Initial Study/Mitigated Negative Declaration
Laguna Canyon Channel Improvements Project

Prepared for:

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
AB	Assembly Bill
ACOE	U.S. Army Corps of Engineers
AQMP	Air Quality Management Plan
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CARB	California Air Resources Control Board
CCC	California Coastal Commission
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CH_4	methane
City	City of Laguna Beach
CMP	construction management plan
CO	carbon monoxide
CO_2	carbon dioxide
County	Orange County
CRHR	California Register of Historical Resources
CWA	Clean Water Act
dB	decibel
dB(A)	A-weighted decibel
dBA	A-weighted decibel (adjusted for human hearing)
EIR	environmental impact report
GHG	greenhouse gas
GWP	global warming potential
IS	initial study
Leq	equivalent sound level over a given period
LST	localized significance threshold
LUST	leaking underground storage tank
MND	mitigated negative declaration
MT CO_2E	metric ton of CO_2 equivalent
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NF_3	nitrogen trifluoride
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
OEHHA	Office of Environmental Health Hazard Assessment
PM_{10}	course particulate matter
$PM_{2.5}$	fine particulate matter
RCB	reinforced concrete box
RCNM	Roadway Construction Noise Model

Acronym/Abbreviation	Definition
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
SF_6	sulfur hexafluoride
SMR	State Marine Reserve
SO_x	sulfur oxides
SR-	State Route
TAC	toxic air contaminant
UBC	Uniform Building Code
VOC	volatile organic compound

1 INTRODUCTION

1.1 Project Overview

The downtown area of the City of Laguna Beach (City) has a long history of flooding issues because of the lack of conveyance capacity of the existing Laguna Canyon Channel storm drain system. The existing facility conveys flow from approximately 9 square miles of tributary drainage area reaching beyond State Route (SR-) 73 to the Pacific Ocean. The current drainage system consists of a combination of natural channels in the upper reaches and a reinforced concrete channel along the eastern portion of SR-133 until it reaches the downtown portion of the City, where it is routed underground into variable sizes of reinforced concrete boxes (RCBs). Most of the channel is owned and operated by Orange County (County) Flood Control District. The County facility, referred to as Facility No. I02, extends from the upstream side of Beach Street, while the City operates and maintains the portion of culvert from Beach Street to the ocean, with the exception of the California Department of Transportation (Caltrans) portion of culvert under the South Coast Highway (SR-1).

The culvert between Beach Street and the ocean was constructed in 1928. In the 1970s, the County improved a portion of the channel from Beach Street to Forest Avenue. The remaining section of Laguna Canyon Channel between Beach Street and the ocean currently consists of a combination of variable sizes and shapes of aging material composed of a system with inadequate hydraulic capacity for the 10-year-storm design standard. Consequently, this portion of the channel experiences floods approximately every 5 to 7 years.

1.2 California Environmental Quality Act Compliance

The California Environmental Quality Act (CEQA), a statewide environmental law contained in California Public Resources Code, Sections 21000–21177, applies to most public agency decisions to carry out, authorize, or approve actions that have the potential to adversely affect the environment (California Public Resources Code, Section 21000 et seq.). The overarching goal of CEQA is to protect the physical environment. To achieve that goal, CEQA requires that public agencies identify the environmental consequences of their discretionary actions and consider alternatives and mitigation measures that could avoid or reduce significant adverse impacts when avoidance or reduction is feasible. It also gives other public agencies and the public an opportunity to comment on the information. If significant adverse impacts cannot be avoided, reduced, or mitigated to below a level of significance, the public agency is required to prepare an environmental impact report (EIR) and balance the proposed Laguna Canyon Channel Improvements Project's (project's) environmental concerns with other goals and benefits in a statement of overriding considerations.

1.3 Preparation and Processing of this Initial Study/Mitigated Negative Declaration

The City's Public Works Department directed and supervised the preparation of this Initial Study/Mitigated Negative Declaration (IS/MND). Although prepared with assistance from the consulting firm Dudek, the content contained within, and the conclusions drawn by, this IS/MND reflect the sole independent judgement of the City.

1.4 Initial Study Checklist

The City prepared the project's Environmental Checklist (i.e., IS) per CEQA Guidelines, Sections 15063 through 15065. The CEQA Guidelines include a suggested checklist to indicate whether the project would have an adverse impact on the environment. The checklist is found in Section 3, Initial Study Checklist, of this IS/MND. Following the checklist, Sections 3.1 through 3.18 include an explanation and discussion of each significance determination made in the checklist.

For this IS/MND, the following four possible responses to each of the individual environmental issue areas are included in the checklist:

1. ***Potentially Significant Impact***
2. ***Less-Than-Significant Impact with Mitigation Incorporated***
3. ***Less-Than-Significant Impact***
4. ***No Impact***

1.5 Existing Documents to be Incorporated by Reference

CEQA Guidelines, Sections 15150, 15168(c)(3), and 15168(d)(2), permit and encourage that an environmental document incorporate by reference other documents that provide relevant data. The *Laguna Beach General Plan* (General Plan) (City of Laguna Beach 2012a), the *Laguna Beach Downtown Specific Plan* (Specific Plan) (City of Laguna Beach 2008), and the City's Municipal Code (City of Laguna Beach 2017a), which are all incorporated by reference pursuant to CEQA Guidelines, Section 15150, are available for review from the following:

City of Laguna Beach
Community Development Department
505 Forest Avenue
Laguna Beach, California 92651

1.6 Points of Contact

The lead agency for this environmental document is the City. Any questions about the preparation of this MND, its assumptions, or its conclusions should be referred to the following:

Lisa Penna, Project Manager
City of Laguna Beach, Public Works Department
505 Forest Avenue
Laguna Beach, California 92651
949.428.1500
lpenna@andpen.com

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2 PROJECT DESCRIPTION

2.1 Project Location

The project site is located in the southeastern part of the City, which is found along the Pacific Ocean in the southern part of the County (Figure 1, Project Location). Regionally, the City is bounded by the City of Irvine to the north, the Cities of Laguna Niguel and Aliso Viejo to the east, the City of Dana Point to the southeast, the Pacific Ocean to the southwest, and unincorporated Orange County and the City of Newport Beach to the west. The project site is located generally between Beach Street and the existing ocean outfall at Main Beach, along the eastern portion of SR-133 (Broadway Street) (Figure 2, Site Plan).

2.2 Environmental Setting

City of Laguna Beach

The City is situated in an unusual setting not found elsewhere in the County. This setting results from both the location of the City as a seaside community and its physical elements, characterized by steep hillsides, rugged canyon bottoms, prominent ridgelines, and large areas of open space. These conditions physically separate the City from the urbanization occurring elsewhere in the County and provide a natural open-space buffer around the community. The particular physical features of the City can be divided into three geomorphic regions: coastal fringe; hillsides, canyons, and ridges; and the central basin (City of Laguna Beach 2012b).

The City is situated on the Pacific coastline and has an area of approximately 8.8 square miles. It includes areas that are zoned for residential, commercial, light industrial, institutional, recreational, open space, agriculture-recreation, and public lands uses. Open space, recreational, and environmentally sensitive lands make up approximately 59% of the total area. Residential land use makes up 35%, commercial uses make up approximately 4%, and industrial and institutional make up 1% each of the developed land within the City boundaries (City of Laguna Beach 2012b).

Laguna Beach Downtown Specific Plan Area

The Specific Plan covers the downtown basin of the City and is generally bounded by the Laguna Canyon Frontage Road, the Pacific Ocean, Legion Street and Cliff Drive. The Specific Plan area also encompasses the area called the Central Bluffs situated on the southern side of South Coast Highway between Laguna Avenue and Sleepy Hollow Lane. Additionally, the Specific Plan includes the entrance to the village from Laguna Canyon Road, an area known as the Civic Art District that includes many of the civic and art institutions in town (City of Laguna 2008).

Project Site

The approximately 0.39-acre project site consists of a portion of the Laguna Canyon Channel, including the existing transition structure, box culvert, and outfall structure, which are primarily located between Beach Street and the existing ocean outfall at Main Beach. The Orange County Flood Control District owns and maintains most of the upstream portions of the Laguna Canyon Channel, which consists of a combination of natural channel, improved channel, and culvert sections. The culvert extends from the Pacific Ocean northeast to Laguna Canyon, where it runs parallel to SR-133. The culvert between Beach Street and the ocean is owned by the City, with the exception of the Caltrans portion of the culvert under South Coast Highway.

The northern extent of the project site begins at the Beach Street transition structure located immediately north of Beach Street between Broadway Street and Ocean Avenue. Flows from the storm drain system enter a double 6-foot-high, 10-foot-wide RCB from an 8.5-foot-high, 14.5-foot-wide rectangular concrete channel upstream. A pier wall exists between the 6-foot-by-10-foot RBC, forming a transition from a single concrete channel into a double culvert (Figure 3a, Existing Site Photos).

The double 6-foot-by-10-foot culvert extends approximately 60-feet long under Beach Street. This structure is then restricted to a single 6-foot-high by 12-foot-wide RCB, which spans from Beach Street to South Coast Highway (Figure 3b, Existing Site Photos). This abrupt restriction in culvert width causes the flows to back up approximately 50 feet upstream of the Beach Street culvert inlet, which has resulted in flooding at Beach Street as recently as 2010.

At South Coast Highway, the single RCB transitions to a Caltrans-maintained culvert consisting of a double 4.5-foot-high by 11-foot-wide RCB. The system transitions from a single 6-foot-by-12-foot RCB to a double RCB (23-foot-wide section) under South Coast Highway. This type of structure is referred to as a “squash box,” where a reduction in facility height occurs. This segment of the storm drainage system falls under the jurisdiction of Caltrans and is not a part of the project.

The storm drain system ultimately outlets at Main Beach, under the boardwalk on the ocean side (Figure 3b). During the summer months, the City’s Water Quality Program berms sand in front of the outlet to trap summer storm flows in the culvert, where it is pumped into the sanitary sewer for treatment. During this time of the year, depths of sand get as high as 4 feet in the outlet. At the beginning of the rainy season, the flows from the outlet blow through the sand, creating a channel to the ocean.

Surrounding Land Uses

The project site is located within a highly developed, urbanized part of the City. The area surrounding the project site is within the Specific Plan and primarily contains a mix of commercial uses, with hotel and residential uses located closer to the periphery of the Specific Plan area.

The City's Zoning Map identifies the area surrounding the transition structure and culvert as CBD-2 (Downtown Commercial), while the area surrounding the Main Beach outlet is zoned CBD (Public Parks) (City of Laguna Beach 2012c).

2.3 Project Summary

The project includes removing and replacing the transition structure immediately upstream of Beach Street and approximately 50 linear feet of double RCB structure at the Main Beach outlet, and performing structural improvements within the existing culvert box between Beach Street and the Caltrans squash box structure located under South Coast Highway.

The existing transition structure immediately north of Beach Street would be reconstructed. A pier extension and a parapet wall are proposed at the culvert entrance. The pier extension is a reinforced concrete tapered extension that extends up the open channel section from the existing pier wall. This facility is designed to improve the hydraulic performance of the inlet, as well as reduce the potential for large debris to block the entrance of the culvert. By raising the wall height around the transition and at the culvert entrance and improving the hydraulics within the upstream transition, the existing capacity of the storm drainage system would be increased (Figure 4, Proposed Transition Structure).

The Main Beach outlet would be replaced in its current location. Although modern building materials and methods would be used, once re-constructed, the outlet would be identical, both in appearance and dimensions, to the existing structure (Figure 5, Proposed Outlet Structure).

Rehabilitating the existing single 6-foot-high by 12-foot-wide RCB from Beach Street to the Main Beach ocean outfall would involve using concrete to patch and reinforce areas within the culvert that have been deemed as lacking adequate structural integrity.

2.4 Construction and Phasing

For the purposes of the analysis provided in this IS/MND, it is assumed that the project will be constructed over 6 months, starting in 2019 after the end of the rainy season. The anticipated construction phasing and schedule is presented in Table 1.

Table 1
Construction Schedule

Construction Phase	Construction Schedule
Demolition	1 month
Transition construction	2 months
Underground rehabilitation	2 months
Outfall construction	1 month

Although the final construction schedule and phasing cannot be finalized until the design is completed, and the City selects a construction contractor, it is likely that some of the construction and rehabilitation phases can be performed concurrently once demolition has occurred.

Construction activity would typically be limited to the City allowable construction hours and days (i.e., between the hours of 7:30 a.m. and 6:00 p.m. Monday through Friday). However, it is possible that isolated periods of nighttime work may be necessary to minimize disruptions to residents, local businesses, visitors, and vehicular circulation in the project area. Because the construction schedule has yet to be finalized, it is currently unknown whether or not nighttime construction would be required. As such, the impact analysis presented in this IS/MND assumes that some nighttime construction would be required.

It is expected that only one construction staging area would be required. Since the exact location of the staging area is unknown at this time, this analysis conservatively considers the environmental impacts associated with two potential construction staging areas: one located just north of the Main Beach ocean outfall, and the other occurring within City Parking Lot 12 (Figure 2).

Project construction may require temporary, intermittent lane closures. If necessary, temporary and intermittent closures could potentially affect the local circulation system, including sidewalks, the boardwalk along Main Beach, bicycle lanes, and bus stops. Refer to Section 3.15, Transportation and Traffic, for a discussion on potential project-related impacts on vehicular and pedestrian circulation.

As previously discussed, Caltrans currently owns and maintains a squash box structure under South Coast Highway, which the culvert component of the proposed project presently connects to—and would continue to post-project—along the north side of the highway. This segment of the storm drainage system falls under the jurisdiction of Caltrans and is not a part of the project. Caltrans is currently in the preliminary planning, design, and funding stages for a project that proposes to remove and replace/rebuild the squash box structure. The anticipated funding fiscal year for construction of this improvement is 2019/2020, with the estimated earliest construction start date being mid-2020. Given that construction of the proposed project is anticipated to commence and be completed by Summer 2019, project construction is not expected to overlap with construction of the Caltrans project.

2.5 Operation and Maintenance

The operation and maintenance of the project will be the responsibility of the City. Procedures required include debris removal, periodic facility inspections, and structural repairs. Annually, only a nominal number of routine maintenance and unexpected emergency repair activities are anticipated.

2.6 Project Approvals

The project may require the following discretionary approvals:

- Approval of an MND by the Planning Commission
- Approval of plans and specifications by the City's Public Works Department
- A coastal development permit by the City and/or the California Coastal Commission pursuant to Section 25.07, Coastal Development Permits, of the Laguna Beach Municipal Code
- Regulatory permits by the Regional Water Quality Control Board (RWQCB), U.S. Army Corps of Engineers (ACOE), and/or California Department of Fish and Wildlife (CDFW)
- A temporary construction easement by Caltrans
- Design review is required for all building, structures, and physical improvements in environmentally sensitive areas per Section 25.05.040(B)(l) of the Laguna Beach Municipal Code. Pursuant to Section 25.05.040(B)(p), the City Council may waive the requirement of design review if it is determined that there are special circumstances applicable to the proposed project.

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3 INITIAL STUDY CHECKLIST

1. Project Title:

Laguna Canyon Channel Improvements Project

2. Lead Agency Name and Address:

City of Laguna Beach
Public Works Department
505 Forest Avenue
Laguna Beach, California 92651

3. Contact Person and Phone Number:

Lisa Penna, Project Manager
City of Laguna Beach, Public Works Department
505 Forest Avenue
Laguna Beach, California 92651

4. Project Location:

The project site is located generally between Beach Street and the existing ocean outfall at Main Beach, along the eastern portion of SR-133 (Broadway Street).

5. Project Sponsor's Name and Address:

City of Laguna Beach
Public Works Department
505 Forest Avenue
Laguna Beach, California 92651

6. General Plan Designation:

Central Business District (CBD)

7. Zoning:

Downtown Commercial (CBD-2)

8. Description of project:

The project includes removing and replacing both the transition structure immediately upstream of Beach Street and approximately 50 linear feet of double RCB structure at the Main Beach outlet, and performing structural improvements within the existing culvert box between Beach Street and the Caltrans squash box structure located under South Coast Highway.

See Section 2, Project Description, for a description of the project.

9. Surrounding Land uses and Setting (Briefly describe the project's surroundings):

The project site is located in within a developed, urbanized part of the City. The area surrounding the project site is within the Specific Plan and primarily contains a mix of commercial uses, with hotel and residential uses located closer to the periphery of the Specific Plan area.

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

The project would require the following discretionary approvals:

- Approval of an MND by the Planning Commission
- Approval of plans and specifications by the City's Public Works Department
- A coastal development permit by the City and/or California Coastal Commission
- Regulatory permits by the RWQCB, ACOE, and/or CDFW
- A temporary construction easement by Caltrans

11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, has consultation begun?

Assembly Bill (AB) 52 notification letters were prepared by City and sent out to representatives from all Native American tribes that had previously requested to be notified of public works and private development projects proposed within the City. As of the date of this IS/MND, no responses to these notification letters have been received by the City.

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

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

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

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

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

	March 5, 2019
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 Environmental Impact Report (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 No. 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.

		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?	☐	☒	☐	☐

3.1 Aesthetics

a) Would the project have a substantial adverse effect on a scenic vista?

Less Than Significant with Mitigation Incorporated. Scenic vista and other important resources are typically associated with natural landforms such as mountains, foothills, ridgelines, and coastlines. The General Plan Open Space Element identifies the undeveloped hillside lands and the City's shorelines as important visual resources. In addition, the General Plan Open Space Element specifies policies to ensure preservation of the City's visual resources (City of Laguna Beach 2006).

The project site is composed of the City-owned portion of the Laguna Canyon Channel from the Beach Street transition structure to the Main Beach ocean outfall, except the Caltrans-owned portion under SR-1, within the Specific Plan (City of Laguna Beach 2017b). The majority of the project would be located underground and below grade and outside of the public and private viewsheds. In addition, both the transition structure and ocean outfall would be reconstructed within the same footprints as the existing structures and would be designed to share a similar appearance and dimensions as the existing structures. Thus, the project would not affect views of or from any scenic vista in the broader project area, and visual impacts would be limited to the duration of construction activities.

During construction of the project, equipment, vehicles, and materials would be stored on the project site within a designated staging area. Although storage of these construction items would be temporary and cease promptly upon completion of construction activities, such storage activity could potentially affect the viewshed of surrounding land uses. As a result, Mitigation Measures (MM)-AES-1 and MM-AES-2 would be required to reduce impacts related to the short-term, on-site storage of construction equipment, vehicles, and materials. MM-AES-1 involves the storage of construction items within a fenced and screened designated staging area, while MM-AES-2 pertains to the prompt removal of demolition and construction debris from the project site. MM-AES-3 would also be required to reduce the potential visual impacts associated with cranes, whereas MM-AES-4 would be necessary to provide residents and business owners with a point of contact to ask questions or make complaints related to staging activities. Therefore, with the incorporation of MM-AES-1 through MM-AES-4, impacts associated with scenic vistas would be less than significant.

MM-AES-1 The City of Laguna Beach and its contractors shall ensure that during non-construction hours, all construction equipment, vehicles, and materials shall be relegated to a designated staging area on or adjacent to the project site. This staging areas shall be fenced and screened to clearly identify the boundary of the storage area and to limit views of stored construction items from adjacent land uses and roadways. The temporary staging area and enclosures shall remain closed at times when work is not taking place.

All staging area fencing shall use coated material to eliminate glare. The fencing material shall incorporate colors and color patterns that have the least contrast with the surroundings and modify the overall impact of the fence surface that is directly viewed by nearby visual receptors.

Any on-site staging area shall be located within an appropriate, convenient portion of the project site away from adjacent land uses and roadways, as feasible. Storage containers shall also be used to store loose construction items and materials to prevent a haphazard visual appearance on the project site.

MM-AES-2 The City of Laguna Beach and its contractors shall ensure that any demolition and construction debris not designated for reuse on the project site shall be promptly removed from the site in accordance with the approved construction schedule. No long-term stockpiling of such debris shall occur on the project site, and no short-term stockpiles shall exceed the height of the temporary construction fencing that will bound the project site. Demolition and construction debris earmarked for reuse on the project site shall be a permitted activity but shall still occur at a height that is not readily visible from adjacent land uses and roadways.

