s/veh		17.4			18.2			5.9			6.6	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	26.3		7.3	5.4	27.0		7.3
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.5	21.5		18.5	5.5	22.5		18.5
Max Q Clear Time (g_c+I1), s	2.7	4.1		2.4	2.4	3.2		3.3
Green Ext Time (p_c), s	0.0	3.2		0.3	0.0	3.3		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	7.3
HCM 2010 LOS	A

FUTURE (2022) + PROJECT AM PEAK HOUR
1: CHINA LAKE BLVD & RADAR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	2	9	14	11	28	17	365	4	31	233	18
Future Volume (veh/h)	10	2	9	14	11	28	17	365	4	31	233	18
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	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	2	10	15	12	30	18	397	4	34	253	20
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	184	17	52	143	28	63	40	1967	20	70	1878	147
Arrive On Green	0.07	0.07	0.07	0.07	0.07	0.07	0.02	0.55	0.55	0.04	0.56	0.56
Sat Flow, veh/h	682	236	707	390	373	848	1774	3590	36	1774	3325	261
Grp Volume(v), veh/h	23	0	0	57	0	0	18	196	205	34	134	139
Grp Sat Flow(s),veh/h/ln	1625	0	0	1611	0	0	1774	1770	1856	1774	1770	1817
Q Serve(g_s), s	0.0	0.0	0.0	0.8	0.0	0.0	0.4	2.2	2.2	0.7	1.4	1.4
Cycle Q Clear(g_c), s	0.5	0.0	0.0	1.3	0.0	0.0	0.4	2.2	2.2	0.7	1.4	1.4
Prop In Lane	0.48		0.43	0.26		0.53	1.00		0.02	1.00		0.14
Lane Grp Cap(c), veh/h	253	0	0	233	0	0	40	970	1017	70	999	1026
V/C Ratio(X)	0.09	0.00	0.00	0.24	0.00	0.00	0.45	0.20	0.20	0.49	0.13	0.14
Avail Cap(c_a), veh/h	834	0	0	849	0	0	245	970	1017	289	999	1026
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	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.3	0.0	0.0	17.7	0.0	0.0	19.2	4.6	4.6	18.7	4.1	4.1
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.5	0.0	0.0	7.6	0.5	0.4	5.2	0.3	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(50%),veh/ln	0.2	0.0	0.0	0.6	0.0	0.0	0.3	1.2	1.3	0.5	0.7	0.8
LnGrp Delay(d),s/veh	17.5	0.0	0.0	18.2	0.0	0.0	26.8	5.0	5.0	23.9	4.4	4.4
LnGrp LOS	B			B			C	A	A	C	A	A
Approach Vol, veh/h		23			57			419			307	
Approach Delay, s/veh		17.5			18.2			6.0			6.5	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.1	26.3		7.4	5.4	27.0		7.4
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.5	21.5		18.5	5.5	22.5		18.5
Max Q Clear Time (g_c+I1), s	2.7	4.2		2.5	2.4	3.4		3.3
Green Ext Time (p_c), s	0.0	3.4		0.3	0.0	3.5		0.3

Intersection Summary		
HCM 2010 Ctrl Delay		7.4
HCM 2010 LOS		A

CUMULATIVE AM PEAK HOUR
1: CHINA LAKE BLVD & RADAR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	1	13	20	10	27	22	406	10	30	260	18
Future Volume (veh/h)	10	1	13	20	10	27	22	406	10	30	260	18
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	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	1	14	22	11	29	24	441	11	33	283	20
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	172	14	68	162	25	58	52	1938	48	68	1873	132
Arrive On Green	0.08	0.08	0.08	0.08	0.08	0.08	0.03	0.55	0.55	0.04	0.56	0.56
Sat Flow, veh/h	576	175	875	528	321	745	1774	3529	88	1774	3355	236
Grp Volume(v), veh/h	26	0	0	62	0	0	24	221	231	33	149	154
Grp Sat Flow(s),veh/h/ln	1626	0	0	1594	0	0	1774	1770	1847	1774	1770	1821
Q Serve(g_s), s	0.0	0.0	0.0	0.9	0.0	0.0	0.5	2.6	2.6	0.7	1.6	1.7
Cycle Q Clear(g_c), s	0.6	0.0	0.0	1.5	0.0	0.0	0.5	2.6	2.6	0.7	1.6	1.7
Prop In Lane	0.42		0.54	0.35		0.47	1.00		0.05	1.00		0.13
Lane Grp Cap(c), veh/h	253	0	0	245	0	0	52	972	1014	68	988	1016
V/C Ratio(X)	0.10	0.00	0.00	0.25	0.00	0.00	0.46	0.23	0.23	0.49	0.15	0.15
Avail Cap(c_a), veh/h	821	0	0	835	0	0	242	972	1014	286	988	1016
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	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.4	0.0	0.0	17.8	0.0	0.0	19.3	4.7	4.7	19.0	4.3	4.3
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.5	0.0	0.0	6.3	0.5	0.5	5.3	0.3	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(50%),veh/ln	0.3	0.0	0.0	0.7	0.0	0.0	0.4	1.4	1.4	0.5	0.9	0.9
LnGrp Delay(d),s/veh	17.6	0.0	0.0	18.3	0.0	0.0	25.6	5.2	5.2	24.3	4.6	4.6
LnGrp LOS	B			B			C	A	A	C	A	A
Approach Vol, veh/h		26			62			476			336	
Approach Delay, s/veh		17.6			18.3			6.2			6.5	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	26.6		7.6	5.7	27.0		7.6
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.5	21.5		18.5	5.5	22.5		18.5
Max Q Clear Time (g_c+I1), s	2.7	4.6		2.6	2.5	3.7		3.5
Green Ext Time (p_c), s	0.0	3.8		0.3	0.0	4.0		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	7.5
HCM 2010 LOS	A