MM-AES-3 At the construction and staging area locations, if the use of a crane is required, the City of Laguna Beach and its contractors shall ensure that the crane(s) are lowered to a position below the visual screening when not in use and at all times between 6:00 p.m. and 7:00 a.m.

MM-AES-4 The City of Laguna Beach and its contractors shall establish a hotline telephone number, posted at each construction staging area, for receiving public questions or complaints. Any complaints received regarding visual issues and concerns, or violations of these mitigation measures at and adjacent to the project sites shall be investigated and responded to within 48 hours.

b) Would the project substantially damage scenic resources including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

Less-Than-Significant Impact. The nearest designated state scenic highway to the project site is the segment of SR-91 (Riverside Freeway) located approximately between SR-55 and the Orange County/Riverside County line (Caltrans 2011). This segment of SR-91 is located in northern Orange County, approximately 20 miles north of the project site. Thus, the project would not be within the viewshed of an official designated state scenic highway.

The nearest eligible, yet not official designated, state scenic highway is the SR-1 (South Coast Highway), which traverses the project site. However, the majority of the project would be located underground and below grade and outside of the public viewshed from SR-1. In addition, both the transition structure and ocean outfall would be reconstructed within the same footprints as the existing structures and would be designed to share a similar appearance and dimensions as the existing structures. Therefore, impacts associated with state scenic highways would be less than significant.

c) ***Would the project substantially degrade the existing visual character or quality of the site and its surroundings?***

Less Than Significant with Mitigation Incorporated. As previously discussed in Section 3.1(a), the project involves replacement of existing underground and below-grade flood control infrastructure, all of which is not explicitly visible from the public right of way and private vantage points. Short-term construction impacts would result from the staging equipment and materials in a designated staging area near the project site. However, although storage of these construction items would be temporary and cease promptly upon completion of construction activities, such storage activity could potentially affect the viewshed of surrounding land uses. As a result, MM-AES-1 and MM-AES-2 would be required to reduce impacts related to the short-term, on-site storage of construction equipment, vehicles, and materials. Therefore, with the incorporation of MM-AES-1 and MM-AES-2, impacts associated with the visual character and quality of the project site would be less than significant.

d) ***Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?***

Less Than Significant with Mitigation Incorporated. Similar to the existing conditions, the project consists of underground and below-grade flood control infrastructure and would not require any new sources of operational lighting. However, should isolated periods of nighttime construction be required, temporary construction lighting would be required on the project site. Although the surrounding project area contains many source of nighttime lighting associated with the nearby commercial land uses, precautions would need to take place to ensure that construction lighting would not result in light trespass onto neighboring properties. As a result, MM-AES-4 and MM-AES-5 would be required to reduce impacts related to the short-term, on-site use of construction lighting. With the incorporation of mitigation, impacts associated with the light and glare would be less than significant.

MM-AES-5 The City of Laguna Beach and its contractors shall ensure that construction lighting shall be installed using hooded shields or other devices around the light fixtures to minimize glare and upward/horizontal casting of light. All lighting shall be directed away and shall not shine on any neighboring property, with specific attention being given to the nearest residential properties to the project site. Construction lighting shall be positioned to minimize intrusive light that is cast beyond the project site.

		Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
II.	**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?	☐	☐	☒	☐

3.2 Air Quality

a) Would the project conflict with or obstruct implementation of the applicable air quality plan?

Less-Than-Significant Impact. The project site is located within the South Coast Air Basin (SCAB), which includes the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties and all of Orange County, and is within the jurisdictional boundaries of the South Coast Air Quality Management District (SCAQMD).

The SCAQMD administers the Air Quality Management Plan (AQMP) for the SCAB, which is a comprehensive document outlining an air pollution control program for attaining all California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS). The most recent adopted AQMP is the 2016 AQMP (SCAQMD 2016), which was adopted by the SCAQMD Governing Board on March 3, 2017. The 2016 AQMP represents a new approach, focusing on available, proven, and cost-effective alternatives to traditional strategies while seeking to achieve multiple goals in partnership with other entities promoting reductions in greenhouse gases (GHGs) and toxic risk, as well as efficiencies in energy use, transportation, and goods movement (SCAQMD 2016). Because mobile sources are the principal contributor to the SCAB's air quality challenges, the SCAQMD has been and will continue to be closely engaged with the California Air Resources Control Board (CARB) and the U.S. Environmental Protection Agency, which have primary responsibility for these sources.

The purpose of a consistency finding is to determine if a project is inconsistent with the assumptions and objectives of the regional air quality plans, and thus, if it would interfere with the region's ability to comply with federal and state air quality standards. The approach to determining the potential for the project to conflict with an AQMP is the same when evaluating the project's consistency with the 2016 AQMP. The SCAQMD has established criteria for determining consistency with the currently applicable AQMP in Chapter 12, Sections 12.2 and 12.3, in the SCAQMD *CEQA Air Quality Handbook*. The criteria are as follows (SCAQMD 1993):

- Whether the project would result in an increase in the frequency or severity of existing air quality violations, cause or contribute to new violations, or delay timely attainment of the ambient air quality standards or interim emission reductions in the AQMP
- Whether the project would exceed the assumptions in the AQMP or increments based on the year of project buildout and phase

To address the first criterion regarding the project's potential to result in an increase in the frequency or severity of existing air quality violations, cause or contribute to new violations, or delay timely attainment of the ambient air quality standards or interim emission reductions in the AQMP, project-generated criteria air pollutant emissions were estimated and analyzed for significance and are addressed under Section 3.2(b). Detailed results of this analysis are included in Appendix A, CalEEMod Results. Project construction would not generate criteria air pollutant emissions that would exceed the SCAQMD thresholds. The project would not generate regular operational emissions, as discussed under Section 3.2(b).

In general, projects are considered consistent with, and would not conflict with or obstruct implementation of, the AQMP if the growth in socioeconomic factors is consistent with the underlying regional plans used to develop the AQMP. The AQMP reduction and control measures, which are outlined to mitigate emissions, are based on existing and projected land use and development. The SCAQMD uses demographic growth forecasts for various socioeconomic categories (e.g., population, housing, employment by industry) developed by the Southern California Association of Governments (SCAG) for its Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) (SCAG 2016), which is based on general plans for cities and counties in the SCAB, for the development of the AQMP emissions inventory (SCAQMD 2016). The 2016 AQMP relies on the land use and population projections provided in SCAG 2016 RTP/SCS Regional Growth Forecast. The SCAG Regional Transportation Plans and Regional Growth Forecasts are generally consistent with the local plans; therefore, the 2016 AQMP is generally consistent with local government plans.

The second criterion regarding the project's potential to exceed the assumptions in the AQMP or increments based on the year of project buildout and phase is primarily assessed by determining consistency between the project's land use designations and potential to generate population growth. The project would not require a change in land use designation or zoning change. Accordingly, the project is consistent with the SCAG RTP/SCS forecasts used in the SCAQMD AQMP development. In addition, the project does not propose additional land for development and would not induce additional population in the project area. Because the project would involve only construction and improvements to existing infrastructure, there would not be an increase in population in the region associated with its implementation.

Therefore, based on the analysis above, impacts associated with the applicable AQMP would be less than significant.

b) Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Less-Than-Significant Impact. A quantitative analysis was conducted to determine whether construction of the project may result in emissions of criteria air pollutants from mobile, area, and energy sources that may cause exceedances of the NAAQS or CAAQS or contribute to existing nonattainment of ambient air quality standards. The following discussion identifies potential short- and long-term impacts that would result from implementation of the project.

Construction of the project would result in a temporary addition of pollutants to the local airshed caused by soil disturbance, fugitive dust emissions, and combustion pollutants from on-site construction equipment, as well as from on-road construction vehicles traveling to and from the site. Construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of operation and, for dust, the prevailing weather conditions. Thus, an increment of day-to-day variability exists.

Pollutant emissions associated with construction activity were quantified using the California Emissions Estimator Model (CalEEMod). Default values provided by the program were used where detailed project information was not available. A detailed depiction of the construction schedule—including information regarding phasing, equipment used during each phase, vendor trucks, and worker vehicles—is contained in the CalEEMod outputs, as provided in Appendix A.

Implementation of the project would generate construction-related air pollutant emissions from entrained dust, equipment and vehicle exhaust emissions. Entrained dust results from the exposure of earth surfaces to wind from the direct disturbance and movement of soil, resulting in course particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$) emissions. The project would be required to comply with SCAQMD Rule 403 to control dust emissions generated during construction activities. Standard construction practices required under Rule 403 would be employed to reduce fugitive dust emissions, including watering of the active sites approximately three times daily depending on weather conditions. Internal combustion engines used by construction equipment and on-road vehicles would result in emissions of volatile organic compounds (VOCs), oxides of nitrogen (NO_x), carbon monoxide (CO), PM_{10}, $PM_{2.5}$, and minimal emissions of sulfur oxides (SO_x).

The following four phases of construction were modeled for this analysis: (1) demolition, (2) transition construction, (3) underground rehabilitation, and (4) outfall construction. It is anticipated that construction would occur from approximately March 2018 through May 2018. The construction activity schedule, equipment mix, and number of vendor trucks and workers for the air emissions modeling of the project are shown in Table 2. For this analysis, it was assumed that heavy construction equipment would be used 5 days per week (22 days per month).

Table 2
Construction Schedule, Equipment, and On-Road Vehicles

Construction Schedule	On-Road Vehicles (One-Way Trips/Day)			Off-Road Equipment		
	Workers	*Vendors*	*Haul Trucks*	*Type*	*Quantity*	*Hours/Day*
Demolition	15	5	15	Air compressors	2	8
				Concrete/industrial saws	1	4
				Dumpers/tenders	1	4
				Sweepers/scrubbers	1	4
				Tractors/loaders/backhoes	1	4
				Excavators	1	4
				Generator sets	2	8
Transition construction	10	10	0	Cement and mortar mixers	1	4
				Cranes	1	2
				Tractors/loaders/backhoes	1	4
				Dumpers/tenders	1	4
				Generator sets	2	8
				Plate compactors	1	4
				Rollers	1	4
Underground rehabilitation	5	10	0	Cement and mortar mixers	1	4
				Concrete/industrial saws	1	4

Table 2
Construction Schedule, Equipment, and On-Road Vehicles

Construction Schedule	On-Road Vehicles (One-Way Trips/Day)			Off-Road Equipment		
	Workers	*Vendors*	*Haul Trucks*	*Type*	*Quantity*	*Hours/Day*
				Generator sets	2	8
				Pumps	1	8
				Welders	1	4
Outfall construction	10	10	0	Cement and mortar mixers	1	4
				Cranes	1	2
				Bore/drill rigs	1	2
				Rubber-tired loaders	1	4
				Dumpers/tenders	1	4
				Generator sets	2	8
				Plate compactors	1	4
				Tractors/loaders/backhoes	1	4

Table 3 presents the estimated maximum daily construction emissions generated during construction of the project. The values shown are the maximum summer or winter daily emissions results from CalEEMod. Details of the emission calculations are provided in Appendix A. The analysis assumes a construction start date during 2018, which represents a start date that was initially envisioned by the City during the preliminary stages of planning and design for the proposed project. This construction start date has since been pushed back to 2019. However, for the purposes of air emissions impact analysis, assuming an earlier start date for project construction represents the worst-case scenario for criteria air pollutant emissions, because equipment and vehicle emission factors for later years would be less due to more stringent standards for off-road equipment and heavy-duty trucks, as well as fleet turnover replacing older equipment and vehicles.

Table 3
Estimated Maximum Daily Construction Emissions

Year	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
	(Pounds/Day)					
2018	3.73	31.86	24.10	0.05	2.16	1.86
Maximum Daily	**3.73**	**31.86**	**24.10**	**0.05**	**2.48**	**1.86**
SCAQMD threshold	**75**	**100**	**550**	**150**	**150**	**55**
Threshold exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

Source: SCAQMD 2015.
Notes: CO = carbon monoxide; NO_x = oxides of nitrogen; PM_{10} = coarse particulate matter; $PM_{2.5}$ = fine particulate matter; SCAQMD = South Coast Air Quality Management District; SO_x = sulfur oxides; VOC = volatile organic compound
The values shown are the maximum summer or winter daily emissions results from CalEEMod.
These estimates reflect control of fugitive dust required by SCAQMD Rule 403.
See Appendix A for detailed results.

As shown in Table 3, daily construction emissions would not exceed the SCAQMD significance thresholds for VOC, NO_x, CO, SO_x, PM_{10}, or $PM_{2.5}$ during construction of the project. Therefore, short-term construction impacts associated with regional air emissions would be less than significant.

Operational Emissions

Once project demolition and construction is complete, operational activity would be limited to a nominal number of routine maintenance and unexpected emergency repair work. Routine equipment operation or vehicle trips would not be required. The project would drain through gravity only, and no pumps or other equipment would be required to convey stormwater. Therefore, long-term operational impacts associated with regional air emissions would be less than significant.

c) ***Would the project 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)?***

Less-Than-Significant Impact. Air pollution is largely a cumulative impact. The nonattainment status of regional pollutants is a result of past and present development, and the SCAQMD develops and implements plans for future attainment of ambient air quality standards. Based on these considerations, project-level thresholds of significance for criteria pollutants are used in the determination of whether a project's individual emissions would have a cumulatively considerable contribution on air quality. If a project's emissions would exceed the SCAQMD significance thresholds, it would be considered to have a cumulatively considerable contribution. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant (SCAQMD 2003).

As discussed in Section 3.2(b) and shown in Table 3, daily construction emissions would not exceed the SCAQMD significance thresholds for VOC, NO_x, CO, SO_x, PM_{10}, or $PM_{2.5}$ during construction of the project, and short-term construction impacts associated with regional air emissions would be less than significant.

Cumulative localized impacts would potentially occur if a construction project were to occur concurrently with another off-site project. Construction schedules for potential future projects near the project site are currently unknown; therefore, potential construction impacts associated with two or more simultaneous projects would be considered speculative.[1] However, future projects would be subject to CEQA and would potentially require quantitative air quality analysis and modeling, and where necessary, mitigation. Criteria air pollutant emissions associated with construction of future projects would be reduced through implementation of control measures required by the SCAQMD. Cumulative PM_{10} and $PM_{2.5}$ emissions would be reduced because all future projects would be subject to SCAQMD Rule 403 (Fugitive Dust), which sets forth general and specific requirements for all construction sites in the SCAQMD (SCAQMD 2005).

Therefore, based on the above, the project would not result in a cumulatively considerable increase in emissions of nonattainment pollutants.

d) Would the project expose sensitive receptors to substantial pollutant concentrations?

Less-Than-Significant Impact. Localized project impacts associated with construction criteria air pollutants emissions are assessed below.

Sensitive Receptors

Sensitive receptors are those individuals more susceptible to the effects of air pollution than the population at large. People most likely to be affected by air pollution include children, the elderly, and people with cardiovascular and chronic respiratory diseases. According to the SCAQMD, sensitive receptors include residences, schools, playgrounds, childcare centers, long-term healthcare facilities, rehabilitation centers, convalescent centers, and retirement homes (SCAQMD 1993). Residential land uses are located approximately 90 meters to the west of the project site (along Lower Cliff Drive). The residences to the west of the project site represent the closest off-site sensitive receptors to the project activities.

Localized Significance Thresholds

The SCAQMD recommends a localized significance threshold (LST) analysis to evaluate localized air quality impacts to sensitive receptors in the immediate vicinity of the project site as a result of construction activities. The project is located in Source-Receptor Area 20 (Central Orange County Coastal). This analysis applies the SCAQMD LST values for a 1-acre site within Source-Receptor Area 20 with a receptor distance of 50 meters.

Project construction activities would result in temporary sources of on-site criteria air pollutant emissions associated with construction equipment exhaust and concrete handling activities.

[1] The CEQA Guidelines state that if a particular impact is too speculative for evaluation, the agency should note its conclusion and terminate discussion of the impact (14 CCR 15145).

Off-site emissions from trucks and worker vehicle trips are not included in the LST analysis because they occur off site. The maximum daily on-site construction emissions generated during construction of the project are presented in Table 4 and compared to the SCAQMD localized significance criteria for Source-Receptor Area 20 to determine whether project-generated on-site construction emissions would result in potential LST impacts.

Table 4
Construction Localized Significance Thresholds Analysis

Year	NO_2	CO	PM_{10}	$PM_{2.5}$
	Pounds per Day (On Site)			
2018	31.68	24.10	2.16	1.86
Maximum Daily On Site Emissions	**31.68**	**24.10**	**2.48**	**1.86**
SCAQMD LST Criteria	*93*	*738*	*13*	*5*
Threshold Exceeded?	**No**	**No**	**No**	**No**

Source: SCAQMD 2008a.
Notes: CO = carbon monoxide; LST = localized significance threshold; NO_2 = nitrogen dioxide; PM_{10} = particulate matter; $PM_{2.5}$ = fine particulate matter; SCAQMD = South Coast Air Quality Management District
See Appendix A for detailed results.

As shown in Table 4, proposed construction activities would not generate emissions in excess of site-specific LSTs. Therefore, impacts associated with localize air emissions would be less than significant.

CO Hotspots

Traffic-congested roadways and intersections have the potential to generate localized high levels of CO. Localized areas where ambient concentrations exceed federal and/or state standards for CO are termed CO "hotspots." CO transport is extremely limited and disperses rapidly with distance from the source. Under certain extreme meteorological conditions, however, CO concentrations near a congested roadway or intersection may reach unhealthy levels, affecting sensitive receptors. Typically, high CO concentrations are associated with severely congested intersections operating at an unacceptable level of service (level of service E or worse is unacceptable). Projects contributing to adverse traffic impacts may result in the formation of a CO hotspot. Additional analysis of CO hotspot impacts would be conducted if a project would result in a significant impact or contribute to an adverse traffic impact at a signalized intersection that would potentially subject sensitive receptors to CO hotspots.

Title 40, Section 93.123(c)(5), of the Code of Federal Regulations, states that "CO, PM_{10}, and $PM_{2.5}$ hot-spot analyses are not required to consider construction-related activities which cause temporary increases in emissions. Each site which is affected by construction-related activities shall be considered separately, using established 'Guideline' methods. Temporary increases are defined as those which occur only during the construction phase and last five years or less at any individual site" (40 CFR 93.123). While project construction would involve on-road vehicle trips from trucks and workers, construction activities would last approximately 6 months and would not require a project-level construction hotspot analysis. Because the project would not result in long-term operational vehicular trips, an operational CO hotspot evaluation is also not required. Therefore, impacts associated CO hotspots would be less than significant.

Toxic Air Contaminants

Toxic air contaminants (TACs) are defined as substances that may cause or contribute to an increase in deaths or in serious illness, or that may pose a present or potential hazard to human health. Health effects from carcinogenic air toxics are usually described in terms of cancer risk. The SCAQMD recommends an incremental cancer risk threshold of 10 in 1 million. "Incremental cancer risk" is the net increased likelihood that a person continuously exposed to concentrations of TACs resulting from a project over a 9-, 30-, and 70-year exposure period will contract cancer based on the use of standard Office of Environmental Health Hazard Assessment (OEHHA) risk-assessment methodology (OEHHA 2015). In addition, some TACs have non-carcinogenic effects. The SCAQMD recommends a Hazard Index of 1 or more for acute (short-term) and chronic (long-term) non-carcinogenic effects.[2] TACs that would potentially be emitted during construction activities associated with development of the project would be diesel particulate matter.