CUMULATIVE + PROJECT AM PEAK HOUR
1: CHINA LAKE BLVD & RADAR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑↑↱		↰	↑↑↱	
Traffic Volume (veh/h)	10	2	15	20	11	28	23	419	10	31	290	18
Future Volume (veh/h)	10	2	15	20	11	28	23	419	10	31	290	18
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	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	11	2	16	22	12	30	25	455	11	34	315	20
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	163	18	72	160	28	60	54	1932	47	70	1880	119
Arrive On Green	0.08	0.08	0.08	0.08	0.08	0.08	0.03	0.55	0.55	0.04	0.56	0.56
Sat Flow, veh/h	505	226	900	500	349	749	1774	3532	85	1774	3381	214
Grp Volume(v), veh/h	29	0	0	64	0	0	25	228	238	34	164	171
Grp Sat Flow(s),veh/h/ln	1631	0	0	1598	0	0	1774	1770	1848	1774	1770	1825
Q Serve(g_s), s	0.0	0.0	0.0	0.9	0.0	0.0	0.6	2.7	2.7	0.8	1.8	1.9
Cycle Q Clear(g_c), s	0.6	0.0	0.0	1.5	0.0	0.0	0.6	2.7	2.7	0.8	1.8	1.9
Prop In Lane	0.38		0.55	0.34		0.47	1.00		0.05	1.00		0.12
Lane Grp Cap(c), veh/h	253	0	0	248	0	0	54	968	1011	70	984	1015
V/C Ratio(X)	0.11	0.00	0.00	0.26	0.00	0.00	0.47	0.24	0.24	0.49	0.17	0.17
Avail Cap(c_a), veh/h	821	0	0	833	0	0	241	968	1011	285	984	1015
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	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.4	0.0	0.0	17.8	0.0	0.0	19.3	4.8	4.8	19.0	4.4	4.4
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.5	0.0	0.0	6.2	0.6	0.5	5.2	0.4	0.4
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	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.0	0.7	0.0	0.0	0.4	1.4	1.5	0.5	1.0	1.0
LnGrp Delay(d),s/veh	17.6	0.0	0.0	18.3	0.0	0.0	25.5	5.3	5.3	24.3	4.8	4.8
LnGrp LOS	B			B			C	A	A	C	A	A
Approach Vol, veh/h		29			64			491			369	
Approach Delay, s/veh		17.6			18.3			6.3			6.6	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.1	26.6		7.7	5.7	27.0		7.7
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.5	21.5		18.5	5.5	22.5		18.5
Max Q Clear Time (g_c+I1), s	2.8	4.7		2.6	2.6	3.9		3.5
Green Ext Time (p_c), s	0.0	4.1		0.4	0.0	4.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	7.6
HCM 2010 LOS	A

EXISTING PM PEAK HOUR
1: CHINA LAKE BLVD & RADAR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	9	26	33	8	31	37	358	35	42	516	37
Future Volume (veh/h)	47	9	26	33	8	31	37	358	35	42	516	37
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	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	51	10	28	36	9	34	40	389	38	46	561	40
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	224	26	52	192	31	73	79	1696	165	88	1761	125
Arrive On Green	0.10	0.10	0.10	0.10	0.10	0.10	0.04	0.52	0.52	0.05	0.53	0.53
Sat Flow, veh/h	844	254	504	633	299	704	1774	3260	317	1774	3352	239
Grp Volume(v), veh/h	89	0	0	79	0	0	40	210	217	46	296	305
Grp Sat Flow(s),veh/h/ln	1602	0	0	1635	0	0	1774	1770	1807	1774	1770	1821
Q Serve(g_s), s	0.3	0.0	0.0	0.0	0.0	0.0	0.9	2.7	2.7	1.0	3.9	4.0
Cycle Q Clear(g_c), s	2.0	0.0	0.0	1.7	0.0	0.0	0.9	2.7	2.7	1.0	3.9	4.0
Prop In Lane	0.57		0.31	0.46		0.43	1.00		0.18	1.00		0.13
Lane Grp Cap(c), veh/h	303	0	0	296	0	0	79	921	940	88	930	956
V/C Ratio(X)	0.29	0.00	0.00	0.27	0.00	0.00	0.51	0.23	0.23	0.52	0.32	0.32
Avail Cap(c_a), veh/h	808	0	0	812	0	0	279	921	940	279	930	956
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	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.5	0.0	0.0	17.4	0.0	0.0	19.3	5.4	5.4	19.2	5.6	5.6
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.5	0.0	0.0	4.9	0.6	0.6	4.7	0.9	0.9
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	1.0	0.0	0.0	0.9	0.0	0.0	0.6	1.4	1.5	0.6	2.1	2.2
LnGrp Delay(d),s/veh	18.0	0.0	0.0	17.9	0.0	0.0	24.2	6.0	6.0	23.9	6.5	6.5
LnGrp LOS	B			B			C	A	A	C	A	A
Approach Vol, veh/h		89			79			467			647	
Approach Delay, s/veh		18.0			17.9			7.5			7.7	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.6	26.0		8.8	6.3	26.2		8.8
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.5	21.5		18.5	6.5	21.5		18.5
Max Q Clear Time (g_c+I1), s	3.0	4.7		4.0	2.9	6.0		3.7
Green Ext Time (p_c), s	0.0	5.4		0.8	0.0	5.3		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	9.0
HCM 2010 LOS	A

FUTURE (2022) PM PEAK HOUR
1: CHINA LAKE BLVD & RADAR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	10	28	36	9	33	40	387	38	45	557	40
Future Volume (veh/h)	51	10	28	36	9	33	40	387	38	45	557	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	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	55	11	30	39	10	36	43	421	41	49	605	43
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	226	27	53	194	32	73	84	1688	164	92	1752	124
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.05	0.52	0.52	0.05	0.52	0.52
Sat Flow, veh/h	853	253	503	645	303	696	1774	3260	316	1774	3352	238
Grp Volume(v), veh/h	96	0	0	85	0	0	43	228	234	49	319	329
Grp Sat Flow(s),veh/h/ln	1609	0	0	1644	0	0	1774	1770	1807	1774	1770	1821
Q Serve(g_s), s	0.3	0.0	0.0	0.0	0.0	0.0	1.0	3.0	3.0	1.1	4.4	4.4
Cycle Q Clear(g_c), s	2.1	0.0	0.0	1.8	0.0	0.0	1.0	3.0	3.0	1.1	4.4	4.4
Prop In Lane	0.57		0.31	0.46		0.42	1.00		0.17	1.00		0.13
Lane Grp Cap(c), veh/h	306	0	0	300	0	0	84	916	935	92	925	951
V/C Ratio(X)	0.31	0.00	0.00	0.28	0.00	0.00	0.51	0.25	0.25	0.53	0.34	0.35
Avail Cap(c_a), veh/h	804	0	0	809	0	0	278	916	935	278	925	951
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	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.6	0.0	0.0	17.5	0.0	0.0	19.3	5.5	5.6	19.2	5.8	5.8
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.5	0.0	0.0	4.8	0.6	0.6	4.7	1.0	1.0
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	1.1	0.0	0.0	1.0	0.0	0.0	0.6	1.6	1.6	0.7	2.4	2.5
LnGrp Delay(d),s/veh	18.1	0.0	0.0	18.0	0.0	0.0	24.2	6.2	6.2	23.9	6.8	6.8
LnGrp LOS	B			B			C	A	A	C	A	A
Approach Vol, veh/h		96			85			505			697	
Approach Delay, s/veh		18.1			18.0			7.7			8.0	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.7	26.0		8.9	6.5	26.2		8.9
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.5	21.5		18.5	6.5	21.5		18.5
Max Q Clear Time (g_c+I1), s	3.1	5.0		4.1	3.0	6.4		3.8
Green Ext Time (p_c), s	0.0	5.9		0.8	0.0	5.6		0.9