Diesel particulate matter emissions would be emitted from heavy equipment operations and heavy-duty trucks. Heavy-duty construction equipment is subject to a CARB Airborne Toxics Control Measure for in-use diesel construction equipment to reduce diesel particulate emissions. As described for the LST analysis, PM_{10} (representative of diesel particulate matter) exposure would be minimal. According to the OEHHA, health risk assessments, which determine the exposure of sensitive receptors to toxic emissions, should be based on a 30-year exposure period for the maximally exposed individual resident; however, such assessments should be limited to the period/duration of activities associated with the project. Thus, the duration of the proposed construction activities would only constitute a small percentage of the total 30-year exposure period. The construction period for the project would be approximately 3 months, after which construction-related TAC emissions would cease. Due to this relatively

[2] Non-cancer adverse health risks are measured against a hazard index, which is defined as the ratio of the predicted incremental exposure concentrations of the various non-carcinogens from the project to published reference exposure levels that can cause adverse health effects.

short period of exposure and minimal particulate emissions on site, TACs generated during construction would not be expected to result in concentrations causing significant health risks.[3] Therefore, impacts associated TACs would be less than significant.

Health Impacts of Criteria Air Pollutants

Construction of the project would generate criteria air pollutant emissions; however, the project would not exceed the SCAQMD mass-emission thresholds. The SCAB is designated as nonattainment for O_3 for the NAAQS and CAAQS. Thus, existing O_3 levels in the SCAB are at unhealthy levels during certain periods. The health effects associated with O_3 are generally associated with reduced lung function. Because the project would not involve construction activities that would result in O_3 precursor emissions (VOC or NO_x) that would exceed the SCAQMD thresholds, the project is not anticipated to substantially contribute to regional O_3 concentrations and the associated health impacts.

In addition to O_3, NO_x emissions contribute to potential exceedances of the NAAQS and CAAQS for NO_2. Exposure to NO_2 and NO_x can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Project construction would not exceed the SCAQMD NO_x threshold, and existing ambient NO_2 concentrations are below the NAAQS and CAAQS. Thus, project construction is not expected to result in exceedances of the NO_2 standards or contribute to associated health effects.

CO tends to be a localized impact associated with congested intersections. In terms of adverse health effects, CO competes with oxygen, often replacing it in the blood, reducing the blood's ability to transport oxygen to vital organs. The results of excess CO exposure can include dizziness, fatigue, and impairment of central nervous system functions. CO hotspots were discussed previously as a less-than-significant impact. Thus, the project's CO emissions would not contribute to the health effects associated with this pollutant.

The SCAB is designated as nonattainment for PM_{10} under the CAAQS and nonattainment for $PM_{2.5}$ under the NAAQS and CAAQS. Particulate matter contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Particulate matter exposure has been linked to a variety of problems, including premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms such as irritation of the airways, coughing, or difficulty breathing (EPA 2016). As with O_3 and NO_x, the project would not generate emissions of PM_{10} or $PM_{2.5}$ that would

[3] Refer to footnote 2.

exceed the SCAQMD's thresholds. Accordingly, the project's PM_{10} and $PM_{2.5}$ emissions are not expected to cause any increase in related regional health effects for these pollutants. Therefore, impacts associated with adverse health effects related to the project generation of air pollutants would be less than significant.

e) Would the project create objectionable odors affecting a substantial number of people?

Less-Than-Significant Impact. The occurrence and severity of potential odor impacts depend on numerous factors. The nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of receiving location each contribute to the intensity of the impact. Although offensive odors seldom cause physical harm, they can be annoying, cause distress among the public, and generate citizen complaints.

SCAQMD provides a list of land uses associated with odor concerns, which include agricultural uses, wastewater treatment plants, food-processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding (SCAQMD 1993). Implementation of the project would not result in operation of the types of land uses listed in SCAQMD's screening criteria.

During project construction, exhaust from equipment may produce discernible odors typical of most construction sites. Potential odors produced during construction would be attributable to concentrations of unburned hydrocarbons from tailpipes of construction equipment. However, such odors would disperse rapidly from the project site and generally occur at magnitudes that would not affect substantial numbers of people. In addition, the project would not include the application of architectural coatings or asphalt pavement. Therefore, impacts associated with the creation of objectionable odors would be less than significant.

		Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
III.	**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 U.S. Fish and Wildlife Service?	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
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?	☐	☐	☐	☒

3.3 Biological Resources

The following analysis is based in part on the July 2017 Biological Resources Letter Report prepared by Dudek and included as Appendix B of this IS/MND.

a) Would the project 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?

On June 22, 2017, Dudek conducted a general pedestrian biological survey of the project site, in addition to conducting literature searches and regulatory database reviews. The most recent versions of the California Natural Diversity Database and the California Native Plant Society Inventory of Rare and Endangered Plants (as cited in the Biological Resources Letter Report (Appendix B)) were reviewed to identify sensitive biological resources present or potentially present on the project site and surrounding quadrangles. An essential fish habitat assessment was conducted to evaluate potential impacts/disturbances associated with proposed construction activities to fish, fish habitat, and other marine resources within and adjacent to the project site. Essential fish habitat is regulated under the Magnuson-Stevens Fishery Conservation and

Management Act, protecting waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. 1801 et seq.), which also includes eelgrass (*Zostera marina*) beds. Substrates include soft substrates (sand), hard (rocky) substrates, structures underlying waters, and associated biological communities. Additionally, a preliminary investigation of the extent and distribution of ACOE jurisdictional waters of the United States, RWQCB jurisdictional waters of the state, and CDFW jurisdictional streambed and associated riparian habitat was conducted.

Special-Status Species

Less-Than-Significant Impact. No plant species listed or proposed for listing as rare, threatened, or endangered by either CDFW or the U.S. Fish and Wildlife Service was detected on the project site. Additionally, no plant species considered sensitive by the California Native Plant Society was observed, and no special-status plant species are expected to occur on site due to the existing development and full site disturbance. No wildlife species listed or proposed for listing as rare, threatened, or endangered by either CDFW or the U.S. Fish and Wildlife Service was detected on site. It was determined that no special-status wildlife species are expected to occur on site because of the lack of suitable habitat.

Tables E-1 and E-2 in Appendix E of the Biological Resources Letter Report (Appendix B) list sensitive plant and wildlife species that are known to occur within a 10-mile radius of the project site (CDFW 2017) or are identified as occurring or potentially occurring according to the City's biological inventory (Marsh et al. 1983). For each species listed, a determination is made regarding the potential use of the project site based on information gathered during the field reconnaissance, known habitat present, current site conditions, past and present land uses, and knowledge of their relative distributions in the area.

Based on the species ranges, vegetation communities/land covers (e.g., developed, ornamental), and soils present on the project site, there is little to no potential for special-status plants or special-status wildlife to occur within the study area. Therefore, impacts associated with special-status species would be less than significant.

Nesting Birds

Less Than Significant with Mitigation Incorporated. The study area contains various landscape shrubs and trees that could support nesting birds. Although no active birds were observed during the fieldwork, these shrubs and trees could still potentially provide nesting opportunities for common bird and raptor species protected under the California Fish and Game Code and Migratory Bird Treaty Act. Impacts to nesting bird and raptor species could be potentially significant if implementation of the project would require removal or substantial maintenance (e.g., trimming, pruning) of mature trees during the nesting season. However, as mandated by the Migratory Bird Treaty Act, which is implemented by the U.S. Fish and Wildlife Service, any disturbance at active nesting territories (i.e., trees capable of supporting active nests) must be reduced or eliminated during critical phases of the nesting cycle (generally March through August, annually). Therefore, to minimize the potential environmental effects to nesting birds, the project must comply with the Migratory Bird Treaty Act. Therefore, with the incorporation of MM-BIO-1, impacts associated with wildlife nesting sites would be less than significant.

MM-BIO-1 If demolition, grading, and/or construction activities must occur during the avian nesting season (generally between February to August), the City of Laguna Beach shall ensure that a survey for active nests be conducted by a qualified biologist a maximum of 1 week prior to the activities to determine the presence/absence, location, and status of any active nests on or adjacent to the project site. If no active nests are discovered or identified, no further mitigation is required. In the event that active nests are discovered on site, a suitable buffer determined by the biologist (e.g., 30 to 50 feet for passerines) should be established around any active nest. No ground-disturbing activities shall occur within this buffer until the biologist has confirmed that breeding/nesting is completed, and the young have fledged the nest. Limits of construction to avoid a nest shall be established in the field by the biologist with flagging and stakes or construction fencing. Construction personnel shall be instructed regarding the ecological sensitivity of the fenced area. The results of the survey shall be documented and filed with the City of Laguna Beach within 5 days after the survey.

Essential Fish Habitat

Less Than Significant with Mitigation Incorporated. The project would be located adjacent to Laguna Beach State Marine Reserve (SMR), which extends seaward from the mean high tide line. In an SMR, it is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource, except under a scientific collecting permit issued by the CDFW or specific authorization from the California Fish and Game Commission for research, restoration, or monitoring purposes (14 CCR 632(a)(1)(A)). The project is also located adjacent to an area designated as essential fish habitat in the *Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery* (PFMC 2016). The Fishery Management Plan manages 85 species over a large and ecologically diverse area extending from the Pacific coast border with Mexico to the Pacific coast border between Washington and Canada.

Potential impacts resulting from construction of the project are expected to be minimal and temporary to the managed fish species occurring in the nearshore coastal habitat. During construction activates, it is anticipated that individuals of managed pelagic or groundfish species occur in the adjacent nearshore vicinity of the project would not be affected by construction activities or have to relocate to another area of open water or other shallow water habitat to avoid any disturbances caused by construction activities. No adverse effects are expected from construction activities that will impact recruitment or populations of the protected species within Laguna Beach SMR or affect nighttime spawning runs of California grunion (*Leuresthes tenuis*) (if they occur in the general vicinity). A review of the current habitat data does not indicate that eelgrass is present within the vicinity of the proposed construction site, and kelp forests are located outside the direct influence of proposed construction activities on the project site, which further reduces the potential for occurrence of managed species near the site. However, to avoid and minimize impacts to marine aquatic resources, implementation of MM-BIO-2 will require nighttime construction activities to be avoided between March and August. Therefore, with the incorporation of mitigation, impacts associates with essential fish habitat would be less than significant.

MM-BIO-2 The City of Laguna Beach shall ensure any nighttime construction activities associated with the ocean outfall occur outside of the grunion spawning season (generally between March and August). If nighttime construction during this time period is deemed by the City of Laguna Beach to be infeasible or otherwise unavoidable, an intertidal grunion survey shall be conducted prior to construction activities to ensure that grunions do not use the area immediately surrounding the project site to spawn. If grunion and spawning activities are identified in the immediate area, nighttime construction activities related to the ocean outfall shall continue to be conducted outside of the grunion spawning season.

b) Would the project 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 U.S. Fish and Wildlife Service?

Less-Than-Significant Impact. Vegetation communities and land covers were classified according to the Orange County Habitat Classification System (Gray and Bramlet 1992). Table 5 summarizes the extent of vegetation communities and land covers within the study area. Appendix A in the Biological Resources Letter Report (Appendix B) includes a map of vegetation communities and land covers. Vegetation communities and land covers identified in the study area include sandy beach, flood control channels, and developed and disturbed areas (Table 5).

Table 5
Summary of Vegetation Communities and Land Covers

Vegetation Community/Land Cover	Study Area (Acres)
Marine and Coastal Habitats	
Sandy beach	0.92
Watercourses	
Flood control channels	0.14
Developed Areas	
Urban	6.23
Transportation	0.78
Parks and ornamental plantings	0.38
Disturbed Areas	
Cleared or graded	0.24
Total	**8.69**

Source: Appendix B.

Based on the site-specific assessment, none of the vegetation communities and land covers on the project site are sensitive or considered very high value habitat, high value habitat, or moderate value habitat environmentally sensitive area according to the General Plan (City of Laguna Beach 2012). Therefore, impacts associated with riparian or sensitive vegetation communities would be less than significant.

c) ***Would the project 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?***

Less Than Significant with Mitigation Incorporated. The study area was analyzed to determine the presence and distribution of jurisdictional aquatic resources and significant drainage course as defined by the General Plan. The results of the formal jurisdictional delineation conducted throughout the entire study area identified the reach of one drainage feature—the Laguna Canyon Channel.

The Laguna Canyon Channel storm drain system conveys flows from approximately 9 square miles of tributary drainage area reaching beyond the SR-73 to the Pacific Ocean. The current drainage system within the study area is characterized by a reinforced, open concrete channel north of Forest Avenue and underground pre-cast concrete box culverts of varying sizes through downtown Laguna Beach. Most of this channel occurs underground, but a small portion just north of Beach Street is a reinforced, open concrete channel. The open concrete channels were determined to be jurisdictional non-wetland waters regulated by the ACOE, RWQCB, CDFW, and California Coastal Commission (CCC). The mean high-tide line of the Pacific Ocean was mapped at 8 feet, which occurs outside the study area. Approximately 0.04 acres within the study area are ACOE, RWQCB, CDFW, and CCC jurisdictional.

Implementation of the project would help to mitigate flood issues and provide partial flood protection to downtown Laguna Beach. The project would improve the flood conveyance of the current Laguna Canyon storm drainage system. In addition, the quality of the stormwater discharged from the Laguna Canyon Channel to the outlet would be consistent with water quality standards set forth by the state and the existing composition of the stormwater currently conveyed within the storm drainage system. Further, the project would be subject to the typical restrictions (e.g., best management practices) and requirements that address erosion and stormwater runoff, including those of the Clean Water Act (CWA) and the National Pollutant Discharge Elimination System (NPDES) permit. Nonetheless, given that approximately 0.04 acres of the study area are located within jurisdictional waters of the United States and/or state, MM-BIO-3 would be required to ensure that the project does not adversely affect federally protected wetlands and waters, and if it does, to assure that the appropriate level of compensatory mitigation is provided to offset such impacts. Therefore, with the incorporation of mitigation, impacts associated with federally protected wetlands would be less than significant.

MM-BIO-3 Prior to commencing construction of the project, the applicant shall consult with the U.S. Army Corps of Engineers (ACOE), Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW), and California Coastal Commission (CCC). The applicant shall coordinate with these agencies to acquire the appropriate permits and approvals (i.e., Section 404 permit [ACOE], Section 401 permit [RWQCB], Section 1602 permit [CDFW], and/or Coastal Development Permit [CCC]) to address potential temporary and/or permanent impacts to jurisdictional waters if it is deemed required by any of these agencies. Compensatory mitigation for temporary impacts, if required, shall be implemented as mutually agreed upon by the resource agencies and the City of Laguna Beach. Evidence of these coordination and permitting efforts shall be kept on file at the City of Laguna Beach.

d) ***Would the project 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?***

Less-Than-Significant Impact. Wildlife corridors are linear features that connect large patches of natural open space and provide avenues for the migration of animals. Habitat linkages are small patches that join larger blocks of habitat and help reduce the adverse effects of habitat fragmentation; they may be continuous habitat or discrete habitat islands that function as stepping stones for wildlife dispersal. Due to the limited size and constrained limits of the habitat on site, the property has very low potential to facilitate wildlife movement or function as a habitat linkage. Therefore, impacts associated with wildlife movement or nursery sites would be less than significant.

e) ***Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?***

Less-Than-Significant Impact. Policies and guidance for resource planning in the City are provided by the City's Open Space/Conservation Element (2006), which also serves as the City's certified Local Coastal Program pursuant to the 1976 California Coastal Act. According to the Open Space/Conservation Element (City of Laguna Beach 2006), the project site is not located within a very high value habitat, high value habitat, or moderate value habitat environmentally sensitive area.

The project site occurs just outside of 1 of the 124 Southern California marine protected areas. The Laguna Beach SMR encompasses 5.2 miles of shoreline habitat and 6.33 square miles of protected ocean. The Laguna Beach SMR protects resources by prohibiting the recreational and/or commercial take of all marine resources (i.e., injure, damage, or possess any living, geological, or cultural marine resource). Additionally, the project site occurs within the Laguna Canyon Channel watershed at one of the "local outfall" discharge locations identified on the Water Quality Environmental Sensitive Area Map (City of Laguna Beach 2012). The portion of the project site occurring parallel to the coast occurs within the 200-foot buffer of the Pacific Ocean water quality environmental sensitive area.

The project site is located over 1,000 feet from the Orange County Central and Coastal Natural Community Conservation Plan habitat reserve, which contains 32,818 acres of intact natural habitat. This reserve provides large blocks of intact natural vegetation communities providing habitat, wildlife corridors, and habitat linkages for a range of species.

Based on the site-specific assessment, none of the vegetation communities and land covers on the project site are sensitive or considered very high value habitat, high value habitat, or moderate value habitat according to the General Plan Open Space/Conservation Element (City of Laguna Beach 2006). No special-status plant or wildlife species would be significantly impacted by the project.

Potential impacts resulting from construction of the project are expected to be minimal and temporary to the managed fish species occurring in the nearshore coastal habitat. It is anticipated that individuals of managed pelagic or groundfish species that occur in the adjacent nearshore vicinity of the project site would not be affected by construction activities or have to relocate to another area of open water or other shallow water habitat to avoid any disturbances caused by construction activities. No adverse effects are expected from construction activities that will impact recruitment or populations of the protected species within Laguna Beach SMR or affect nighttime spawning runs of California grunion (if they occur in the general vicinity). A review of the current habitat data does not indicate that eelgrass is present within the vicinity of the proposed construction site, and kelp forests are located outside the direct influence of proposed construction activities on the project site, which further reduces the potential for occurrence of managed species near the site. Therefore, impacts associated with local policies or ordinances protecting biological resources would be less than significant.

f) Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

No Impact. The project site is located over 1,000 feet from the Orange County Central and Coastal Natural Community Conservation Plan habitat reserve. Therefore, no impacts associated with an adopted conservation plan would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
IV. 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?	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
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 dedicated cemeteries?	☐	☐	☒	☐

3.4 Cultural Resources

The following analysis is based on the Cultural Resources Assessment prepared by Duke Cultural Resources Management LLC and included as Appendix C.

a) Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?

Less-Than-Significant Impact. A records search of the project site and a 1-mile radius was conducted at the South Central Coastal Information Center. The records search included a review of all historic and prehistoric archeological sites, as well as cultural resource surveys and excavation reports. In addition, the National Register for Historic Places, California Register of Historical Resources (CRHR), California Historical Landmarks, and California Points of Historical Interest were examined for known cultural resources. A reconnaissance survey of the project site and immediate surroundings was conducted on July 21, 2017, in conjunction with the records search.

Typically, researchers in California use a 50-year age threshold, following State Historic Preservation Office recommendations, when evaluating eligibility for historical resources. Pursuant to CEQA Guidelines, Section 15064.5(a)(3), a resource may be considered to be "historically significant" by the lead agency if the resource meets the criteria for listing, including the following, on the CRHR (California Public Resources Code, Section 5024.1; 14 CCR 4852):

A. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage

B. Is associated with the lives of persons important in our past

C. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values

D. Has yielded, or may be likely to yield, information important in prehistory or history

Even if a resource is not listed on, or determined eligible for listing on, the CRHR, the lead agency may consider the resource to be an "historical resource" for the purposes of CEQA provided that the lead agency determination is supported by substantial evidence (CEQA Guidelines 14 CCR 15064.5). As such, in addition to CEQA, the project site was also evaluated for significance under the City's Historic Preservation Ordinance (Chapter 25.45 of the City's Municipal Code).

According to the state guidelines, a project with an effect that may cause a substantial adverse change in the significance of a historical resource or a unique archaeological resource is a project that may have a significant effect on the environment (14 CCR 15064.5[b]). CEQA further states that a substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired. Actions that would materially impair the significance of a historical resource are any actions that would demolish or adversely alter those physical characteristics of a historical resource that convey its significance and qualify it for inclusion in the CRHR or in a local register or survey that meet the requirements of PRC 5020.1(k) and 5024.1(g).