Intersection Summary		
HCM 2010 Ctrl Delay		9.2
HCM 2010 LOS		A

FUTURE (2022) + PROJECT PM PEAK HOUR
1: CHINA LAKE BLVD & RADAR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	12	36	36	11	39	49	483	38	50	643	40
Future Volume (veh/h)	51	12	36	36	11	39	49	483	38	50	643	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	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	55	13	39	39	12	42	53	525	41	54	699	43
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	213	34	68	186	40	86	97	1695	132	99	1728	106
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.05	0.51	0.51	0.06	0.51	0.51
Sat Flow, veh/h	730	295	588	559	343	743	1774	3327	259	1774	3387	208
Grp Volume(v), veh/h	107	0	0	93	0	0	53	279	287	54	365	377
Grp Sat Flow(s),veh/h/ln	1612	0	0	1645	0	0	1774	1770	1817	1774	1770	1826
Q Serve(g_s), s	0.4	0.0	0.0	0.0	0.0	0.0	1.2	3.9	3.9	1.3	5.4	5.4
Cycle Q Clear(g_c), s	2.4	0.0	0.0	2.1	0.0	0.0	1.2	3.9	3.9	1.3	5.4	5.4
Prop In Lane	0.51		0.36	0.42		0.45	1.00		0.14	1.00		0.11
Lane Grp Cap(c), veh/h	315	0	0	311	0	0	97	901	925	99	903	931
V/C Ratio(X)	0.34	0.00	0.00	0.30	0.00	0.00	0.54	0.31	0.31	0.55	0.40	0.40
Avail Cap(c_a), veh/h	791	0	0	796	0	0	273	901	925	273	903	931
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	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.6	0.0	0.0	17.4	0.0	0.0	19.4	6.0	6.0	19.4	6.4	6.4
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.5	0.0	0.0	4.7	0.9	0.9	4.7	1.3	1.3
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(50%),veh/ln	1.2	0.0	0.0	1.1	0.0	0.0	0.7	2.1	2.1	0.7	2.9	3.0
LnGrp Delay(d),s/veh	18.2	0.0	0.0	18.0	0.0	0.0	24.1	6.9	6.9	24.1	7.7	7.7
LnGrp LOS	B			B			C	A	A	C	A	A
Approach Vol, veh/h		107			93			619			796	
Approach Delay, s/veh		18.2			18.0			8.4			8.8	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.8	26.0		9.4	6.8	26.0		9.4
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.5	21.5		18.5	6.5	21.5		18.5
Max Q Clear Time (g_c+I1), s	3.3	5.9		4.4	3.2	7.4		4.1
Green Ext Time (p_c), s	0.0	6.8		1.0	0.0	6.5		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	9.8
HCM 2010 LOS	A

CUMULATIVE PM PEAK HOUR
1: CHINA LAKE BLVD & RADAR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	10	34	42	9	33	46	440	44	45	612	40
Future Volume (veh/h)	51	10	34	42	9	33	46	440	44	45	612	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	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	55	11	37	46	10	36	50	478	48	49	665	43
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	218	29	65	208	33	72	93	1670	167	92	1732	112
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.05	0.51	0.51	0.05	0.51	0.51
Sat Flow, veh/h	771	263	580	702	294	640	1774	3250	325	1774	3376	218
Grp Volume(v), veh/h	103	0	0	92	0	0	50	260	266	49	348	360
Grp Sat Flow(s),veh/h/ln	1614	0	0	1637	0	0	1774	1770	1805	1774	1770	1824
Q Serve(g_s), s	0.3	0.0	0.0	0.0	0.0	0.0	1.2	3.5	3.5	1.1	5.0	5.0
Cycle Q Clear(g_c), s	2.3	0.0	0.0	2.0	0.0	0.0	1.2	3.5	3.5	1.1	5.0	5.0
Prop In Lane	0.53		0.36	0.50		0.39	1.00		0.18	1.00		0.12
Lane Grp Cap(c), veh/h	313	0	0	312	0	0	93	909	928	92	908	936
V/C Ratio(X)	0.33	0.00	0.00	0.29	0.00	0.00	0.54	0.29	0.29	0.53	0.38	0.38
Avail Cap(c_a), veh/h	798	0	0	800	0	0	275	909	928	275	908	936
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	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.5	0.0	0.0	17.4	0.0	0.0	19.3	5.8	5.8	19.4	6.2	6.2
Incr Delay (d2), s/veh	0.6	0.0	0.0	0.5	0.0	0.0	4.7	0.8	0.8	4.7	1.2	1.2
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(50%),veh/ln	1.2	0.0	0.0	1.0	0.0	0.0	0.7	1.9	1.9	0.7	2.7	2.8
LnGrp Delay(d),s/veh	18.1	0.0	0.0	17.9	0.0	0.0	24.0	6.6	6.6	24.1	7.4	7.4
LnGrp LOS	B			B			C	A	A	C	A	A
Approach Vol, veh/h		103			92			576			757	
Approach Delay, s/veh		18.1			17.9			8.1			8.5	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.7	26.0		9.2	6.7	26.0		9.2
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.5	21.5		18.5	6.5	21.5		18.5
Max Q Clear Time (g_c+I1), s	3.1	5.5		4.3	3.2	7.0		4.0
Green Ext Time (p_c), s	0.0	6.5		0.9	0.0	6.2		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	9.6
HCM 2010 LOS	A