The project site was evaluated for the CRHR as an individual property with its period of significance beginning in 1929-1930, when it was built, and terminating in 1968, prior to the major reconstruction of the upper section of the channel between Beach Street and Forest Avenue. Determining the significance of the Laguna Canyon Channel is predicated on the property being associated with an event or events, or a person or person of significance in the history of the City or the County, and the structure's engineering significance that retains a sufficient level of integrity in order to convey its historic character. A review of available project materials found that the project site is not associated with an event or persons of significant in history of the City or the County or retains a sufficient level of integrity. As a result, the project site is not considered eligible for the CRHR and is not significant as defined in the City's Historic Preservation Ordinance. Therefore, impacts associated with historic resources would be less than significant.

b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Less-Than-Significant Impact. The records search from the South Central Coastal Information Center indicated that 41 cultural resource reports have been previously recorded, and 41 cultural resources have been mapped within 1 mile of the project site. In total, 20 resources are within 0.25 miles of the project site (refer to Table 2 in Appendix C). The nearest recorded resource, the New Lynn Theater (now called the Laguna Cinemas

South Coast Theater), is situated above the Laguna Canyon Channel on the southern side on South Coast Highway. The project would not involve operational or construction activities that would impact this or any of the mapped resources.

No archaeological resources were identified during the reconnaissance survey of the project area and immediate surroundings. The project area is characterized as built environment, and the exposed areas of soil adjacent and beneath the project site are highly disturbed due to previous construction-related earth-moving activities. Given that the proposed project does not involve ground disturbance outside of the existing footprint of the current storm drain facilities, and due to the heavily disturbed soil from decades of construction activities, the discovery of intact archaeological resources would be unlikely.

As such, based on the previous discussion, there is little potential for the discovery of intact subsurface archaeological deposits. In consideration of the results of the South Central Coastal Information Center records search and reconnaissance survey, there is low potential for buried, unrecorded cultural resources to be encountered during construction activities. Therefore, impacts associated with archaeological resources would be less than significant.

c) Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less-Than-Significant Impact. According to the City's General Plan Open Space/Conservation Element (2006), because the City is largely developed, there are few remaining portions that contain potentially significant paleontological resources. Sub-surface paleontological sites are abundant near Aliso Creek, located approximately 3 miles south of the project site. Based on the Laguna Canyon Channel Facility Evaluation Report (Appendix D), the bedrock underlain the site is Topanga Formation bedrock of Miocene Age. Bedrock is exposed at the surface west of Broadway and in increased depth from west to east. Conversely, the project area is not identified in the City's General Plan as containing rock outcroppings or having sensitive paleontological resources. In addition, due to prior earth-moving construction and excavation activities that have taken place over the years within the Laguna Canyon Channel, discovery of any paleontological resources is unlikely. Therefore, impacts associated with paleontological resources would be less than significant.

d) Would the project disturb any human remains, including those interred outside of dedicated cemeteries?

Less-Than-Significant Impact. No known cemeteries or burial grounds are located within the project site, and given the site's low lying, ocean adjacent location, it is unlikely that a currently unrecorded burial ground occurs within the project site. The project site has been previously developed and soil underlying the site have been heavily disturbed. Thus, ground-disturbing activities associated with construction of the proposed project are unlikely to encounter human remains.

However, if skeletal remains are uncovered during construction activities, California Health and Safety Code, Section 7050.5, states that no further disturbance shall occur until the county coroner makes a determination of origin and disposition pursuant to California Public Resources Code, Section 5097.98. In the event of an unanticipated discovery of human remains, the county coroner shall be notified immediately. If the human remains are determined to be prehistoric, the county coroner shall notify the Native American Heritage Commission, which shall notify a most likely descendant. The most likely descendant shall complete the inspection of the site within 48 hours of notification and may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials subject to City approval. Therefore, based on compliance with state regulatory requirements, impacts associated with the discovery of human remains would be less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
V. 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?	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
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?	☐	☐	☐	☒

3.5 Geology and Soils

a) Would the project 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.

No Impact. According to the California Department of Conservation Earthquake Zone maps, the project site is not located within an earthquake fault zone. No known faults underlay the project site and the site is not located in an Alquist-Priolo Earthquake Fault Zone (CDC 1998). In addition, per the General Plan Safety Element, no active or potentially active faults are located in the project area (City of Laguna Beach 1995). Two major inactive fault systems, the Laguna Canyon Fault and the Temple Hills Fault, traverse the City. It is unlikely these faults will experience activity because there is no record of faulting in the geologic record of the last 11,000 years (City of Laguna Beach 1995). Therefore, no impacts associated with fault rupture would occur.

ii) Strong seismic ground shaking?

Less-Than-Significant Impact. Like other projects located in the seismically active Southern California region, the project would likely experience shaking effects from surrounding faults during seismic events. However, the project site is not within any Alquist-Priolo Earthquake Fault Rupture Hazard Zone, and the site would not be affected by ground shaking more than any other area in the seismically active region. In addition, the project would be designed in accordance with all applicable design provisions set forth by applicable Uniform Building Code (UBC) requirements and other relevant industry standards, which dictate specifications to ensure that facilities would be able to withstand specified seismic forces. Therefore, impacts associated with strong seismic ground shaking would be less than significant.

iii) Seismic-related ground failure, including liquefaction?

Less-Than-Significant Impact. According to the Seismic Hazards Zone Map for the Laguna Beach 7.5-Minute Quadrangle, the project area is susceptible to seismically induced liquefaction (CDC 1998). In addition, the General Plan Safety Element states that liquefaction potential in the City is based upon the association of alluvial areas with shallow or potentially shallow groundwater depths (City of Laguna Beach 1995).

A geotechnical conditions summary based on previous subsurface investigations was conducted as part of the Facility Evaluation Report (Appendix D). The analyses determined that the project site should be considered liquefiable. The reconstructed portion of the channel may experience settlement due to liquefaction.

The project would be designed in accordance with all applicable design provisions set forth by applicable UBC requirements and other relevant industry standards, which dictate specifications to ensure that facilities would be able to withstand specified soil characteristics, including liquefaction and other seismic-related ground failure. Therefore, impacts associated with liquefaction and seismic-related ground failure would be less than significant.

iv) Landslides?

Less-Than-Significant Impact. The project site lacks any immediately adjacent hillsides or other natural topographic features such as riverbanks that are typically susceptible to landslides. In addition, according to the Seismic Hazards Zone Map for the Laguna Beach 7.5-Minute Quadrangle, the project area is not located within an earthquake-induced landslide zone (CDC 1998). Therefore, impacts associated with landslides would be less than significant.

b) Would the project result in substantial soil erosion or the loss of topsoil?

Less-Than-Significant Impact. Excavation and trenching would occur during project construction. Soils underlying hardscape land covers and landscaped areas may be temporarily exposed, increasing the potential for erosion. To minimize the potential for wind or water erosion during construction, the project would be subject to the typical restrictions (e.g., BMPs) and requirements that address erosion and runoff, including those of the CWA and NPDES. Construction BMPs would be implemented, as necessary, and may include stormwater and sediment source control, as well as treatment control, BMPs. The final list of BMPs to be implemented would be determined by the project engineer in conjunction with the construction contractor and would be employed to address erosion, siltation, stormwater, drainage, and water quality issues.

Once the project is operational, the project site would return to conditions similar to those prior to construction activities. As such, the project would not have exposed soils on the project site. Therefore, impacts associated with soil erosion would be less than significant.

c) ***Would the project 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?***

Less-Than-Significant Impact. As previously discussed in Section 3.5(a)(iii), while the broader project area may be susceptible to certain soil instability, the project would be designed in accordance with all applicable design provisions set forth by applicable UBC requirements and other relevant industry standards, which dictate specifications to ensure that facilities would be able to withstand structural stresses brought forth by the various soil and geologic characteristics that may affect the project area. Therefore, impacts associated with unstable soils and geologic units would be less than significant.

d) ***Would the project 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?***

Less-Than-Significant Impact. Expansive soils are characterized by their potential shrink/swell behavior. Shrink/swell is the cyclic change in volume (expansion and contraction) that occurs in certain fine-grained clay sediments from the process of wetting and drying. Clay minerals are known to expand with changes in moisture content. The higher the percentage of expansive minerals present in near surface soils, the higher the potential for substantial expansion.

According to the geotechnical conditions summary in the Facility Evaluation Report (Appendix D), the project site is underlain by a thick accumulation of undifferentiated beach deposits and alluvium. These deposits lack substantial quantities of clay materials and are generally considered suitable for the support of the proposed structural foundation elements. In addition, the project would be designed in accordance with all applicable design provisions set forth by applicable UBC requirements and other relevant industry standards, which dictate specifications to ensure that facilities would be able to withstand structural stresses brought forth by expansive soils. Therefore, impacts associated with expansive soils would be less than significant.

e) ***Would the project 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?***

No Impact. The project does not include the use of septic tanks or other alternative wastewater disposal system. Therefore, no impact associated with the septic tanks would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VI. 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?	☐	☐	☒	☐

3.6 Greenhouse Gas Emissions

a) ***Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?***

Less-Than-Significant Impact. Climate change refers to any significant change in measures of climate, such as temperature, precipitation, or wind patterns, lasting for an extended period of time (decades or longer). The Earth's temperature depends on the balance between energy entering and leaving the planet's system, and many factors (natural and human) can cause changes in Earth's energy balance. The greenhouse effect is the trapping and buildup of heat in the atmosphere (troposphere) near the Earth's surface. The greenhouse effect is a natural process that contributes to regulating the Earth's temperature, and it creates a livable environment on Earth. Human activities that emit additional GHGs to the atmosphere increase the amount of infrared radiation that gets absorbed before escaping into space, thus enhancing the greenhouse effect and causing the Earth's surface temperature to rise. Global climate change is a cumulative impact; a project contributes to this impact through its incremental contribution combined with the cumulative increase of all other sources of GHGs. Thus, GHG impacts are recognized exclusively as cumulative impacts (CAPCOA 2008).

A GHG is any gas that absorbs infrared radiation in the atmosphere; in other words, GHGs trap heat in the atmosphere. As defined in California Health and Safety Code, Section 38505(g), for purposes of administering many of the state's primary GHG emissions reduction programs, GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3) (CEQA Guidelines, Section 15364.5).[4] The three GHGs evaluated in this IS/MND are CO_2, CH_4, and N_2O.

Gases in the atmosphere can contribute to climate change both directly and indirectly.[5] The Intergovernmental Panel on Climate Change developed the global warming potential (GWP) concept to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. The reference gas used is CO_2; therefore, GWP-weighted emissions are measured in metric tons of CO_2 equivalent (MT CO_2E). Consistent CalEEMod, Version 2016.3.1, this GHG emissions analysis assumed the GWP for CH_4 is 25 (emissions of 1 MT of CH_4 are equivalent to emissions of 25 MT of CO_2), and the GWP for N_2O is 298, based on the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC 2007).

As discussed in Section3.2, Air Quality, the project is located within the jurisdictional boundaries of the SCAQMD. In October 2008, the SCAQMD proposed recommended numeric CEQA significance thresholds for GHG emissions for lead agencies to use in assessing GHG impacts of residential and commercial development projects as presented in its *Draft Guidance Document – Interim CEQA Greenhouse Gas (GHG) Significance Threshold* (SCAQMD 2008b). This document, which builds on the previous guidance prepared by the California Air Pollution Control Officers Association, explored various approaches for establishing a significance threshold for GHG emissions. The draft interim CEQA thresholds guidance document was not adopted or approved by the Governing Board. However, in December 2008, the SCAQMD adopted an interim 10,000 MT CO_2E per-year screening level threshold for stationary source/industrial projects for which the SCAQMD is the lead agency (see SCAQMD Resolution No. 08-35, December 5, 2008). The 10,000 MT CO_2E per year threshold was based on the conclusion that the threshold was consistent with achieving an emissions capture rate of 90% of all new or modified stationary source projects, which in turn uses Executive Order S-3-05 as the basis for deriving the screening level.

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4 Climate-forcing substances include GHGs and other substances such as black carbon and aerosols. This discussion focuses on the seven GHGs identified in the California Health and Safety Code, Section 38505; impacts associated with other climate-forcing substances are not evaluated herein.

5 Direct effects occur when the gas itself absorbs radiation. Indirect radiative forcing occurs when chemical transformations of the substance produce other GHGs, when a gas influences the atmospheric lifetimes of other gases, and/or when a gas affects atmospheric processes that alter the radiative balance of the Earth (e.g., affect cloud formation or albedo) (EPA 2016).

The SCAQMD formed a GHG CEQA Significance Threshold Working Group to work with SCAQMD staff on developing GHG CEQA significance thresholds until statewide significance thresholds or guidelines are established. From December 2008 to September 2010, the SCAQMD hosted working group meetings and revised the draft threshold proposal several times, although it did not officially provide these proposals in a subsequent document. The SCAQMD has continued to consider adoption of significance thresholds for residential and general land use development projects. The most recent proposal, issued in September 2010, uses the following tiered approach to evaluate potential GHG impacts from various uses (SCAQMD 2010):

Tier 1. Determine if CEQA categorical exemptions are applicable. If not, move to Tier 2.

Tier 2. Consider whether or not the project is consistent with a locally adopted GHG reduction plan that has gone through public hearing and CEQA review, that has an approved inventory, includes monitoring. If not, move to Tier 3.

Tier 3. Consider whether the project generates GHG emissions in excess of screening thresholds for individual land uses. The 10,000 MT CO_2E per year threshold for industrial uses would be recommended for use by all lead agencies. Under option 1, separate screening thresholds are proposed for residential projects (3,500 MT CO_2E per year), commercial projects (1,400 MT CO_2E per year), and mixed-use projects (3,000 MT CO_2E per year). Under option 2, a single numerical screening threshold of 3,000 MT CO_2E per year would be used for all non-industrial projects. If the project generates emissions in excess of the applicable screening threshold, move to Tier 4.

Tier 4. Consider whether the project generates GHG emissions in excess of applicable performance standards for the project service population (population plus employment). The efficiency targets were established based on the goal of AB 32 to reduce statewide GHG emissions to 1990 levels by 2020. The 2020 efficiency targets are 4.8 MT CO_2E per service population for project-level analyses and 6.6 MT CO_2E per service population for plan-level analyses. If the project generates emissions in excess of the applicable efficiency targets, move to Tier 5.

Tier 5. Consider the implementation of CEQA mitigation (including the purchase of GHG offsets) to reduce the project efficiency target to Tier 4 levels.

Section 15064.7(c) of the CEQA Guidelines specifies that "when adopting thresholds of significance, a lead agency may consider thresholds of significance previously adopted or recommended by other public agencies, or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence." The CEQA Guidelines do not prescribe specific methodologies for performing an assessment, establish specific thresholds of significance, or mandate specific mitigation measures. Rather, the CEQA Guidelines emphasize the lead agency's discretion to determine the appropriate methodologies and thresholds of significance that are consistent with the manner in which other impact areas are handled in CEQA (14 CCR 15064.4).

To determine the project's potential to generate GHG emissions that would have a significant impact on the environment, the project's GHG emissions were compared to the quantitative threshold of 3,000 MT CO_2E per year for all non-industrial projects. Per the SCAQMD guidance, construction emissions should be amortized over the operational life of the project, which is assumed to be 30 years (SCAQMD 2008b). Thus, this impact analysis compares amortized construction emissions to the proposed SCAQMD threshold of 3,000 MT CO_2E per year since the project would not include operational activities or associated GHG emissions.

Construction Emissions

Construction of the project would result in GHG emissions primarily associated with the use of off-road construction equipment, on-road trucks, and worker vehicles. As discussed in Section 3.3, CalEEMod was used to calculate the annual GHG emissions based on the construction scenario described in Section 3.2(b). A detailed depiction of expected construction schedules (including information regarding phasing, equipment used during each phase, truck trips, and worker vehicle trips) assumed for the purposes of emissions estimation is provided in Appendix A. On-site sources of GHG emissions include off-road equipment; off-site sources include trucks and worker vehicles. Table 6 presents construction GHG emissions for the project from on-site and off-site emissions sources.

Table 6
Estimated Annual Construction GHG Emissions

Year	CO_2	CH_4	N_2O	CO_2E
	Metric Tons per Year			
2018	186.47	0.03	0.00	187.17
Total	**186.47**	**0.03**	**0.00**	**187.17**
Amortized Over 30 Years				**6.24**
SCAQMD Recommended Threshold				*3,000*
Exceeds Threshold?				**No**

Source: See Appendix A for complete results.
Notes: CH_4 = methane; CO_2 = carbon dioxide; CO_2E = carbon dioxide equivalent; GHG = greenhouse gas; N_2O = nitrous oxide

As shown in Table 6, the estimated total GHG emissions during project construction would be approximately 187 MT CO_2E. Amortized over 30 years, construction GHG emissions would be approximately 6 MT CO_2E per year. Because the project would not generate operational emissions, as discussed below, total amortized project emissions of 6 MT CO_2E per year would not exceed the recommended SCAQMD threshold of 3,000 MT CO_2E per year.

In addition, as with project-generated construction criteria air pollutant emissions, GHG emissions generated during proposed demolition activities would be short term, lasting only for the duration of the construction period (until demolition is complete), and would not represent a long-term source of GHG emissions. Therefore, short-term construction impacts associated with the generation of GHG emissions would be less than significant.

Operational Emissions

Once project demolition and construction is complete, operational activity would be limited to a nominal number of routine maintenance and unexpected emergency repair work. Routine equipment operation or vehicle trips would not be required. The project would drain through gravity only, and no pumps or other equipment would be required to convey stormwater. Therefore, long-term operational impacts associated with GHGs emissions would be less than significant.

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less-Than-Significant Impact. The Climate Change Scoping Plan, approved by CARB in 2008 and updated in 2014 and 2017, provides a framework for actions to reduce California's GHG emissions and requires CARB and other state agencies to adopt regulations and other initiatives to reduce GHGs. The Scoping Plan is neither directly applicable to specific projects nor intended to be used for project-level evaluations.[6] Under the Scoping Plan, however, there are several state regulatory measures aimed at the identification and reduction of GHG emissions. CARB and other state agencies have adopted many of the measures identified in the Scoping Plan. Most of these measures focus on area source emissions (e.g., energy usage, high-GWP GHGs in consumer products) and changes to the vehicle fleet (hybrid, electric, and more fuel-efficient vehicles) and associated fuels, among others (CARB 2014, 2017).

[6] The Final Statement of Reasons for the amendments to the CEQA Guidelines reiterates the statement in the Initial Statement of Reasons that "the Scoping Plan may not be appropriate for use in determining the significance of individual projects because it is conceptual at this stage and relies on the future development of regulations to implement the strategies identified in the Scoping Plan" (14 CCR 15064.4).

Regarding consistency with post-2020 statewide targets, specifically Senate Bill 32 (goal of reducing GHG emissions to 40% below 1990 levels by 2030) and Executive Order S-3-05 (goal of reducing GHG emissions to 80% below 1990 levels by 2050), there are no established protocols or thresholds of significance for that future-year analysis. However, CARB forecasts that compliance with the current Scoping Plan puts the state on a trajectory of meeting these long-term GHG goals, although the specific path to compliance is unknown (CARB 2014). As discussed previously, the project would result in minimal short-term GHG emissions and would not result in long-term operational emissions. As such, the project would not conflict with the state's trajectory toward future GHG reductions.

Therefore, based on the above, impacts associated with policies and regulations adopted for the purpose of reducing GHG emissions would be less than significant.

		Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VII.	**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 that 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)	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☒	☐	☐
f)	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?	☐	☐	☐	☒

3.7 Hazards and Hazardous Materials

a) ***Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?***

Short-Term Construction Impacts

Less Than Significant With Mitigation Incorporated. During construction of the project, potentially hazardous materials would likely be handled on the project site. These materials would include gasoline, diesel fuel, lubricants, and other petroleum-based products used to operate and maintain construction equipment. Handling of these potentially hazardous materials would be temporary and would coincide with the short-term construction phase of the project. Consistent with federal, state, and local requirements, removal and disposal of hazardous materials from the project site would be conducted by a permitted and licensed service provider. Any handling, transport, use, or disposal of hazardous materials must comply with all relevant federal, state, and local agencies and regulations, including the U.S. Environmental Protection Agency, the California Department of Toxic Substances Control, the California Occupational Safety and Health Administration, Caltrans, the Resource Conservation and Recovery Act, the Orange County Environmental Health Division, and the Laguna Beach Fire Department.