CUMULATIVE + PROJECT PM PEAK HOUR
1: CHINA LAKE BLVD & RADAR

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↰	↑↑↱		↰	↑↑↱	
Traffic Volume (veh/h)	51	12	42	42	11	39	55	536	44	50	698	40
Future Volume (veh/h)	51	12	42	42	11	39	55	536	44	50	698	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	1900	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	55	13	46	46	12	42	60	583	48	54	759	43
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	205	36	79	197	41	84	106	1687	139	98	1720	97
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.06	0.51	0.51	0.06	0.51	0.51
Sat Flow, veh/h	667	297	652	617	334	689	1774	3312	272	1774	3405	193
Grp Volume(v), veh/h	114	0	0	100	0	0	60	311	320	54	394	408
Grp Sat Flow(s),veh/h/ln	1616	0	0	1640	0	0	1774	1770	1815	1774	1770	1829
Q Serve(g_s), s	0.4	0.0	0.0	0.0	0.0	0.0	1.4	4.5	4.5	1.3	6.1	6.1
Cycle Q Clear(g_c), s	2.6	0.0	0.0	2.2	0.0	0.0	1.4	4.5	4.5	1.3	6.1	6.1
Prop In Lane	0.48		0.40	0.46		0.42	1.00		0.15	1.00		0.11
Lane Grp Cap(c), veh/h	320	0	0	321	0	0	106	901	924	98	894	924
V/C Ratio(X)	0.36	0.00	0.00	0.31	0.00	0.00	0.57	0.35	0.35	0.55	0.44	0.44
Avail Cap(c_a), veh/h	778	0	0	780	0	0	268	901	924	252	894	924
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	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.7	0.0	0.0	17.6	0.0	0.0	19.7	6.3	6.3	19.8	6.8	6.8
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.5	0.0	0.0	4.7	1.0	1.0	4.8	1.6	1.5
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	1.3	0.0	0.0	1.1	0.0	0.0	0.8	2.4	2.5	0.7	3.3	3.5
LnGrp Delay(d),s/veh	18.4	0.0	0.0	18.1	0.0	0.0	24.4	7.3	7.3	24.5	8.4	8.3
LnGrp LOS	B			B			C	A	A	C	A	A
Approach Vol, veh/h		114			100			691			856	
Approach Delay, s/veh		18.4			18.1			8.8			9.4	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.9	26.4		9.7	7.1	26.2		9.7
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	6.1	21.9		18.5	6.5	21.5		18.5
Max Q Clear Time (g_c+I1), s	3.3	6.5		4.6	3.4	8.1		4.2
Green Ext Time (p_c), s	0.0	7.5		1.0	0.0	6.9		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	10.2
HCM 2010 LOS	B

EXISTING AM PEAK HOUR
2: CHINA LAKE BLVD & BOWMAN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	81	51	51	38	30	41	299	50	39	151	18
Future Volume (veh/h)	18	81	51	51	38	30	41	299	50	39	151	18
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	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	20	88	55	55	41	33	45	325	54	42	164	20
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	44	225	131	189	265	191	85	1416	633	80	1265	152
Arrive On Green	0.02	0.10	0.10	0.06	0.13	0.13	0.05	0.40	0.40	0.05	0.40	0.40
Sat Flow, veh/h	1774	2158	1253	3442	1964	1418	1774	3539	1583	1774	3182	383
Grp Volume(v), veh/h	20	71	72	55	36	38	45	325	54	42	90	94
Grp Sat Flow(s),veh/h/ln	1774	1770	1642	1721	1770	1613	1774	1770	1583	1774	1770	1795
Q Serve(g_s), s	0.5	1.7	1.9	0.7	0.8	0.9	1.1	2.8	1.0	1.1	1.5	1.5
Cycle Q Clear(g_c), s	0.5	1.7	1.9	0.7	0.8	0.9	1.1	2.8	1.0	1.1	1.5	1.5
Prop In Lane	1.00		0.76	1.00		0.88	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	44	185	171	189	239	217	85	1416	633	80	704	714
V/C Ratio(X)	0.46	0.38	0.42	0.29	0.15	0.17	0.53	0.23	0.09	0.52	0.13	0.13
Avail Cap(c_a), veh/h	195	700	649	378	700	638	230	1416	633	226	704	714
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	21.9	19.0	19.1	20.7	17.4	17.4	21.2	9.0	8.5	21.3	8.7	8.7
Incr Delay (d2), s/veh	7.4	1.3	1.6	0.8	0.3	0.4	5.1	0.4	0.3	5.2	0.4	0.4
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	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.9	0.9	0.4	0.4	0.4	0.7	1.4	0.5	0.6	0.8	0.8
LnGrp Delay(d),s/veh	29.3	20.3	20.7	21.5	17.7	17.8	26.3	9.4	8.7	26.4	9.1	9.1
LnGrp LOS	C	C	C	C	B	B	C	A	A	C	A	A
Approach Vol, veh/h		163			129			424			226	
Approach Delay, s/veh		21.6			19.3			11.1			12.3	
Approach LOS		C			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	6.6	22.7	7.0	9.3	6.7	22.6	5.6	10.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.8	18.2	5.0	18.0	5.9	18.1	5.0	18.0
Max Q Clear Time (g_c+I1), s	3.1	4.8	2.7	3.9	3.1	3.5	2.5	2.9
Green Ext Time (p_c), s	0.0	2.8	0.0	1.0	0.0	2.9	0.0	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.3
HCM 2010 LOS	B

FUTURE (2022) AM PEAK HOUR
2: CHINA LAKE BLVD & BOWMAN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	87	54	55	41	32	44	321	54	42	163	19
Future Volume (veh/h)	19	87	54	55	41	32	44	321	54	42	163	19
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	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	21	95	59	60	45	35	48	349	59	46	177	21
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	45	231	133	201	277	194	88	1395	624	86	1253	147
Arrive On Green	0.03	0.11	0.11	0.06	0.14	0.14	0.05	0.39	0.39	0.05	0.39	0.39
Sat Flow, veh/h	1774	2162	1250	3442	1991	1395	1774	3539	1583	1774	3192	374
Grp Volume(v), veh/h	21	77	77	60	39	41	48	349	59	46	97	101
Grp Sat Flow(s),veh/h/ln	1774	1770	1642	1721	1770	1617	1774	1770	1583	1774	1770	1797
Q Serve(g_s), s	0.5	1.9	2.0	0.8	0.9	1.0	1.2	3.0	1.1	1.2	1.6	1.7
Cycle Q Clear(g_c), s	0.5	1.9	2.0	0.8	0.9	1.0	1.2	3.0	1.1	1.2	1.6	1.7
Prop In Lane	1.00		0.76	1.00		0.86	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	45	189	175	201	247	225	88	1395	624	86	695	705
V/C Ratio(X)	0.46	0.41	0.44	0.30	0.16	0.18	0.54	0.25	0.09	0.54	0.14	0.14
Avail Cap(c_a), veh/h	193	695	645	375	695	635	232	1395	624	232	695	705
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	22.0	19.1	19.2	20.7	17.4	17.4	21.3	9.3	8.7	21.3	8.9	9.0
Incr Delay (d2), s/veh	7.2	1.4	1.7	0.8	0.3	0.4	5.1	0.4	0.3	5.1	0.4	0.4
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	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.0	1.0	0.4	0.5	0.5	0.7	1.5	0.5	0.7	0.9	0.9
LnGrp Delay(d),s/veh	29.2	20.5	21.0	21.5	17.7	17.8	26.4	9.8	9.0	26.4	9.4	9.4
LnGrp LOS	C	C	C	C	B	B	C	A	A	C	A	A
Approach Vol, veh/h		175			140			456			244	
Approach Delay, s/veh		21.7			19.4			11.4			12.6	
Approach LOS		C			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	6.7	22.6	7.2	9.4	6.8	22.5	5.7	10.9
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.0	18.0	5.0	18.0	6.0	18.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	3.2	5.0	2.8	4.0	3.2	3.7	2.5	3.0
Green Ext Time (p_c), s	0.0	3.0	0.0	1.1	0.0	3.1	0.0	1.1