GeoTracker online database is the State Water Resources Control Board's management system for sites that impact, or have the potential to impact, water quality in the state, with emphasis on groundwater. GeoTracker contains records for sites that require cleanup, such as leaking underground storage tank (LUST) sites, Department of Defense sites, and Cleanup Program sites. In addition, GeoTracker contains records to permitted facilities such as irrigated lands, oil and gas production, operating permitted underground storage tanks, and land disposal sites (SWRCB 2015). GeoTracker was used to search the project area to determine whether any possible recognized environmental concerns occur in the project area. The search identified the following recognized environmental conditions that could potentially impact the project site:

- Mobil Gas Station No. 18-HK6 (104 North Coast Highway)

The Mobil Gas Station No. 18-HJ6 is identified by GeoTracker as an "Open-Verification Monitoring" LUST cleanup site. The State Water Resources Control Board identified the potential contaminant of concern for the site as gasoline (SWRCB 2012). As a LUST cleanup site, the primary concern for the project in relation to the Mobil gas station site would be groundwater contamination and an association groundwater plume that may have migrated below the location of the storm drain alignments. The subsurface groundwater plume associated with this gas station use was previously identified in the immediate area of the intersection of South Coast Highway and Broadway Street. However, the most current investigation reveals that contaminant plume at the site has not affected groundwater (SWRCB 2017). Ongoing remediation activities are actively overseen by the State Water Resources Control Board, and despite continued compliance with federal, state, and local provisions related to cleanup efforts, construction of the project may result in environmental and health impacts if not properly addressed.

Due to the proximity of the Mobil gas station LUST cleanup site to the project site, subsurface pockets of isolated contamination could occur under the project site. To minimize risk to construction workers who would handle subsurface soils, as well as those residing in the vicinity of the project, MM-HAZ-1 would be required. In addition, MM-HAZ-2 would further reduce risks associated with construction equipment and staging areas. Therefore, with the incorporation of mitigation, short-term impacts associated routine transport, use, or disposal of hazardous materials would be less than significant.

MM-HAZ-1 Prior to the issuance of a demolition, grading, and/or building permit, the City of Laguna Beach shall include the following instructions to its construction contractor on all plans pertaining to subsurface construction activities for the project: “The construction contractor shall regularly inspect the exposed soil for visual evidence of any contamination or volatilization of contaminants (odors). If visual or odor contamination indicators are identified during construction activities, all work shall stop in the vicinity of the potential contamination, and an investigation shall be designed and performed by a qualified environmental consultant to verify the presence and extent of contamination on the project site. Results of the investigation shall be reviewed and approved by the City of Laguna Beach prior to resuming construction activities in the vicinity of the contamination.”

The investigation shall include collecting samples for laboratory analysis and quantification of contaminant levels within the disturbance areas. Subsurface investigation shall determine appropriate worker protection and hazardous material and disposal procedures appropriate for the project site. Contaminated soil or groundwater determined to be hazardous shall be removed by personnel who have been trained through the Occupational Safety and Health Administration–recommended 40-hour safety program with an approved plan for groundwater extractions, soil excavation, control of contaminant releases to the air, and off-site transport or on-site treatment.

MM-HAZ-2 Prior to construction activities, the City of Laguna Beach shall include the following instructions to its construction contractor on all project plans:

- The construction contractor shall remove equipment and construction material during and before inclement weather.
- No fuel or other hazardous materials shall be stored in staging areas.
- Construction equipment shall be inspected daily for leakage. Leaking equipment shall not be allowed to remain on site and shall be removed from the project site immediately. Leaking equipment shall not be repaired on the project site and shall only be repaired at a permitted off-site facility before being returned on site.

Long-Term Operational Impacts

Less-Than-Significant Impact. Once operational, the project would involve minimal hazardous materials used during operations and maintenance activities. The handling, transport, and use of hazardous materials would comply with all applicable federal, state, and local regulations to reduce the opportunity for the creation of hazards to humans or the environmental. In addition, as required by the U.S. Occupational Safety and Health Administration, all hazardous materials stored on site would be accompanied by a Material Safety Data Sheet, which would inform on-site personnel of the necessary remediation procedures in the case of accidental release. Therefore, long-term construction impacts associated with the routine transport, use, or disposal of hazardous materials would be less than significant.

b) Would the project 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?

Less Than Significant with Mitigation Incorporated. Refer to Section 3.7(a).

c) Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Less-Than-Significant Impact. Land uses and activities typically associated with hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste include heavy commercial, manufacturing, research, and industrial uses. Once operational, the project would continue as a storm drainage facility that would not emit hazardous emissions or materials.

Laguna Presbyterian Preschool (415 Forest Avenue) is the closest existing school in the project vicinity, located approximately 0.1 mile east of the project site. Although, the project site is located within the 0.25-mile radius of this school, the project would not emit hazardous emissions. Therefore, impacts associated with emitting or handling hazardous emissions or materials within 0.25 miles of a school would be less than significant.

d) Would the project be located on a site that 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?

No Impact. The Hazardous Waste and Substances Sites (Cortese) List is a planning document used by the state, local agencies, and developers to comply with the CEQA requirements of providing information about the locations of hazardous materials release sites. California Government Code, Section 65962.5, requires the California Environmental Protection Agency to develop, at least annually, an updated Cortese List. The Department of Toxic Substances Control is responsible for a portion of the information contained in the Cortese List. Other state and local government agencies are required to provide additional hazardous materials release information for the Cortese List.

The GeoTracker database and the California Department of Toxic Substances Control EnviroStor database were reviewed to determine the location, type, and cleanup status of sites within 0.5 miles of the project site (SWRCB 2015; DTSC 2007). GeoTracker contains sites that require groundwater cleanup (LUSTs, Department of Defense, and site cleanup program), as well as permitted facilities that could impact groundwater (irrigated lands, oil and gas production, operating underground storage tanks, and land disposal sites). The EnviroStor database includes the following site types: federal superfund sites (national priorities list); state response, including military facilities and state superfund; voluntary cleanup; and school sites. There are 13 LUST cleanup sites located within 0.5 miles of the project site, 11 of which are closed, and 2 are under monitoring. The EnviroStor database identified no cleanup and/or permitted sites within the 0.5-mile radius of the project site.

Based on online search of hazardous materials sites, the project site was not identified on the Cortese List or any other list of hazardous materials sites. Therefore, no impacts associated with inclusion on the Cortese List would occur.

e) ***Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?***

Less Than Significant with Mitigation Incorporated. As discussed in Section 3.15(a), prior to the start of construction activities, a construction management plan (CMP) will be prepared to address impacts to local vehicular circulation as a result of temporary lane closure and associated detours that may be intermittently required during certain construction activities. Implementation of the CMP, which is required under MM-TRA-1, would minimize impacts to local circulation and help ensure that emergency responders can navigate in and around the project area with minimal disruption. Given that any lane closures would be temporary and mitigated with adherence to the CMP, and because the majority of construction activities will not require any type of street closures or detours, any potential impacts with emergency response in the project area would be reduced to acceptable levels of significance. Therefore, with the incorporation of mitigation, impacts associated with emergency response and evacuation plans would be less than significant.

f) ***Would the project 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?***

No Impact. According to the General Plan Safety Element, the City has adopted special building requirements in its hazardous fire area (wildland/urban interface zone) that exceed the UBC requirements (City of Laguna Beach 1995). The project site is surrounded by existing development in an urbanized portion away from any urban-wildland interface. The reconstructed portions of the system would be built in accordance with City's building requirements to reduce risk involving fires. In addition, the project involves a subsurface storm drainage system that does involve habitable structures, and therefore, does not exposed people to risk of loss, injury, or death associated with wildland fires. Therefore, no impacts associated with wildland fire would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
VIII. HYDROLOGY AND WATER QUALITY – Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
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 pre-existing 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) Result in an increase in pollutant discharges to receiving waters? (Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical storm water pollutants [e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances and trash].)	☐	☐	☒	☐
g) Result in significant alteration of receiving water quality during or following construction?	☐	☐	☒	☐
h) Result in increased impervious surfaces and associated increased runoff?	☐	☐	☐	☒
i) Create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?	☐	☐	☒	☐
j) Result in increased erosion downstream?	☐	☐	☒	☐
k) Result in an increase in any pollutant for which a downstream water body is already impaired, as listed on the Clean Water Act Section 303(d) list?	☐	☐	☒	☐
l) Exacerbate already existing sensitive conditions to downstream environmentally sensitive area?	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
m) Have a potentially significant adverse impact on the surface water quality of either marine, fresh or wetland waters?	☐	☐	☒	☐
n) Have a potentially significant adverse impact on ground water quality?	☐	☐	☒	☐
o) Cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives, policies or degradation of beneficial uses?	☐	☐	☒	☐
p) Impact aquatic, wetland or riparian habitat	☐	☐	☒	☐
q) Otherwise substantially degrade water quality?	☐	☐	☒	☐
r) 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?	☐	☐	☒	☐
s) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☒	☐
t) 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?	☐	☐	☒	☐
u) Inundation by seiche, tsunami, or mudflow?	☐	☐	☒	☐

3.8 Hydrology and Water Quality

a) Would the project violate any water quality standards or waste discharge requirements?

Short-Term Construction Impacts

Less-Than-Significant Impact. Construction of the project would include earthwork activities that may generate soil erosion and could potentially result in violation of water quality standards or waste discharge requirements if appropriate BMPs are not properly incorporated during construction activities. However, the project would be subject to the typical restrictions (e.g., BMPs) and requirements that address erosion and stormwater runoff, including those of the CWA and the NPDES permit. Construction BMPs would be implemented as necessary and may include stormwater control, sediment source control, and/or treatment control BMPs. The final list of BMPs to be implemented would be determined by the project engineer in conjunction with the construction contractor and would be employed to address erosion, siltation, stormwater, drainage, and water quality issues. Therefore, short-term construction impacts associated with water quality standards and waste discharge requirements would be less than significant.

Long-Term Operational Impacts

Less-Than-Significant Impact. Under the existing conditions, the water discharged at the outlet at Main Beach must comply with local and state, water quality standards. According to the *City of Laguna Beach Sewer System Management Plan* (City of Laguna Beach 2015), the City maintains diversion structures to protect receiving waters from storm pollution from storm drains. During the summer months, the City's Water Quality Program berms sand in front of the outlet to trap summer storm flows in the culvert, where it is pumped into the sanitary sewer for treatment.

Following implementation of the project, the transition structure, box culvert, and outlet would operate similar to the existing facilities. In addition, the project would not alter the makeup of the stormwater discharged from the outlet, and thus, the stormwater would still comply with all applicable water quality standards. Therefore, long-term operational impacts associated with water quality standards and waste discharge requirements would be less than significant.

b) Would the project 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 (i.e., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?

No Impact. Under the existing conditions, the project site contains impervious storm drain facilities that convey stormwater flows from upper natural channels to the ocean. The project site does not currently serve as a groundwater recharge area. Subsurface construction activities would likely encounter groundwater and would require isolated dewatering to remove groundwater from the construction sites. However, dewatering activities would be temporary and would not permanently impact the local aquifer underlying the project site.

In addition, aside from a limited amount of water needed during construction, no water supplies, including groundwater supplies, would be required. As such, the project would not require groundwater supplies to serve the project, or interfere with groundwater recharge. Therefore, no impacts associated with groundwater recharge or groundwater supplies would occur.

c) ***Would the project 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?***

Less-Than-Significant Impact. Following implementation of the project, the transition structure, box culvert, and outlet would operate similar to existing conditions, albeit with increased capacity and greater efficiency. Thus, the existing drainage pattern would be retained following implementation of the project. In addition, the project would be subject to the typical restrictions (e.g., BMPs) and requirements that address erosion and stormwater runoff, including those of the CWA and the NPDES permit. Construction BMPs would be implemented as necessary and may include stormwater control, sediment source control, and/or treatment control BMPs. The final list of BMPs to be implemented would be determined by the project engineer in conjunction with the construction contractor and would be employed to address erosion, siltation, stormwater, drainage, and water quality issues. Therefore, impacts associated with existing drainage patterns and erosion/siltation would be less than significant.

d) ***Would the project 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?***

Less-Than-Significant Impact. As previously discussed, following implementation of the project, the transition structure, box culvert, and outlet would operate similar to existing conditions, albeit with increased capacity and greater efficiency. Thus, the existing drainage pattern would be retained following implementation of the project. Further, the overarching purpose of the project is to alleviate flooding issues that have occurred over the past years in the downtown area of the City as a result of blockage, and to maintain existing drainage structures that are aging. As such, the project would have a beneficial effect on stormwater drainage in the project area and wound not increase the rate or amount of surface runoff in a way that would result in flooding on or off site. Therefore, impacts associated with existing drainage patterns and flooding would be less than significant.

e) ***Would the project 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?***

Less-Than-Significant Impact. Following implementation of the project, the transition structure, box culvert, and outlet would operate similar to existing conditions, albeit with increased capacity and greater efficiency. The new storm drain system has been designed and engineered to capture a greater percentage of stormwater that is conveyed through the Laguna Canyon Channel, while at the same time having a beneficial effect on stormwater drainage in the project area. Therefore, impacts associated with runoff water would be less than significant.

f) Result in an increase in pollutant discharges to receiving waters? (Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical storm water pollutants [e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances and trash].)

Less-Than-Significant Impact. Refer to Section 3.8(a).

g) Result in significant alteration of receiving water quality during or following construction?

Less-Than-Significant Impact. Refer to Section 3.8(a).

h) Result in increased impervious surfaces and associated increased runoff?

No Impact. Under the existing conditions, the project site contains impervious storm drain facilities that convey stormwater flows from upper natural channels to the ocean. Following implementation of the project, the transition structure, box culvert, and outlet would operate, as well encompass a footprint, similar to existing conditions, albeit with increased capacity and greater efficiency. Therefore, no impacts associated with an increase in impervious surfaces and associated increased runoff would occur.

i) Create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes?

Less-Than-Significant Impact. Refer to Sections 3.8(c) and 3.8(d).

j) Result in increased erosion downstream?

Less-Than-Significant Impact. Refer to Section 3.8(c).

k) Result in an increase in any pollutant for which a downstream water body is already impaired, as listed on the Clean Water Act Section 303(d) list?

Less-Than-Significant Impact. Refer to Section 3.8(a).

l) Exacerbate already existing sensitive conditions to downstream environmentally sensitive area?

Less-Than-Significant Impact. The project site occurs just outside of 1 of the 124 Southern California marine protected areas. The Laguna Beach SMR encompasses 5.2 miles of shoreline habitat and 6.33 square miles of protected ocean. The Laguna Beach SMR protects resources by prohibiting the recreational and/or commercial take of all marine resources (i.e., injure, damage, or possess any living, geological, or cultural marine resource). Additionally, the project site occurs within the Laguna Canyon Channel watershed at one of the "local outfall" discharge locations identified on the Water Quality Environmental Sensitive Area Map (City of Laguna Beach 2012). The portion of the project site occurring parallel to the coast occurs within the 200-foot buffer of the Pacific Ocean water quality environmental sensitive area.

Based on the site-specific assessment, none of the vegetation communities and land covers on the project site are sensitive or considered very high value habitat, high value habitat, or moderate value habitat according to the General Plan Open Space/Conservation Element (City of Laguna Beach 2006). No special-status plant or wildlife species would be significantly impacted by the project.

Potential impacts resulting from construction of the project are expected to be minimal and temporary to the managed fish species occurring in the nearshore coastal habitat. It is anticipated that individuals of managed pelagic or groundfish species that occur in the adjacent nearshore vicinity of the project site would not be affected by construction activities or have to relocate to another area of open water or other shallow water habitat to avoid any disturbances caused by construction activities. No adverse effects are expected from construction activities that will impact recruitment or populations of the protected species within Laguna Beach SMR or affect nighttime spawning runs of California grunion (if they occur in the general vicinity). A review of the current habitat data does not indicate that eelgrass is present within the vicinity of the proposed construction site, and kelp forests are located outside the direct influence of proposed construction activities on the project site, which further reduces the potential for occurrence of managed species near the site. Therefore, impacts associated with downstream environmentally sensitive areas would be less than significant.

m) Have a potentially significant adverse impact on the surface water quality of either marine, fresh or wetland waters?

Less-Than-Significant Impact. Refer to Section 3.8(a).

n) ***Have a potentially significant adverse impact on ground water quality?***

Less-Than-Significant Impact. Refer to Sections 3.8(a) and 3.8(b).

o) ***Cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives, policies or degradation of beneficial uses?***

Less-Than-Significant Impact. Refer to Section 3.8(b).

p) ***Impact aquatic, wetland or riparian habitat?***

Less-Than-Significant Impact. Refer to Section 3.8(l).

q) ***Would the project otherwise substantially degrade water quality?***

Less-Than-Significant Impact. Refer to Section 3.8(a).

r) ***Would the project 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?***

Less-Than-Significant Impact. According to the Flood Insurance Rate Map for the project area, Flood Insurance Rate Map Panel No. 06059C0416J, the northern part of the project site, including the transition structure, is located in Flood Hazard Zone AE, while the southern half, which includes the ocean outfall, is locate in Flood Hazard Zone VE. Both of these zones are defined by the Federal Emergency Management Agency as area susceptible to inundation by the 1% annual chance flood (i.e., located with the 100-year floodplain). In addition, the northern portion of the project site is also located in a floodway area, which is defined as a channel of a stream plus any adjacent floodplain that must be kept free of encroachment so that the1% annual chance flood can be carried out without substantial increases in flood height (FEMA 2009).

As previously discussed, the project would have a beneficial effect on stormwater drainage in the project area and wound not increase the rate or amount of surface runoff in a manner that would result in flooding on or off site. Following implementation of the project, the transition structure, box culvert, and outlet would operate, as well encompass a footprint, similar to the existing facilities.

No housing or other inhabitable structures would be constructed as part of the project, and compared with the existing conditions, the project would not increase the need for operations and maintenance staff to be working on site. As such, the project would not subject housing, property, residents, or employees to increased risk due to flooding. Therefore, impacts associated with placing housing within a 100-year flood hazard area would be less than significant.

s) Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?

Less-Than-Significant Impact. Refer to Section 3.8(r).

t) Would the project 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?

Less-Than-Significant Impact. According to the Figure IX-9, Prado Dam and Santiago Reservoir Inundation Areas, from the County's General Plan Safety Element, the project site is located outside of a dam inundation area (County of Orange 2012a). However, as previously discussed, the project site does occur in an area defined by the Federal Emergency Management Agency as being susceptible to inundation by the 1% annual chance flood. Nonetheless, no housing or other inhabitable structures would be constructed as part of the project, and compared with the existing conditions, the project would not increase the need for operations and maintenance staff to be working on site. As such, the project would not subject housing, property, residents, or employees to increased risk due to flooding. Therefore, impacts associated with exposing people or structures to a significant risk due to flooding would be less than significant.

u) Inundation by seiche, tsunami, or mudflow?

Less-Than-Significant Impact. According to the Tsunami Inundation Map for Emergency Planning Laguna Beach Quadrangle, the project site is located in a tsunami inundation area (CalEMA et al. 2009). Notwithstanding, no housing or other inhabitable structures would be constructed as part of the project, and compared with the existing conditions, the project would not increase the need for operations and maintenance staff to be working on site. As such, the project would not subject housing, property, residents, or employees to increased risk due to tsunami. In addition, the City has taken steps to warn residents, visitors, and employees of the possibility of an impending tsunami, including monitoring National Weather Services's Pacific Tsunami Warning Center.

In regard to seiche or mudflow, because of the lack of immediately adjacent lakes, reservoirs, or hillside, the project site would not be susceptible to these types of natural phenomena. Therefore, impacts associated with seiche, tsunami, or mudflow would be less than significant.

		Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
IX.	**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?	☐	☐	☐	☒

3.9 Land Use and Planning

a) Would the project physically divide an established community?