Intersection Summary	
HCM 2010 Ctrl Delay	14.6
HCM 2010 LOS	B

FUTURE (2022) + PROJECT AM PEAK HOUR
2: CHINA LAKE BLVD & BOWMAN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	87	54	55	41	39	44	335	54	45	169	24
Future Volume (veh/h)	30	87	54	55	41	39	44	335	54	45	169	24
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	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	33	95	59	60	45	42	48	364	59	49	184	26
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	66	233	134	200	236	195	88	1406	629	89	1243	173
Arrive On Green	0.04	0.11	0.11	0.06	0.13	0.13	0.05	0.40	0.40	0.05	0.40	0.40
Sat Flow, veh/h	1774	2162	1250	3442	1842	1522	1774	3539	1583	1774	3121	435
Grp Volume(v), veh/h	33	77	77	60	43	44	48	364	59	49	103	107
Grp Sat Flow(s),veh/h/ln	1774	1770	1642	1721	1770	1594	1774	1770	1583	1774	1770	1786
Q Serve(g_s), s	0.8	1.9	2.1	0.8	1.0	1.2	1.2	3.2	1.1	1.3	1.7	1.8
Cycle Q Clear(g_c), s	0.8	1.9	2.1	0.8	1.0	1.2	1.2	3.2	1.1	1.3	1.7	1.8
Prop In Lane	1.00		0.76	1.00		0.95	1.00		1.00	1.00		0.24
Lane Grp Cap(c), veh/h	66	190	177	200	227	204	88	1406	629	89	705	711
V/C Ratio(X)	0.50	0.40	0.44	0.30	0.19	0.22	0.54	0.26	0.09	0.55	0.15	0.15
Avail Cap(c_a), veh/h	191	684	635	370	684	616	210	1406	629	210	705	711
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	22.0	19.4	19.5	21.0	18.1	18.2	21.6	9.4	8.8	21.6	9.0	9.0
Incr Delay (d2), s/veh	5.7	1.4	1.7	0.8	0.4	0.5	5.2	0.4	0.3	5.1	0.4	0.4
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	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	1.0	1.0	0.4	0.5	0.5	0.7	1.7	0.5	0.7	0.9	0.9
LnGrp Delay(d),s/veh	27.7	20.7	21.2	21.9	18.5	18.7	26.8	9.9	9.1	26.7	9.4	9.4
LnGrp LOS	C	C	C	C	B	B	C	A	A	C	A	A
Approach Vol, veh/h		187			147			471			259	
Approach Delay, s/veh		22.1			19.9			11.5			12.7	
Approach LOS		C			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	6.8	23.0	7.2	9.5	6.8	23.0	6.2	10.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.5	18.5	5.0	18.0	5.5	18.5	5.0	18.0
Max Q Clear Time (g_c+I1), s	3.3	5.2	2.8	4.1	3.2	3.8	2.8	3.2
Green Ext Time (p_c), s	0.0	3.2	0.0	1.1	0.0	3.3	0.0	1.1

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B

CUMULATIVE AM PEAK HOUR
2: CHINA LAKE BLVD & BOWMAN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	38	87	54	55	41	45	44	346	54	120	187	37
Future Volume (veh/h)	38	87	54	55	41	45	44	346	54	120	187	37
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	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	41	95	59	60	45	49	48	376	59	130	203	40
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	78	230	133	196	212	190	87	1322	591	166	1237	239
Arrive On Green	0.04	0.11	0.11	0.06	0.12	0.12	0.05	0.37	0.37	0.09	0.42	0.42
Sat Flow, veh/h	1774	2162	1250	3442	1770	1583	1774	3539	1583	1774	2959	572
Grp Volume(v), veh/h	41	77	77	60	45	49	48	376	59	130	120	123
Grp Sat Flow(s),veh/h/ln	1774	1770	1642	1721	1770	1583	1774	1770	1583	1774	1770	1762
Q Serve(g_s), s	1.1	2.0	2.2	0.8	1.1	1.4	1.3	3.6	1.2	3.5	2.1	2.1
Cycle Q Clear(g_c), s	1.1	2.0	2.2	0.8	1.1	1.4	1.3	3.6	1.2	3.5	2.1	2.1
Prop In Lane	1.00		0.76	1.00		1.00	1.00		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	78	188	175	196	212	190	87	1322	591	166	740	736
V/C Ratio(X)	0.53	0.41	0.44	0.31	0.21	0.26	0.55	0.28	0.10	0.78	0.16	0.17
Avail Cap(c_a), veh/h	182	654	607	353	654	585	182	1322	591	211	740	736
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	22.8	20.3	20.4	22.0	19.4	19.5	22.6	10.7	9.9	21.6	8.9	8.9
Incr Delay (d2), s/veh	5.5	1.4	1.8	0.9	0.5	0.7	5.4	0.5	0.3	13.7	0.5	0.5
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	0.7	1.0	1.1	0.4	0.6	0.6	0.8	1.9	0.6	2.3	1.1	1.1
LnGrp Delay(d),s/veh	28.3	21.7	22.2	22.9	19.9	20.2	28.0	11.2	10.3	35.3	9.3	9.4
LnGrp LOS	C	C	C	C	B	C	C	B	B	D	A	A
Approach Vol, veh/h		195			154			483			373	
Approach Delay, s/veh		23.3			21.2			12.8			18.4	
Approach LOS		C			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	9.1	22.7	7.3	9.7	6.9	24.9	6.6	10.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.8	18.2	5.0	18.0	5.0	19.0	5.0	18.0
Max Q Clear Time (g_c+I1), s	5.5	5.6	2.8	4.2	3.3	4.1	3.1	3.4
Green Ext Time (p_c), s	0.0	3.3	0.0	1.1	0.0	3.6	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	17.3
HCM 2010 LOS	B