No Impact. The physical division of an established community typically refers to the construction of a linear feature (such as a major highway or railroad tracks) or removal of access (such as a local road or bridge) that would impair mobility within an existing community and outlying area. Under the existing conditions, the Laguna Canyon Channel and culvert are not used as connection between established communities. Instead, connectivity in the surrounding area is facilitated through local roadways and pedestrian sidewalks. Therefore, no impacts associated with the physical division of an established community would occur.

b) Would the project 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?

No Impact. The City’s Zoning Map identifies the area surrounding the transition structure and culvert as CBD-2 (Downtown Commercial), while the area surrounding the Main Beach outlet is zoned CBD (Public Parks) (City of Laguna Beach 2012c).

Following implementation of the project, the transition structure, box culvert, and outlet would operate, as well encompass a footprint, similar to the existing facilities. These existing facilities are considered with both the underling General Plan land use designation and zoning; thus, the new facilities are also expected to be consistent with the provisions outlined within the General

Plan, including the Land Use Element and Open Space/Conservation Element (which also serves as the City's certified Local Coastal Program pursuant to the 1976 California Coastal Act), as well as the City's Municipal Code and Zoning Ordinance. Therefore, no impacts associated with applicable land use plans, policies, or regulations would occur.

c) ***Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?***

No Impact. The project site is located over 1,000 feet from the Orange County Central and Coastal Natural Community Conservation Plan habitat reserve. Therefore, no impacts associated with an adopted conservation plan would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
X. 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?	☐	☐	☐	☒

3.10 Mineral Resources

a) ***Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?***

No Impact. According to the County's General Plan Resources Element, the California Department of Conservation, Division of Mines and Geology, identified significant sand and gravel resources within the Orange County region. These resource areas are mapped within the County's General Plan Resources Element located in portions of the Santa Ana River, Santiago Creek, San Juan Creek, and Arroyo Trabuco (County of Orange 2012b).

Figure VI-3, the Mineral Resources Map, of the Resource Element has not identified mineral resource areas around the project site. The nearest mineral resource area to the project site is located within San Juan Creek, several miles east of the project site (County of Orange 2012b). Therefore, no impacts associated with the loss of known mineral resources would occur.

b) Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

No Impact. Refer to Section 3.10(a).

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XI. 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?	☐	☒	☐	☐

3.11 Noise

Regulatory Setting

City of Laguna Beach Municipal Code

The City's Municipal Code Noise Ordinance, Chapter 7.25, Noise (2005a), is intended to control unnecessary, excessive, and annoying sounds from sources on one property to receivers on another; this is achieved by setting limits that cannot be exceeded at adjacent properties. Noise taking place on public roadways or resulting from rail transit or other interstate commerce is preempted by federal and state law.

Section 7.25.040 (Exterior Noise Standards) of the City's Municipal Code specifies a noise level of 70 A-weighted decibels (adjusted for human hearing) (dBA) L_{eq} (day or night) in the Specific Plan Area, Noise Zone IV.[7] At the nearest residences (located to the west of the project site and zoned as CBD

[7] Consisting of Zones CBD1, CBD2, CBD visitor commercial, CBD central bluffs and civic arts district. The project alignment is located within these zones.

Residential), the City's Municipal Code specifies a noise level of 65 dBA L_{eq} during daytime hours (7:00 a.m. to 10:00 p.m.) and 55 dBA L_{eq} during nighttime hours (10:00 p.m. to 7:00 a.m.) (2005a).

Construction noise is addressed in Section 7.25.080 of the City's Municipal Code, which states the following (2005a):

> (A) Weekdays. No person, while engaged in construction, remodeling, digging, grading, demolition or any other related building activity, shall operate any tool, equipment or machine in a manner which produces loud noise that disturbs a person of normal sensitivity who works or resides in the vicinity, or a peace or code enforcement officer, on any weekday except between the hours of seven-thirty a.m. and six p.m.
>
> (B) Weekends and Holidays. No person, while engaged in construction, remodeling, grading, demolition or other related building activity, shall operate any tool, equipment or machine in a manner which produces loud noise that disturbs a person of normal sensitivity who works or resides in the vicinity, or a peace or code enforcement officer, on any weekend day or any federal holiday.
>
> (C) No landowner, construction company owner, contractor, subcontractor, or employer shall permit or allow any person or persons working under their direction and control to operate any tool, equipment or machine in violation of the provisions of this section.
>
> (D) Exceptions.
>
> > (1) The provisions of this section shall not apply to emergency construction work performed by a private party when authorized by the director of community development, building official or their designee.
> >
> > (2) The maintenance, repair or improvement of any public work or facility by public employees, by any person or persons acting pursuant to a public works contract, or by any person or persons performing such work or pursuant to the direction of, or on behalf of, any public agency; provided, however, this exception shall not apply to the city of Laguna Beach, or its employees, contractors or agents, unless:
> >
> > > (a) The city manager or a department director determines that the maintenance, repair or Improvement is immediately necessary to maintain public services;

(b) The maintenance, repair or improvement is of a nature that cannot feasibly be conducted during normal business hours; or

(c) The city council has approved project specifications, contract provisions, or an environmental document that specifically authorizes construction during hours of the day which would otherwise be prohibited pursuant to this section.

(3) Any construction that complies with the noise limits specified in Section 7.25.040 of this chapter.

(4) Construction activities for certain public benefit nonprofit art organizations, specifically the Sawdust Festival, Art-A-Fair and the Laguna Art Museum, shall be permitted between the hours of seven-thirty a.m. and ten p.m. Monday through Friday, seven-thirty a.m. and eight p.m. on Saturday and Sunday.

Existing Noise Environment

Ambient noise in the project vicinity is primarily generated from traffic on the major arterial roadways in the project area, including Beach Street, Ocean Avenue, Broadway Street, and South Coast Highway.

Land uses in the general vicinity of the site consist of commercial, residential, and transient (hotel) uses. Commercial and recreational land uses exist in the immediate vicinity of the project alignment; the nearest residential land uses are located approximately 250 feet to the west.

Based on a series of noise measurements conducted in 2005 as part of the update to the City of Laguna Beach General Plan Noise Element, typical noise levels in the project area range from approximately 45 to 85 dB on an instantaneous basis and approximately 66 to 68 dBA L_{eq} (day and night, respectively) on an average basis (City of Laguna Beach 2005b).

a) Would the project result in 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?

Short-Term Construction Impacts

Less Than Significant with Mitigation Incorporated. Construction of the project would involve a series of construction activities, including demolition, construction of the new transition structure, rehabilitation of the culvert, and ocean outfall construction. Equipment would include the use of tractors, loaders, backhoes, pickup trucks, plate compactors, concrete and mortar mixers, flatbed trucks, compressors, and cranes.

Although construction activity would typically be limited to the City's allowable construction hours and days (i.e., between the hours of 7:30 a.m. to 6:00 p.m. Monday through Friday), it is possible that isolated periods of nighttime work may be necessary to minimize disruptions to residents, local businesses, visitors, and vehicular circulation in the project area.

The project alignment would be adjacent to commercial land uses. The nearest residential land uses would be located approximately 250 feet away from the transition structure and underground rehabilitation work, with the direct view (and the direct acoustical path) of the work areas blocked by intervening buildings. The acoustical shielding would provide a minimum noise reduction of 5 dB for the work at the aboveground transition structure and a minimum 10 dB noise reduction for the underground rehabilitation work. The nearest residential land uses from the outfall portion of the project site would be located approximately 320 feet to the west. The residences nearest the outfall would have a direct view of the work, and thus, the direct acoustical path from the nearest receivers to the construction work would not be blocked by intervening buildings or terrain.

Construction noise and vibration are temporary phenomena. Construction noise and vibration levels vary from hour to hour and day to day depending on the equipment in use, the operations being performed, and the distance between the source and receptor. The typical maximum noise levels for various pieces of construction equipment at a distance of 50 feet are presented in Table 7. Note that the equipment noise levels presented in Table 7 are maximum noise levels. Typically, construction equipment operates in alternating cycles of full power and low power, producing average noise levels less than the maximum noise level. The average sound level of construction activity also depends on the amount of time that the equipment operates and the intensity of the construction activities during that time.

Table 7
Construction Equipment Noise Levels

Equipment Type	Typical Noise Level dB(A) at 50 Feet
Backhoe	80
Truck	88
Loader	85
Compactor	82
Roller	74

Source: FTA 2006.
dB(A) = A-weighted decibel

The maximum noise levels at 50 feet for typical equipment would range up to 88 decibels (dB) for the type of equipment normally used for this type of project, although the hourly noise levels would vary and would be lower. Construction noise in a well-defined area typically attenuates at approximately 6 dB per doubling of distance.

The Federal Highway Administration's Roadway Construction Noise Model (RCNM) (2008) was used to estimate construction noise levels at the nearest occupied noise-sensitive land uses (as near as 250 feet for the transition structure and underground rehabilitation work and as near as 320 feet for the outfall construction area). Although the model was funded and promulgated by the Federal Highway Administration, the RCNM is often used for non-roadway projects because the same types of construction equipment used for roadway projects are also used for other project types. Input variables for the RCNM consist of the receiver/land use types, the equipment type and number of each (e.g., two graders, a loader, a tractor), the duty cycle for each piece of equipment (e.g., percentage of hours the equipment typically works per day), and the distance from the noise-sensitive receiver. No topographical or structural shielding was assumed in the modeling of the outfall construction work, and conservative 5 dB and 10 dB estimates of structural shielding was assumed for the transition structure and the underground rehabilitation work, respectively. The RCNM has default duty-cycle values for the various pieces of equipment, which were derived from an extensive study of typical construction activity patterns. Those default duty-cycle values were used for this noise analysis.

Using the Federal Highway Administration's RCNM construction noise model and construction information (types and number of construction equipment by phase) provided by the project engineers, the estimated noise levels from construction were calculated as presented in Table 8. The RCNM inputs and outputs are provided in Appendix E.

Table 8
Construction Noise Model Results Summary

Construction Phase	Construction Noise at Representative Receiver Distances (L_{eq} (dBA))
	Nearest Receivers (250 Feet for Transition Structure and Underground Rehabilitation Work; 320 Feet for Outfall Work)
Demolition of existing transition structure – large equipment	64
Demolition of existing transition structure – small equipment	68
Transition structure construction – large equipment	57
Transition structure construction – small equipment	64

Table 8
Construction Noise Model Results Summary

Construction Phase	Construction Noise at Representative Receiver Distances (L_{eq} (dBA))
	Nearest Receivers (250 Feet for Transition Structure and Underground Rehabilitation Work; 320 Feet for Outfall Work)
Transition structure construction – trucks	58
Underground rehabilitation	65
Outfall construction	69

Source: FHWA 2008.
Notes: dBA = A-weighted decibel; L_{eq} = equivalent sound level over a given period
Noise levels predicted to be higher for small equipment than large equipment because more pieces of equipment are anticipated to be operational simultaneously. The number of pieces of construction equipment working at any one time or day within the transition structure and underground rehabilitation sites is limited by space.

As presented in Table 8, the noise levels are predicted to range from approximately 57 dBA L_{eq} to 69 dBA L_{eq}. The highest noise levels at noise-sensitive uses are predicted to occur during outfall construction, when construction activities would not be acoustically shielded by intervening structures. At the receivers nearest to the transition structure and underground rehabilitation work areas, the highest noise levels are predicted to be approximately 68 dBA L_{eq}.

Pursuant to the City's Municipal Code, Section 7.25.080, noise from construction activity is not subject to the operational noise standards in Section 7.25.040, provided that the stated conditions are met—primarily, the condition that construction does not take place between the hours of 6:00 p.m. and 7:30 a.m. Monday through Friday and does not take place on weekends or holidays. Because of the project location and the nature of the work, it is anticipated that isolated periods of nighttime work may be necessary to minimize disruptions to residents, local businesses, visitors, and vehicular circulation in the project area. If construction work does occur during nighttime hours, the noise levels would exceed the City's Municipal Code noise standard for CBD Residential zoning of 55 dBA from 10:00 p.m. to 7:00 a.m. However, with implementation of MM-NOI-1 noise from project construction would not exceed applicable noise standards. With the incorporation of mitigation, short-term construction noise impacts would be less than significant.

MM-NOI-1 The following mitigation shall be implemented during construction of the project:

1. If nighttime construction work is determined to be necessary to minimize disruption of commerce in the downtown area, reduce congestion on local streets, or for other logistical reasons, an exception to nighttime construction

noise standards shall be requested in accord with the City of Laguna Beach Municipal Code, Section 7.25.080(D)(2).

2. During construction, the construction contractor shall ensure that all internal combustion engines on construction equipment and trucks are fitted with properly maintained mufflers.
3. During construction activities, the project contractors shall be responsible for requiring the proper maintenance and tuning of all construction equipment to minimize noise emissions.
4. Stockpiling and vehicle staging areas shall be located as far away from occupied residences as possible and screened from these uses by a solid noise attenuation barrier.
5. All stationary construction equipment (e.g., air compressor, generators, impact wrenches) shall be operated as far away from residential uses as possible and shall be shielded with temporary sound barriers, sound aprons, or sound skins.
6. To the extent feasible, haul routes for removing excavated materials or delivery of aggregate materials from the site shall be designed to avoid residential areas and areas occupied by noise sensitive receptors (e.g., hospitals, schools, and convalescent homes).
7. Idling equipment shall be turned off when not in use for periods longer than 5 minutes.
8. If feasible, the following types of construction equipment shall be used:
   a. Electrical instead of diesel-powered equipment
   b. Hydraulic tools instead of pneumatic tools
   c. Electric welders powered by remote generators
9. Residences within 500 feet of work sites shall be notified of the construction schedule in writing at least 72 hours prior to construction. The contractor shall designate a noise disturbance point of contact who would be responsible for responding to complaints regarding construction noise. The point of contact shall determine the cause of the complaint and ensure that reasonable measures are implemented to correct the problem. A contact number for the noise disturbance point of contact shall be conspicuously placed on

construction site fences and written into the construction notification schedule sent to nearby residences.

Long-Term Operational Impacts

No Impact. Once project demolition and construction is complete, operational activity would be limited to a nominal number of routine maintenance and unexpected emergency repair work. Routine equipment operation or vehicle trips would not be required. The project would drain through gravity only, and no pumps or other equipment would be required to convey stormwater. Therefore, long-term operational noise impacts would be less than significant.

b) Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Less-Than-Significant Impact. Demolition and construction activities that might expose persons to excessive groundborne vibration or groundborne noise have the potential to cause a significant impact. Groundborne vibration information related to construction/heavy equipment activities has been collected by Caltrans. Information from Caltrans indicates that transient vibrations (such as from demolition activity) with a peak particle velocity of approximately 0.035 inches per second may be characterized as barely perceptible, and vibration levels of 0.24 inches per second may be characterized as distinctly perceptible (Caltrans 2013). The heavier pieces of construction equipment, such as large bulldozers or hoe rams, would have peak particle velocities of up to approximately 0.089 inches per second at a distance of 25 feet.

Groundborne vibration is typically attenuated over relatively short distances. At the nearest existing noise- and vibration-sensitive land uses (residences located approximately 250 feet or more away) and with the anticipated construction equipment, the peak particle velocity would be approximately 0.003 inches per second. This vibration level would be below the threshold of “barely perceptible” of 0.035 inches per second vibration and the threshold for distinctly perceptible of 0.24 inches per second (FTA 2006).

The major concern with construction (or demolition) vibration is related to building damage. Demolition vibration as a result of the project would not result in structural building damage, which typically occurs at vibration levels of 0.5 inches per second or greater for buildings of reinforced-concrete, steel, or timber construction. Therefore, impacts associated with groundborne vibration would be less than significant.

c) Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

No Impact. Refer to Section 3.11(a).

d) Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Less Than Significant with Mitigation Incorporated. Refer to Section 3.11(a).

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XII. 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?	☐	☐	☐	☒

3.12 Population and Housing

a) Would the project 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)?

No Impact. The project involves replacement/rehabilitation of an existing storm drain system. The City is currently served by this storm drain system, and although the project would improve stormwater conveyance in the project area, it would be not extend infrastructure into an area not already served by such infrastructure. As such, the project would neither directly nor indirectly induce population growth. Therefore, no impacts associated with population growth would occur.

b) Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

No Impact. Under the existing condition, the project site does not contain any residential structures or other habitable buildings. Therefore, no impacts associated with displacing substantial numbers of existing housing would occur.

c) Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

No Impact. As previously discussed, the project site does not contain any residential structures or other habitable buildings. As such, the project site also does not support a residential population. Therefore, no impacts associated with displacing substantial numbers of people would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XIII. 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?	☐	☐	☐	☒

3.13 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 and police protection?

Less Than Significant with Mitigation Incorporated. The project would neither directly nor indirectly induce population growth. Thus, the project would not result in an increase in calls for service or expand the Laguna Beach Fire Department's and Laguna Beach Police Department's service areas.

Notwithstanding, construction of the project would introduce limited construction traffic onto the local circulation system and would include construction activities in close proximity to traffic lanes. In addition, project construction may even require temporary, intermittent lane closures, specifically when demolition debris is being loaded into adjacent haul trucks or when new building materials are being delivered. If necessary, temporary and intermittent closures could potentially affect the ability of firefighters and police officers to navigate the downtown area in a timely and efficient matter. Specifically, firefighters stationed at Laguna Beach Fire Station No. 1 and police officers located near the downtown headquarters could be impacted if construction traffic generates congestion in the project area.

As discussed in Section 3.15(a), a CMP is being prepared to address impacts to local vehicular circulation as a result of temporary lane closure and associated detours that may be intermittently required during certain construction activities. Implementation of the CMP, which is required under MM-TRA-1, would minimize impacts to local circulation and would help ensure that emergency responders can navigate in and around the project area with minimal disruption. Given that any lane closures would be temporary and mitigated with adherence to the CMP, any potential impacts with emergency response in the project area would be reduced to acceptable levels of significance. Therefore, with the incorporation of mitigation, impacts associated with fire and police protection services would be less than significant.

Schools?

No Impact. The project would neither directly nor indirectly induce population growth. As such, no increase in school-aged children is expected as a result of the project. Therefore, no impacts associated with schools would occur.

Parks?

No Impact. The project would neither directly nor indirectly induce population growth. As such, no increase in the patronage of park and recreational facilities is anticipated as a result of the project. Therefore, no impacts associated with parks would occur.

Other public facilities?

No Impact. The project would neither directly nor indirectly induce population growth. As such, no increase in the patronage of libraries, community centers, or other public facilities is expected as a result of the project. Therefore, no impacts associated with other public facilities would occur.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XIV. 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?	☐	☐	☒	☐

3.14 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?

No Impact. The project would neither directly nor indirectly induce population growth. As such, no increase in the patronage of park and recreational facilities is expected as a result of the project. Therefore, no impacts associated with recreational facilities would occur.

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?

Less-Than-Significant Impact. The project would not include recreational facilities or require the construction or expansion of recreational facilities. Notwithstanding, the project would involve the reconstruction of the existing ocean outfall located at Main Beach, adjacent to Main Beach Park. Project construction may require temporary, intermittent lane closures. If necessary, temporary and intermittent closures could potentially affect the local circulation system, including the boardwalk along Main Beach and Main Beach Park. However, any such temporary, intermittent closure of the boardwalk would not result in closure of the park or limitation of access to recreational facilities (e.g., playground, public art, restrooms) found at the park. Upon completion of project construction, access to Main Beach and the adjacent Main Beach Park would be identical to existing conditions. Therefore, impacts associated with new or expanded recreational facilities would be less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XV. 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) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d) Result in inadequate emergency access?	☐	☐	☒	☐
e) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☒	☐	☐

3.15 Transportation and Traffic

a) Would the project 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?

Less Than Significant With Mitigation Incorporated. Construction of the project would introduce limited construction traffic onto the local circulation system and would include construction activities in close proximity to traffic lanes. In addition, project construction may even require temporary, intermittent lane closures, specifically when demolition debris is being loaded into adjacent haul trucks or when new building materials are being delivered. If necessary, temporary and intermittent closures could potentially affect the ability of local traffic to navigate the downtown area in a timely and efficient matter.

As required under MM-TRA-1, a CMP is being prepared to address impacts to local vehicular circulation as a result of temporary lane closure and associated detours that may be intermittently required during certain construction activities. Implementation of the CMP would minimize impacts to local circulation in and around the project area with minimal disruption. Given that any lane closures would be temporary and mitigated with adherence to the CMP, and because the majority of construction activities would not require any type of street closures or detours, any potential impacts to local circulation in the project area would be reduced to acceptable levels of significance. Therefore, with the incorporation of mitigation, impacts associated with applicable plans, ordinances, or policies establishing measures of effectiveness for the performance of the circulation system would be less than significant.

MM-TRA-1 Prior to the start of construction activities, a construction management plan (CMP) should be prepared by the construction contractor for any construction activities that encroach into the public right-of-way and could potentially impact vehicular or pedestrian circulation in the project area. All modes of transportation shall be addressed in the CMP, including but not limited to passenger and emergency vehicle circulation, bus and trolley routes, and pedestrian movement. The CMP shall include measures designed to reduce the impact of temporary construction traffic and any necessary lane or street closure. Such measures may include but are not limited to providing early notification of closures to the Laguna Beach Fire and Police Departments, residents, and nearby businesses; the use of signage before and during construction activities that clearly delineates detour routes around the lane and street closures; and flaggers to direct traffic in the vicinity of the closure.

b) Would the project 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?

Less Than Significant With Mitigation Incorporated. Refer to Section 3.15(a).

c) Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

No Impact. The project would not involve permanent alteration of existing roadways. In addition, the movement of any large construction equipment would occur during off-peak hours and would only be required intermittently throughout construction of the project. Therefore, no impacts associated with hazardous design features or incompatible uses would occur.

d) Would the project result in inadequate emergency access?

Less-Than-Significant Impact. Following implementation of the project, the transition structure, box culvert, and outlet would operate, as well encompass a footprint, similar to the existing facilities. As such, emergency access on and around the project site would be identical compared with the existing conditions. Therefore, no impacts associated with emergency access would occur.

e) Would the project conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Less Than Significant With Mitigation Incorporated. Following implementation of the project, the transition structure, box culvert, and outlet would operate, as well encompass a footprint, similar to the existing facilities. As such, no permanent impacts to public transit, bicycle, or pedestrian facilities are anticipated.

However, as previously discussed, project construction may even require temporary, intermittent lane closures. If necessary, temporary and intermittent closures could potentially affect the local circulation system, including sidewalks, the boardwalk along Main Beach, bicycle lanes, and bus stops. To minimize any potential impacts to these alternative transportation facilities, MM-TRA-1 requires that a CMP be prepared to address impacts to local vehicular circulation as a result of temporary lane closure and associated detours that may be intermittently required during certain construction activities. Implementation of the CMP would minimize impacts to local circulation in and around the project area with minimal disruption. Given that any lane closures would be temporary and mitigated with adherence to the CMP, any potential impacts to local circulation in the project area would be reduced to acceptable levels of significance. Therefore, with the incorporation of mitigation, impacts associated with public and alternative transit facilities would be less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
XVI. TRIBAL CULTURAL RESOURCES				
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?	☐	☐	☒	☐

3.16 Tribal Cultural Resources

The following analysis is based, in part, on the Cultural Resources Assessment prepared by Duke Cultural Resources Management LLC and included as Appendix C.

a) ***Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:***

i) ***Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?***

Less-Than-Significant Impact. As discussed in Section 3.4, although the project site contains storm drain facilities that are old enough to be considered eligible for listing as a local and state historical resources criteria, including the CRHR, as an individual property, the evaluation conducted as part of the Cultural Resources Assessment (Appendix C) found that the project site, including the existing facilities to be replaced and/or rehabilitated, are not listed or eligible for listing in the CRHR or in a local register of historical resources as defined in the California Public Resources Code, Section 5020.1(k). Therefore, impacts associated with historical resources listed or eligible for listing in the CRHR would be less than significant.

ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

Less-Than-Significant Impact. The records search from the South Central Coastal Information Center indicated that 41 cultural resource reports have been previously recorded, and 41 cultural resources have been mapped within 1 mile of the project site. In total, 20 resources are within 0.25 miles of the project site (refer to Table 2 in Appendix C). The nearest recorded resource, the New Lynn Theater (now called the Laguna Cinemas South Coast Theater), is situated above the Laguna Canyon Channel on the southern side on South Coast Highway. The proposed project would not involve operational or construction activities, which would impact this or any of the mapped resources.

No archaeological resources were identified during the reconnaissance survey of the project area and immediate surroundings. The project area is characterized as built environment, and the exposed areas of soil adjacent and beneath the project site are highly disturbed due to previous construction-related earth-moving activities. Given that the proposed project does not involve ground disturbance outside of the existing footprint of the current storm drain facilities, and due to the heavily disturbed soil from decades of construction activities, the discovery of intact archaeological resources would be unlikely.

The proposed project is subject to compliance with AB 52 (California Public Resources Code, Section 21074), which requires consideration of impacts to tribal cultural resources as part of the CEQA process and requires the City, as the lead agency, to notify any groups that are traditionally or culturally affiliated with the geographic area of the project and who have requested notification. All records related to AB 52 are currently on file with the City. As of the date of this IS/MND, no consultation requests or other responses to the City's notification have been received.

As such, based on the previous discussion, there is little potential for the discovery of intact subsurface archaeological deposits. In consideration of the results of the South Central Coastal Information Center records search and reconnaissance survey, there is low potential for buried, unrecorded cultural resources to be encountered during construction activities. Therefore, impacts associated with tribal cultural resources would be less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
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?	☐	☐	☒	☐

3.17 Utilities and Service Systems

a) Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

No Impact. The project would not generate wastewater requiring treatment. Therefore, no impacts associated with wastewater treatment requirements would occur.

b) Would the project 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?

No Impact. Aside from a limited amount of water needed during construction, no water supplies would be required. In addition, the project would not generate wastewater requiring treatment. Therefore, no impacts associated with new or expanded water or wastewater treatment facilities would occur.

c) ***Would the project 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?***

Less Than Significant with Mitigation Incorporated. The project involves the replacement/rehabilitation of an existing storm drain system. While the construction of the project could potentially result in environmental effects, as addressed throughout this IS/MND, with the implementation of various mitigation measures, impacts could be reduced to acceptable levels of significance. Therefore, with the incorporation of mitigation, impacts associated with new or expanded stormwater drainage facilities would be less than significant.

d) ***Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?***

No Impact. Refer to Section 3.17(b).

e) ***Would the project 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?***

No Impact. Refer to Section 3.17(a).

f) ***Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?***

Less-Than-Significant Impact. Solid waste generated in the City is collected by Waste Management of Orange County. Waste Management of Orange County provides industrial customers with roll-off service for bins or specialized compacters each week from their yards in Cities of Santa Ana and Irvine (Waste Management 2017). In addition, Waste Management of Orange County operates two transfer stations, which handle trash and recyclables from local waste haulers, businesses such as landscapers or construction firms, and local residences, in the Cities of Orange and Irvine (Waste Management 2017). Materials brought to transfer stations that cannot be recycled are loaded onto a tractor-trailer and hauled to the landfill.

The Orange County Solid Waste Management System is composed of the following three landfills: Olinda Alpha Landfill, Frank R. Bowerman Landfill, and Prima Deshecha Landfill. Olinda Alpha Landfill has a permitted maximum daily throughput of 8,000 tons, the Frank R. Bowerman Landfill has a permitted maximum daily throughput of 11,500 tons, and the Prima Deshecha Landfill has a permitted maximum daily throughput of 4,000 tons (CalRecycle 2017a, 2017b, 2017c).

Once operational, the project would not produce any solid waste requiring accommodation by a landfill. Construction of the project would demolish 7,500 square feet of material. Any demolition debris not reused on site would be transported to Prima Deshecha Landfill or another permitted facility. The solid waste generated during construction would represent a nominal percentage of the 4,000 tons of collective maximum daily throughput permitted for the active permitted landfill facilities located in the County. In addition, waste generation during construction would be disposed of in accordance with federal, state, and local regulations related to solid waste. Therefore, impacts associated with solid waste disposal would be less than significant.

g) Would the project comply with federal, state, and local statutes and regulations related to solid waste?

Less-Than-Significant Impact. All collection, transportation, and disposal of solid waste generated by the project would comply with all applicable federal, state, and local statues and regulations. Under AB 939, the Integrated Waste Management Act of 1989, the City is required to develop source reduction, reuse, recycling, and composting programs to reduce the amount of solid waste entering landfills. Local jurisdictions are mandated to divert at least 50% of their solid waste generation to recycling. The City's Municipal Code (Section 7.19.050) requires submission of a waste management plan to estimate weight of the construction and demolition materials that will be landfilled (City of Laguna Beach 2017a). As indicated, if the diversion percentage is greater than or equal to 50%, a feasibility exemption per the City's Municipal Code, Section 7.19.10, must be submitted (City of Laguna Beach 2017c). Additionally, the City adopted the 2016 Green Building Standards Code, which sets recycling requirements for construction and demolition projects and requires a minimum 65% diversion (City of Laguna Beach 2017d). The waste management plan would be approved by the director of Public Works to ensure a minimum of 65% of construction materials and debris is diverted.

In addition, the state has set a goal of 75% recycling, composting, and source reduction of solid waste by 2020. To help reach this goal, the state has adopted ABs 341 and 1826. AB 341 is a mandatory commercial recycling bill, and AB 1826 is mandatory organic recycling. Waste generated by the project would enter the City's waste stream but would not adversely affect the City's ability to meet ABs 939, 341, and 1826 because the project's waste generation would represent a nominal percentage of the waste created within the City. Therefore, impacts associated with solid waste disposal regulations would be less than significant.

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
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?	☐	☒	☐	☐

3.18 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?

Less Than Significant With Mitigation Incorporated. As discussed in Section 3.3, with the incorporation of mitigation, the project would not 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, or reduce the number or restrict the range of a rare or endangered plant or animal.

In addition, as addressed in Section 3.4, Cultural Resources, potentially significant impacts related to archaeological and Native American resources would be reduced to less-than-significant levels with implementation of mitigation. Therefore, with the incorporation of mitigation, impacts associated with important examples of the major periods of California history or prehistory would be less than significant.

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)?

Less Than Significant with Mitigation Incorporated. As analyzed in this IS/MND, project construction and operation could potentially result in individual-level environmental impacts that could be potentially significant without the incorporation of mitigation. Therefore, when coupled with impacts related to the implementation of other related projects throughout the broader geographic area, the project could potentially result in cumulative-level impacts if these significant impacts are left unmitigated.

However, with the incorporation of mitigation identified throughout this document, the project's potential impacts would be reduced to less-than-significant levels and would not considerably contribute to regional cumulative impacts in the greater project region. Additionally, these other related projects would presumably be required by the applicable lead agency to (1) comply with the all applicable federal, state, and local regulatory requirements; and (2) incorporate all feasible mitigation measures to further ensure that their potentially cumulative impacts will be reduced to less-than-significant levels. Therefore, the project would not result in individually limited but cumulatively considerable impacts.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Less Than Significant with Mitigation Incorporated. As addressed throughout this IS/MND, with the incorporation of mitigation, environmental impacts associated with project construction and operation would be reduced to less-than-significant levels. Therefore, the project would not directly or indirectly cause substantial adverse effects on human beings.

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4.2 List of Preparers

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Project Manager – Lisa Penna

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Project Manager – Collin Ramsey
Environmental Analyst – Sabrina Alonso
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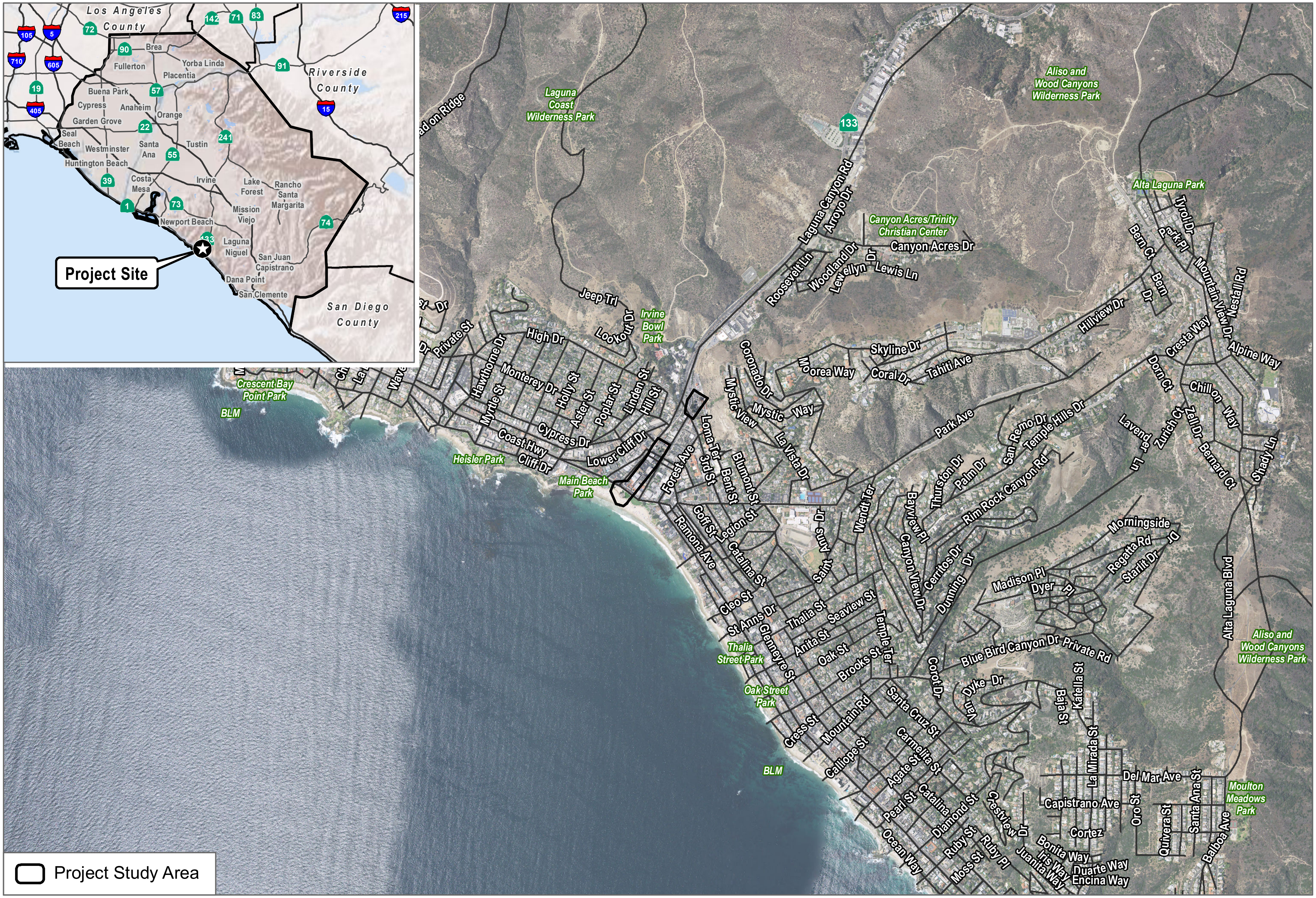
Biological Resources – Ryan Henry
Noise – Mike Greene
Technical Editor – Lindsey Messner
Publications Specialist Lead – Devin Brookhart
GIS/Graphics – Andrew Greis
Project Engineer – Jonis Smith
Project Designer – Jen O'Brien

Duke Cultural Resources Management LLC – Cultural Resources Consultant

Cultural Resources – Curt Duke and Sarah Nava



SOURCE: County of Orange; NAIP 2016

DUDEK

0 1,000 2,000 Feet

FIGURE 1

Project Location

Laguna Canyon Channel Improvements Project

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SOURCE: NAIP 2016; Dudek 2017

DUDEK

FIGURE 2

Site Plan

Laguna Canyon Channel Improvements Project

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Beach Street Culvert, January 10, 1995 Storm

Beach Street Culvert Entrance

FIGURE 3A

Existing Site Photos

Laguna Canyon Channel Improvements Project

DUDEK

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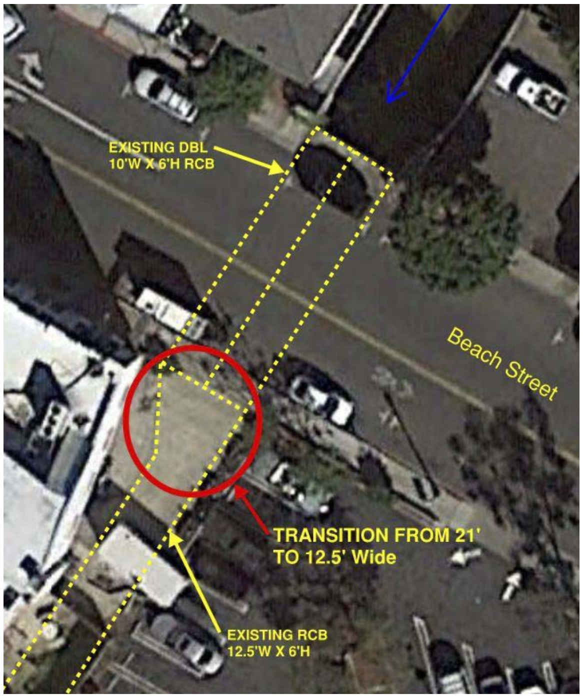

Downstream Transitions Structure at Beach Street


Laguna Canyon Culvert Outlet - During Summer

FIGURE 3B

Existing Site Photos

Laguna Canyon Channel Improvements Project

DUDEK

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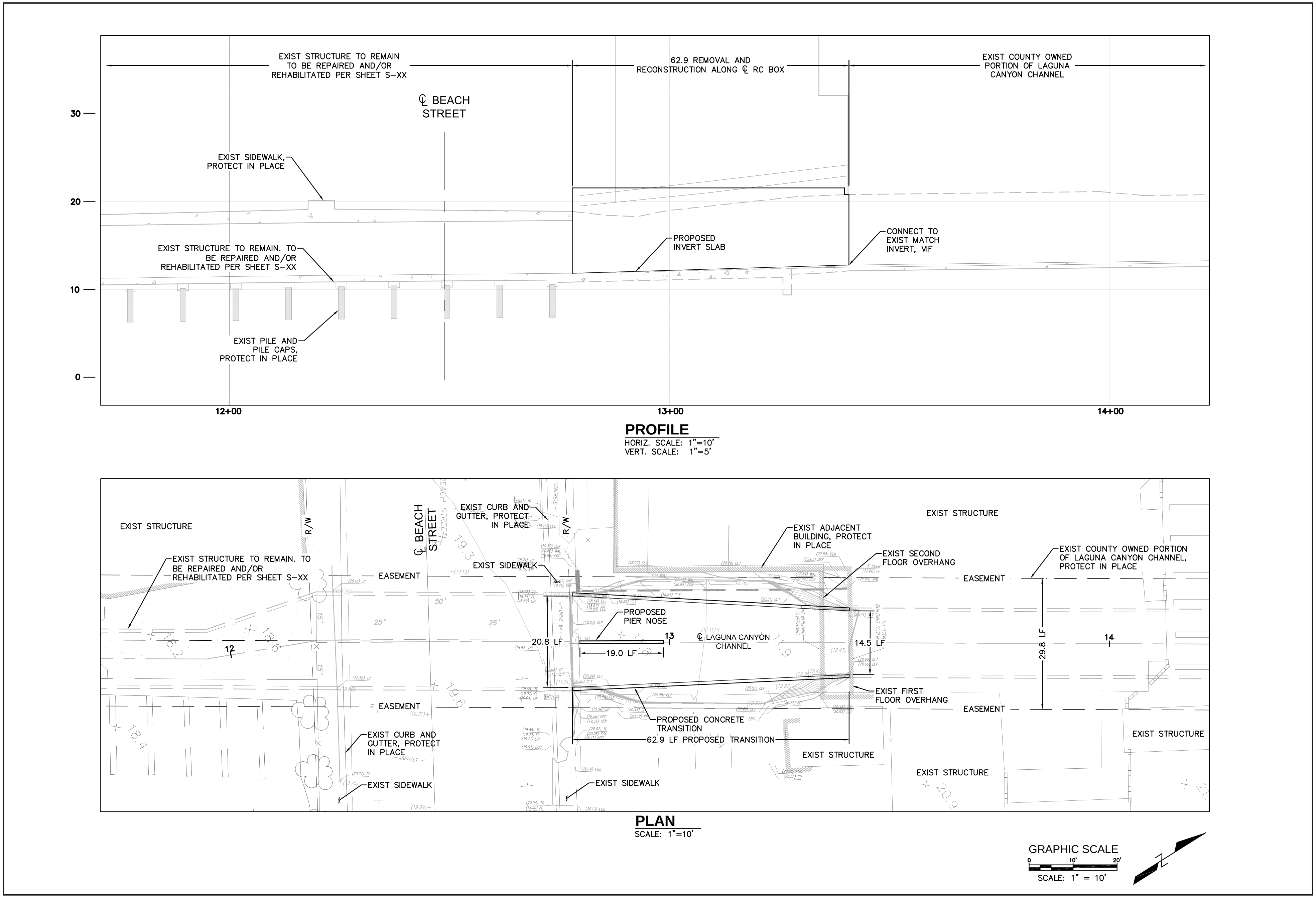