CUMULATIVE + PROJECT AM PEAK HOUR
2: CHINA LAKE BLVD & BOWMAN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	49	87	54	55	41	52	44	360	54	123	193	42
Future Volume (veh/h)	49	87	54	55	41	52	44	360	54	123	193	42
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	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	53	95	59	60	45	57	48	391	59	134	210	46
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	93	233	135	196	199	178	87	1311	587	171	1212	260
Arrive On Green	0.05	0.11	0.11	0.06	0.11	0.11	0.05	0.37	0.37	0.10	0.42	0.42
Sat Flow, veh/h	1774	2162	1250	3442	1770	1583	1774	3539	1583	1774	2900	623
Grp Volume(v), veh/h	53	77	77	60	45	57	48	391	59	134	127	129
Grp Sat Flow(s),veh/h/ln	1774	1770	1642	1721	1770	1583	1774	1770	1583	1774	1770	1753
Q Serve(g_s), s	1.4	2.0	2.2	0.8	1.1	1.6	1.3	3.8	1.2	3.6	2.2	2.3
Cycle Q Clear(g_c), s	1.4	2.0	2.2	0.8	1.1	1.6	1.3	3.8	1.2	3.6	2.2	2.3
Prop In Lane	1.00		0.76	1.00		1.00	1.00		1.00	1.00		0.36
Lane Grp Cap(c), veh/h	93	191	177	196	199	178	87	1311	587	171	739	732
V/C Ratio(X)	0.57	0.40	0.44	0.31	0.23	0.32	0.55	0.30	0.10	0.78	0.17	0.18
Avail Cap(c_a), veh/h	182	652	605	352	652	583	214	1311	587	214	739	732
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	22.6	20.3	20.4	22.1	19.8	20.0	22.7	10.9	10.1	21.6	8.9	8.9
Incr Delay (d2), s/veh	5.4	1.4	1.7	0.9	0.6	1.0	5.4	0.6	0.3	13.8	0.5	0.5
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	0.8	1.0	1.1	0.4	0.6	0.7	0.8	2.0	0.6	2.4	1.2	1.2
LnGrp Delay(d),s/veh	28.0	21.7	22.1	23.0	20.3	21.0	28.1	11.5	10.4	35.4	9.4	9.5
LnGrp LOS	C	C	C	C	C	C	C	B	B	D	A	A
Approach Vol, veh/h		207			162			498			390	
Approach Delay, s/veh		23.5			21.5			12.9			18.4	
Approach LOS		C			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	9.2	22.6	7.3	9.8	6.9	24.9	7.1	10.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.9	18.1	5.0	18.0	5.9	18.1	5.0	18.0
Max Q Clear Time (g_c+I1), s	5.6	5.8	2.8	4.2	3.3	4.3	3.4	3.6
Green Ext Time (p_c), s	0.0	3.5	0.0	1.2	0.0	3.7	0.0	1.2

Intersection Summary	
HCM 2010 Ctrl Delay	17.5
HCM 2010 LOS	B

EXISTING PM PEAK HOUR
2: CHINA LAKE BLVD & BOWMAN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	43	131	64	99	123	80	140	306	68	186	369	49
Future Volume (veh/h)	43	131	64	99	123	80	140	306	68	186	369	49
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	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	47	142	70	108	134	87	152	333	74	202	401	53
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	82	308	145	250	335	204	194	1172	524	252	1144	150
Arrive On Green	0.05	0.13	0.13	0.07	0.16	0.16	0.11	0.33	0.33	0.14	0.36	0.36
Sat Flow, veh/h	1774	2340	1098	3442	2115	1290	1774	3539	1583	1774	3146	413
Grp Volume(v), veh/h	47	106	106	108	111	110	152	333	74	202	224	230
Grp Sat Flow(s),veh/h/ln	1774	1770	1669	1721	1770	1635	1774	1770	1583	1774	1770	1790
Q Serve(g_s), s	1.4	3.1	3.3	1.7	3.1	3.4	4.7	3.9	1.8	6.2	5.2	5.2
Cycle Q Clear(g_c), s	1.4	3.1	3.3	1.7	3.1	3.4	4.7	3.9	1.8	6.2	5.2	5.2
Prop In Lane	1.00		0.66	1.00		0.79	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	82	233	220	250	280	259	194	1172	524	252	644	651
V/C Ratio(X)	0.57	0.45	0.48	0.43	0.40	0.43	0.78	0.28	0.14	0.80	0.35	0.35
Avail Cap(c_a), veh/h	159	570	538	308	570	527	289	1172	524	334	644	651
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	26.1	22.4	22.5	24.8	21.1	21.2	24.2	13.8	13.1	23.2	12.9	13.0
Incr Delay (d2), s/veh	6.1	1.4	1.6	1.2	0.9	1.1	8.0	0.6	0.6	10.0	1.5	1.5
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	0.8	1.6	1.6	0.8	1.6	1.6	2.7	2.0	0.9	3.7	2.8	2.8
LnGrp Delay(d),s/veh	32.2	23.8	24.1	26.0	22.0	22.3	32.2	14.4	13.7	33.2	14.4	14.5
LnGrp LOS	C	C	C	C	C	C	C	B	B	C	B	B
Approach Vol, veh/h		259			329			559			656	
Approach Delay, s/veh		25.4			23.4			19.1			20.2	
Approach LOS		C			C			B			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	12.4	23.0	8.6	11.9	10.6	24.8	7.1	13.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	18.5	5.0	18.0	9.1	19.9	5.0	18.0
Max Q Clear Time (g_c+I1), s	8.2	5.9	3.7	5.3	6.7	7.2	3.4	5.4
Green Ext Time (p_c), s	0.1	4.2	0.0	2.1	0.1	4.2	0.0	2.1

Intersection Summary	
HCM 2010 Ctrl Delay	21.2
HCM 2010 LOS	C

FUTURE (2022) PM PEAK HOUR
2: CHINA LAKE BLVD & BOWMAN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	141	69	107	133	86	151	330	73	201	399	53
Future Volume (veh/h)	46	141	69	107	133	86	151	330	73	201	399	53
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	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	50	153	75	116	145	93	164	359	79	218	434	58
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	85	321	150	253	345	209	208	1145	512	268	1122	149
Arrive On Green	0.05	0.14	0.14	0.07	0.16	0.16	0.12	0.32	0.32	0.15	0.36	0.36
Sat Flow, veh/h	1774	2343	1096	3442	2123	1283	1774	3539	1583	1774	3141	418
Grp Volume(v), veh/h	50	114	114	116	119	119	164	359	79	218	243	249
Grp Sat Flow(s),veh/h/ln	1774	1770	1669	1721	1770	1636	1774	1770	1583	1774	1770	1789
Q Serve(g_s), s	1.6	3.4	3.6	1.8	3.5	3.7	5.1	4.4	2.0	6.8	5.9	5.9
Cycle Q Clear(g_c), s	1.6	3.4	3.6	1.8	3.5	3.7	5.1	4.4	2.0	6.8	5.9	5.9
Prop In Lane	1.00		0.66	1.00		0.78	1.00		1.00	1.00		0.23
Lane Grp Cap(c), veh/h	85	243	229	253	288	266	208	1145	512	268	632	639
V/C Ratio(X)	0.59	0.47	0.50	0.46	0.41	0.45	0.79	0.31	0.15	0.81	0.39	0.39
Avail Cap(c_a), veh/h	155	557	526	301	557	515	295	1145	512	326	632	639
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	26.7	22.7	22.9	25.4	21.5	21.6	24.5	14.6	13.8	23.5	13.7	13.7
Incr Delay (d2), s/veh	6.3	1.4	1.7	1.3	1.0	1.2	9.0	0.7	0.6	12.4	1.8	1.8
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	0.9	1.7	1.8	0.9	1.8	1.8	3.0	2.2	1.0	4.2	3.2	3.2
LnGrp Delay(d),s/veh	33.0	24.2	24.5	26.7	22.4	22.8	33.5	15.3	14.4	35.8	15.5	15.5
LnGrp LOS	C	C	C	C	C	C	C	B	B	D	B	B
Approach Vol, veh/h		278			354			602			710	
Approach Delay, s/veh		25.9			23.9			20.1			21.7	
Approach LOS		C			C			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	13.1	23.0	8.7	12.3	11.2	24.9	7.2	13.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	18.5	5.0	18.0	9.5	19.5	5.0	18.0
Max Q Clear Time (g_c+I1), s	8.8	6.4	3.8	5.6	7.1	7.9	3.6	5.7
Green Ext Time (p_c), s	0.1	4.5	0.0	2.2	0.1	4.4	0.0	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	22.2
HCM 2010 LOS	C

FUTURE (2022) + PROJECT PM PEAK HOUR
2: CHINA LAKE BLVD & BOWMAN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	76	141	69	107	133	106	151	371	73	224	444	87
Future Volume (veh/h)	76	141	69	107	133	106	151	371	73	224	444	87
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	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	83	153	75	116	145	115	164	403	79	243	483	95
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	112	324	151	250	286	212	207	1117	500	292	1073	210
Arrive On Green	0.06	0.14	0.14	0.07	0.15	0.15	0.12	0.32	0.32	0.16	0.36	0.36
Sat Flow, veh/h	1774	2343	1096	3442	1942	1437	1774	3539	1583	1774	2953	578
Grp Volume(v), veh/h	83	114	114	116	131	129	164	403	79	243	288	290
Grp Sat Flow(s),veh/h/ln	1774	1770	1669	1721	1770	1609	1774	1770	1583	1774	1770	1761
Q Serve(g_s), s	2.7	3.5	3.7	1.9	4.0	4.3	5.2	5.1	2.1	7.7	7.2	7.3
Cycle Q Clear(g_c), s	2.7	3.5	3.7	1.9	4.0	4.3	5.2	5.1	2.1	7.7	7.2	7.3
Prop In Lane	1.00		0.66	1.00		0.89	1.00		1.00	1.00		0.33
Lane Grp Cap(c), veh/h	112	244	231	250	261	237	207	1117	500	292	643	640
V/C Ratio(X)	0.74	0.47	0.50	0.46	0.50	0.54	0.79	0.36	0.16	0.83	0.45	0.45
Avail Cap(c_a), veh/h	152	546	516	295	546	497	289	1117	500	323	643	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	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	26.8	23.1	23.2	25.9	22.9	23.0	25.0	15.4	14.4	23.6	14.1	14.1
Incr Delay (d2), s/veh	11.8	1.4	1.6	1.3	1.5	1.9	9.5	0.9	0.7	15.5	2.3	2.3
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(50%),veh/ln	1.7	1.8	1.8	0.9	2.0	2.0	3.1	2.6	1.0	5.0	3.9	3.9
LnGrp Delay(d),s/veh	38.6	24.5	24.9	27.3	24.4	25.0	34.6	16.3	15.0	39.0	16.4	16.4
LnGrp LOS	D	C	C	C	C	C	C	B	B	D	B	B
Approach Vol, veh/h		311			376			646			821	
Approach Delay, s/veh		28.4			25.5			20.8			23.1	
Approach LOS		C			C			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	14.1	22.9	8.7	12.6	11.3	25.7	8.2	13.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.6	18.4	5.0	18.0	9.5	19.5	5.0	18.0
Max Q Clear Time (g_c+I1), s	9.7	7.1	3.9	5.7	7.2	9.3	4.7	6.3
Green Ext Time (p_c), s	0.1	4.9	0.0	2.3	0.1	4.6	0.0	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	23.6
HCM 2010 LOS	C

CUMULATIVE PM PEAK HOUR
2: CHINA LAKE BLVD & BOWMAN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	141	69	107	133	98	151	355	73	278	423	71
Future Volume (veh/h)	64	141	69	107	133	98	151	355	73	278	423	71
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	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	70	153	75	116	145	107	164	386	79	302	460	77
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	318	149	247	300	207	207	1104	494	314	1131	188
Arrive On Green	0.06	0.14	0.14	0.07	0.15	0.15	0.12	0.31	0.31	0.18	0.37	0.37
Sat Flow, veh/h	1774	2343	1096	3442	2004	1384	1774	3539	1583	1774	3038	506
Grp Volume(v), veh/h	70	114	114	116	127	125	164	386	79	302	267	270
Grp Sat Flow(s),veh/h/ln	1774	1770	1669	1721	1770	1618	1774	1770	1583	1774	1770	1774
Q Serve(g_s), s	2.3	3.5	3.8	1.9	3.9	4.2	5.3	5.0	2.1	10.0	6.6	6.7
Cycle Q Clear(g_c), s	2.3	3.5	3.8	1.9	3.9	4.2	5.3	5.0	2.1	10.0	6.6	6.7
Prop In Lane	1.00		0.66	1.00		0.86	1.00		1.00	1.00		0.29
Lane Grp Cap(c), veh/h	102	240	226	247	265	242	207	1104	494	314	659	660
V/C Ratio(X)	0.68	0.47	0.50	0.47	0.48	0.52	0.79	0.35	0.16	0.96	0.41	0.41
Avail Cap(c_a), veh/h	150	537	507	290	537	491	284	1104	494	314	659	660
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	27.4	23.7	23.8	26.4	23.1	23.2	25.5	15.8	14.8	24.2	13.8	13.8
Incr Delay (d2), s/veh	7.8	1.5	1.7	1.4	1.3	1.7	10.1	0.9	0.7	40.4	1.8	1.9
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	1.3	1.8	1.8	0.9	2.0	2.0	3.2	2.5	1.0	8.4	3.5	3.6
LnGrp Delay(d),s/veh	35.2	25.1	25.5	27.8	24.4	24.9	35.5	16.6	15.5	64.6	15.6	15.7
LnGrp LOS	D	C	C	C	C	C	D	B	B	E	B	B
Approach Vol, veh/h		298			368			629			839	
Approach Delay, s/veh		27.6			25.7			21.4			33.3	
Approach LOS		C			C			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	15.0	23.0	8.8	12.5	11.4	26.6	7.9	13.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.5	18.5	5.0	18.0	9.5	19.5	5.0	18.0
Max Q Clear Time (g_c+I1), s	12.0	7.0	3.9	5.8	7.3	8.7	4.3	6.2
Green Ext Time (p_c), s	0.0	4.7	0.0	2.3	0.1	4.5	0.0	2.2

Intersection Summary	
HCM 2010 Ctrl Delay	27.7
HCM 2010 LOS	C

CUMULATIVE + PROJECT PM PEAK HOUR
2: CHINA LAKE BLVD & BOWMAN

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	94	141	69	107	133	118	151	396	73	301	468	105
Future Volume (veh/h)	94	141	69	107	133	118	151	396	73	301	468	105
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	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	102	153	75	116	145	128	164	430	79	327	509	114
Adj No. of Lanes	1	2	0	2	2	0	1	2	1	1	2	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	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	130	355	166	241	274	224	206	1062	475	331	1065	237
Arrive On Green	0.07	0.15	0.15	0.07	0.15	0.15	0.12	0.30	0.30	0.19	0.37	0.37
Sat Flow, veh/h	1774	2343	1096	3442	1849	1516	1774	3539	1583	1774	2878	641
Grp Volume(v), veh/h	102	114	114	116	138	135	164	430	79	327	312	311
Grp Sat Flow(s),veh/h/ln	1774	1770	1669	1721	1770	1595	1774	1770	1583	1774	1770	1750
Q Serve(g_s), s	3.5	3.6	3.8	2.0	4.5	4.8	5.5	6.0	2.3	11.3	8.3	8.4
Cycle Q Clear(g_c), s	3.5	3.6	3.8	2.0	4.5	4.8	5.5	6.0	2.3	11.3	8.3	8.4
Prop In Lane	1.00		0.66	1.00		0.95	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	130	268	253	241	262	236	206	1062	475	331	655	648
V/C Ratio(X)	0.78	0.42	0.45	0.48	0.53	0.57	0.79	0.40	0.17	0.99	0.48	0.48
Avail Cap(c_a), veh/h	144	517	487	279	517	466	279	1062	475	331	655	648
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	28.1	23.7	23.8	27.6	24.3	24.4	26.5	17.2	15.9	25.0	14.8	14.9
Incr Delay (d2), s/veh	22.1	1.1	1.3	1.5	1.6	2.2	10.7	1.1	0.8	46.2	2.5	2.5
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	2.5	1.8	1.9	1.0	2.3	2.3	3.3	3.1	1.1	9.7	4.5	4.5
LnGrp Delay(d),s/veh	50.2	24.8	25.1	29.1	25.9	26.6	37.2	18.3	16.7	71.2	17.3	17.4
LnGrp LOS	D	C	C	C	C	C	D	B	B	E	B	B
Approach Vol, veh/h		330			389			673			950	
Approach Delay, s/veh		32.7			27.1			22.7			35.9	
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	16.0	23.0	8.8	13.8	11.7	27.3	9.0	13.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	11.5	18.5	5.0	18.0	9.7	20.3	5.0	18.0
Max Q Clear Time (g_c+I1), s	13.3	8.0	4.0	5.8	7.5	10.4	5.5	6.8
Green Ext Time (p_c), s	0.0	5.1	0.0	2.4	0.1	4.9	0.0	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	30.2
HCM 2010 LOS	C

FUTURE (2022) + PROJECT AM PEAK HOUR
3: CHINA LAKE BLVD & MAIN DWY

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	25	25	362	42	43	213
Future Volume (Veh/h)	25	25	362	42	43	213
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	25	362	42	43	213
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			700			700
pX, platoon unblocked	1.00	1.00			1.00	
vC, conflicting volume	576	202			404	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	565	190			393	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			96	
cM capacity (veh/h)	436	816			1157	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	25	25	241	163	43	106	106
Volume Left	25	0	0	0	43	0	0
Volume Right	0	25	0	42	0	0	0
cSH	436	816	1700	1700	1157	1700	1700
Volume to Capacity	0.06	0.03	0.14	0.10	0.04	0.06	0.06
Queue Length 95th (ft)	5	2	0	0	3	0	0
Control Delay (s)	13.8	9.6	0.0	0.0	8.2	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	11.7		0.0		1.4		
Approach LOS	B						

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	28.0%	ICU Level of Service	A
Analysis Period (min)	15		

FUTURE (2022) + PROJECT AM PEAK HOUR
3: CHINA LAKE BLVD & MAIN DWY

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	25	25	362	42	43	213
Future Volume (Veh/h)	25	25	362	42	43	213
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	25	362	42	43	213
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			700			700
pX, platoon unblocked	1.00	1.00			1.00	
vC, conflicting volume	576	202			404	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	565	190			393	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			96	
cM capacity (veh/h)	436	816			1157	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	25	25	241	163	43	106	106
Volume Left	25	0	0	0	43	0	0
Volume Right	0	25	0	42	0	0	0
cSH	436	816	1700	1700	1157	1700	1700
Volume to Capacity	0.06	0.03	0.14	0.10	0.04	0.06	0.06
Queue Length 95th (ft)	5	2	0	0	3	0	0
Control Delay (s)	13.8	9.6	0.0	0.0	8.2	0.0	0.0
Lane LOS	B	A			A		
Approach Delay (s)	11.7		0.0		1.4		
Approach LOS	B						

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	28.0%	ICU Level of Service	A
Analysis Period (min)	15		