SOURCE: Dudek, 2017

DUDEK

FIGURE 4

Proposed Transition Structure

Laguna Canyon Channel Improvements Project

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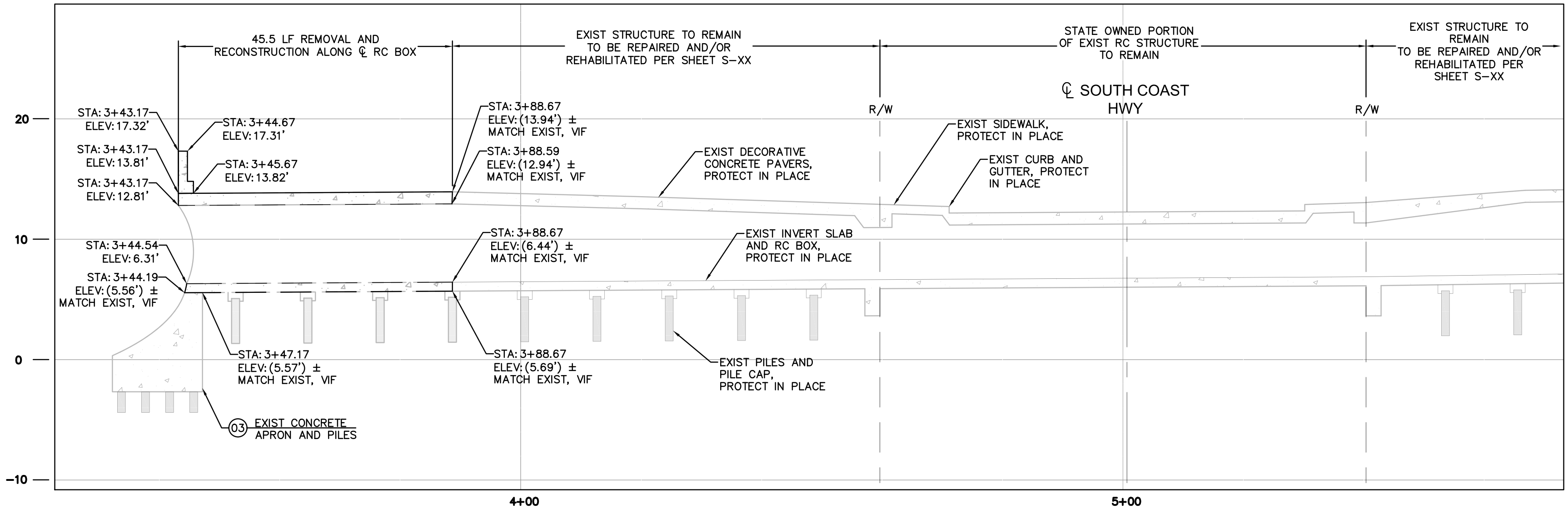
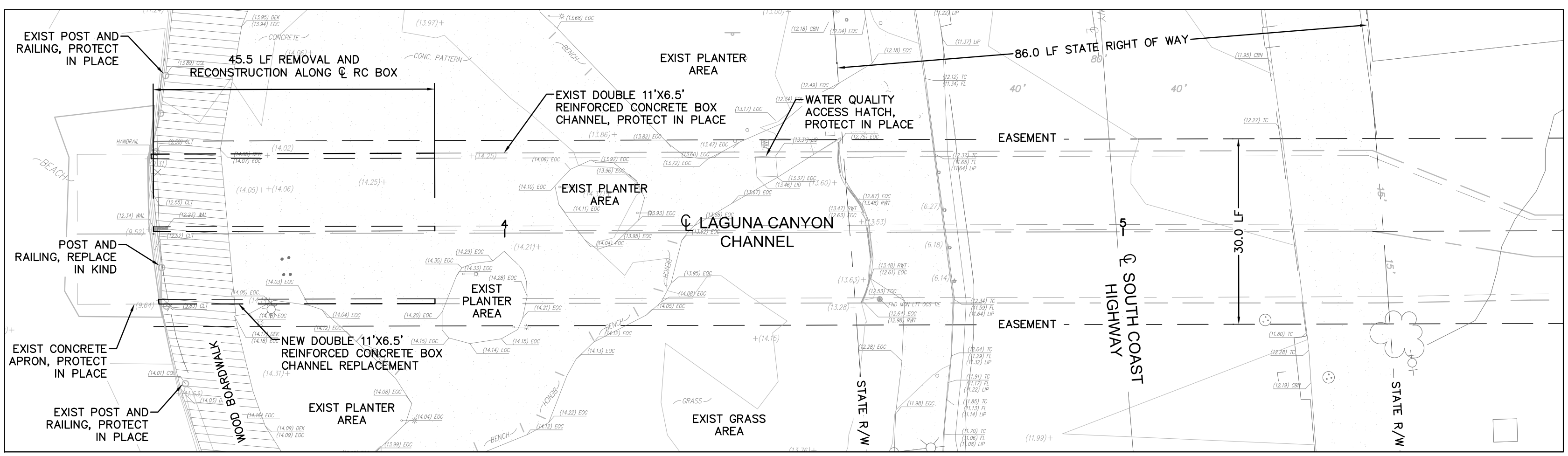


PROFILE
HORIZ. SCALE: 1"=10'
VERT. SCALE: 1"=5'



PLAN
SCALE: 1"=10'

GRAPHIC SCALE
0 10' 20'
SCALE: 1" = 10'

SOURCE: Dudek, 2017

DUDEK

FIGURE 5
Proposed Outfall Structure
Laguna Canyon Channel Improvements Project

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APPENDIX A

CalEEMod Results

CalEEMod Version: CalEEMod.2016.3.1

Date: 7/24/2017 4:04 PM

Laguna Canyon Channel Improvements

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	0.17	7,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Land Use - Refer to CalEEMod Input Matrix Table 4

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Trips and VMT - Refer to CalEEMod Input Matrix Table 9

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	0.5
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	100.00	44.00
tblConstructionPhase	NumDays	10.00	22.00
tblConstructionPhase	NumDays	1.00	44.00
tblConstructionPhase	NumDays	1.00	21.00
tblLandUse	BuildingSpaceSquareFeet	0.00	7,500.00
tblLandUse	LandUseSquareFeet	0.00	7,500.00
tblLandUse	LotAcreage	0.00	0.17
tblOffRoadEquipment	LoadFactor	0.46	0.46
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	OffRoadEquipmentType	Concrete/Industrial Saws	Air Compressors
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Dumpers/Tenders
tblOffRoadEquipment	OffRoadEquipmentType		Sweepers/Scrubbers
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Dumpers/Tenders

tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Welders
tblOffRoadEquipment	OffRoadEquipmentType		Pressure Washers
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Dumpers/Tenders
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00

tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	4.00	2.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblProjectCharacteristics	OperationalYear	2018	2020
tblTripsAndVMT	HaulingTripNumber	0.00	15.00
tblTripsAndVMT	VendorTripNumber	0.00	5.00
tblTripsAndVMT	VendorTripNumber	1.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	23.00	15.00
tblTripsAndVMT	WorkerTripNumber	3.00	10.00
tblTripsAndVMT	WorkerTripNumber	23.00	10.00
tblTripsAndVMT	WorkerTripNumber	28.00	5.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	3.7254	31.8641	24.0982	0.0455	0.7059	1.8348	2.4849	0.1053	1.8009	1.8914	0.0000	4,369.6734	4,369.6734	0.5884	0.0000	4,384.3833
Maximum	**3.7254**	**31.8641**	**24.0982**	**0.0455**	**0.7059**	**1.8348**	**2.4849**	**0.1053**	**1.8009**	**1.8914**	**0.0000**	**4,369.6734**	**4,369.6734**	**0.5884**	**0.0000**	**4,384.3833**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	3.7254	31.8641	24.0982	0.0455	0.3825	1.8348	2.1614	0.0704	1.8009	1.8565	0.0000	4,369.6734	4,369.6734	0.5884	0.0000	4,384.3833
Maximum	**3.7254**	**31.8641**	**24.0982**	**0.0455**	**0.3825**	**1.8348**	**2.1614**	**0.0704**	**1.8009**	**1.8565**	**0.0000**	**4,369.6734**	**4,369.6734**	**0.5884**	**0.0000**	**4,384.3833**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**45.82**	**0.00**	**13.02**	**33.17**	**0.00**	**1.85**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1676	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.1676**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1676	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.1676**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	3/1/2018	3/30/2018	5	22	
2	Transition Construction	Site Preparation	3/31/2018	5/31/2018	5	44	
3	Underground Rehabilitation	Site Preparation	6/1/2018	6/29/2018	5	21	
4	Outfall Construction	Building Construction	6/30/2018	8/30/2018	5	44	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction	Cranes	1	4.00	231	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Rubber Tired Dozers	1	1.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Paving	Pavers	1	7.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Demolition	Air Compressors	2	8.00	78	0.48
Demolition	Concrete/Industrial Saws	1	4.00	81	0.73
Demolition	Dumpers/Tenders	1	4.00	16	0.38
Demolition	Sweepers/Scrubbers	1	4.00	64	0.46
Demolition	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Demolition	Generator Sets	2	8.00	84	0.74
Transition Construction	Cranes	1	2.00	231	0.29
Transition Construction	Cement and Mortar Mixers	1	4.00	9	0.56
Transition Construction	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Transition Construction	Dumpers/Tenders	1	4.00	16	0.38
Transition Construction	Plate Compactors	1	4.00	8	0.43
Transition Construction	Rollers	1	4.00	80	0.38
Transition Construction	Generator Sets	2	8.00	84	0.74
Underground Rehabilitation	Air Compressors	2	8.00	78	0.48

Underground Rehabilitation	Cement and Mortar Mixers	1	4.00	9	0.56
Underground Rehabilitation	Concrete/Industrial Saws	1	4.00	81	0.73
Underground Rehabilitation	Generator Sets	2	8.00	84	0.74
Underground Rehabilitation	Pumps	1	8.00	84	0.74
Underground Rehabilitation	Welders	1	4.00	46	0.45
Underground Rehabilitation	Pressure Washers	1	4.00	13	0.30
Outfall Construction	Cement and Mortar Mixers	1	4.00	9	0.56
Outfall Construction	Cranes	1	2.00	231	0.29
Outfall Construction	Bore/Drill Rigs	1	2.00	221	0.50
Outfall Construction	Rubber Tired Loaders	1	4.00	203	0.36
Outfall Construction	Dumpers/Tenders	1	4.00	16	0.38
Outfall Construction	Generator Sets	2	8.00	84	0.74
Outfall Construction	Plate Compactors	1	4.00	8	0.43
Outfall Construction	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Outfall Construction	Rollers	1	4.00	80	0.38
Outfall Construction	Forklifts	2	6.00	89	0.20
Transition Construction	Graders	1	8.00	187	0.41
Underground Rehabilitation	Graders	1	8.00	187	0.41
Demolition	Rubber Tired Dozers	1	1.00	247	0.40
Underground Rehabilitation	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	9	15.00	5.00	15.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Outfall Construction	12	10.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Transition Construction	9	10.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Underground Rehabilitation	11	5.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5360	19.9663	17.1352	0.0285		1.3473	1.3473		1.3250	1.3250		2,713.3285	2,713.3285	0.3088		2,721.0489
Total	**2.5360**	**19.9663**	**17.1352**	**0.0285**		**1.3473**	**1.3473**		**1.3250**	**1.3250**		**2,713.3285**	**2,713.3285**	**0.3088**		**2,721.0489**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	6.0400e-003	0.2159	0.0515	5.3000e-004	0.0119	8.7000e-004	0.0127	3.2500e-003	8.3000e-004	4.0800e-003		58.4698	58.4698	6.3700e-003		58.6290
Vendor	0.0211	0.5974	0.1757	1.2300e-003	0.0320	4.4900e-003	0.0364	9.1900e-003	4.3000e-003	0.0135		133.8574	133.8574	0.0126		134.1711
Worker	0.0757	0.0502	0.5471	1.6500e-003	0.1677	1.1100e-003	0.1688	0.0445	1.0200e-003	0.0455		164.2196	164.2196	4.3700e-003		164.3288
Total	**0.1028**	**0.8635**	**0.7743**	**3.4100e-003**	**0.2115**	**6.4700e-003**	**0.2180**	**0.0569**	**6.1500e-003**	**0.0631**		**356.5468**	**356.5468**	**0.0233**		**357.1288**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Off-Road	2.5360	19.9663	17.1352	0.0285		1.3473	1.3473		1.3250	1.3250	0.0000	2,713.3285	2,713.3285	0.3088		2,721.0489
Total	**2.5360**	**19.9663**	**17.1352**	**0.0285**		**1.3473**	**1.3473**		**1.3250**	**1.3250**	**0.0000**	**2,713.3285**	**2,713.3285**	**0.3088**		**2,721.0489**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	6.0400e-003	0.2159	0.0515	5.3000e-004	0.0119	8.7000e-004	0.0127	3.2500e-003	8.3000e-004	4.0800e-003		58.4698	58.4698	6.3700e-003		58.6290
Vendor	0.0211	0.5974	0.1757	1.2300e-003	0.0320	4.4900e-003	0.0364	9.1900e-003	4.3000e-003	0.0135		133.8574	133.8574	0.0126		134.1711
Worker	0.0757	0.0502	0.5471	1.6500e-003	0.1677	1.1100e-003	0.1688	0.0445	1.0200e-003	0.0455		164.2196	164.2196	4.3700e-003		164.3288
Total	**0.1028**	**0.8635**	**0.7743**	**3.4100e-003**	**0.2115**	**6.4700e-003**	**0.2180**	**0.0569**	**6.1500e-003**	**0.0631**		**356.5468**	**356.5468**	**0.0233**		**357.1288**

3.3 Transition Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	2.0183	20.1318	12.5394	0.0251		1.0277	1.0277		0.9891	0.9891		2,419.2114	2,419.2114	0.4401		2,430.2134
Total	**2.0183**	**20.1318**	**12.5394**	**0.0251**	**0.5303**	**1.0277**	**1.5580**	**0.0573**	**0.9891**	**1.0464**		**2,419.2114**	**2,419.2114**	**0.4401**		**2,430.2134**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0423	1.1948	0.3513	2.4700e-003	0.0639	8.9900e-003	0.0729	0.0184	8.6000e-003	0.0270		267.7147	267.7147	0.0251		268.3421
Worker	0.0504	0.0335	0.3647	1.1000e-003	0.1118	7.4000e-004	0.1125	0.0296	6.8000e-004	0.0303		109.4797	109.4797	2.9100e-003		109.5525
Total	**0.0927**	**1.2283**	**0.7160**	**3.5700e-003**	**0.1757**	**9.7300e-003**	**0.1854**	**0.0480**	**9.2800e-003**	**0.0573**		**377.1945**	**377.1945**	**0.0280**		**377.8946**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2068	0.0000	0.2068	0.0223	0.0000	0.0223			0.0000			0.0000
Off-Road	2.0183	20.1318	12.5394	0.0251		1.0277	1.0277		0.9891	0.9891	0.0000	2,419.2114	2,419.2114	0.4401		2,430.2134
Total	**2.0183**	**20.1318**	**12.5394**	**0.0251**	**0.2068**	**1.0277**	**1.2345**	**0.0223**	**0.9891**	**1.0115**	**0.0000**	**2,419.2114**	**2,419.2114**	**0.4401**		**2,430.2134**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0423	1.1948	0.3513	2.4700e-003	0.0639	8.9900e-003	0.0729	0.0184	8.6000e-003	0.0270		267.7147	267.7147	0.0251		268.3421
Worker	0.0504	0.0335	0.3647	1.1000e-003	0.1118	7.4000e-004	0.1125	0.0296	6.8000e-004	0.0303		109.4797	109.4797	2.9100e-003		109.5525
Total	**0.0927**	**1.2283**	**0.7160**	**3.5700e-003**	**0.1757**	**9.7300e-003**	**0.1854**	**0.0480**	**9.2800e-003**	**0.0573**		**377.1945**	**377.1945**	**0.0280**		**377.8946**

3.4 Underground Rehabilitation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	3.6580	30.6526	23.5645	0.0425		1.8255	1.8255		1.7920	1.7920		4,047.218 8	4,047.218 8	0.5619		4,061.265 0
Total	**3.6580**	**30.6526**	**23.5645**	**0.0425**	**0.5303**	**1.8255**	**2.3557**	**0.0573**	**1.7920**	**1.8493**		**4,047.218 8**	**4,047.218 8**	**0.5619**		**4,061.265 0**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0423	1.1948	0.3513	2.4700e-003	0.0639	8.9900e-003	0.0729	0.0184	8.6000e-003	0.0270		267.7147	267.7147	0.0251		268.3421
Worker	0.0252	0.0167	0.1824	5.5000e-004	0.0559	3.7000e-004	0.0563	0.0148	3.4000e-004	0.0152		54.7399	54.7399	1.4600e-003		54.7763
Total	**0.0675**	**1.2116**	**0.5337**	**3.0200e-003**	**0.1198**	**9.3600e-003**	**0.1292**	**0.0332**	**8.9400e-003**	**0.0422**		**322.4546**	**322.4546**	**0.0266**		**323.1184**

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Fugitive Dust					0.2068	0.0000	0.2068	0.0223	0.0000	0.0223			0.0000			0.0000
Off-Road	3.6580	30.6526	23.5645	0.0425		1.8255	1.8255		1.7920	1.7920	0.0000	4,047.2188	4,047.2188	0.5619		4,061.2650
Total	**3.6580**	**30.6526**	**23.5645**	**0.0425**	**0.2068**	**1.8255**	**2.0323**	**0.0223**	**1.7920**	**1.8143**	**0.0000**	**4,047.2188**	**4,047.2188**	**0.5619**		**4,061.2650**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0423	1.1948	0.3513	2.4700e-003	0.0639	8.9900e-003	0.0729	0.0184	8.6000e-003	0.0270		267.7147	267.7147	0.0251		268.3421
Worker	0.0252	0.0167	0.1824	5.5000e-004	0.0559	3.7000e-004	0.0563	0.0148	3.4000e-004	0.0152		54.7399	54.7399	1.4600e-003		54.7763
Total	**0.0675**	**1.2116**	**0.5337**	**3.0200e-003**	**0.1198**	**9.3600e-003**	**0.1292**	**0.0332**	**8.9400e-003**	**0.0422**		**322.4546**	**322.4546**	**0.0266**		**323.1184**

3.5 Outfall Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0575	19.0960	13.8392	0.0262		1.1051	1.1051		1.0603	1.0603		2,533.2296	2,533.2296	0.4756		2,545.1190
Total	**2.0575**	**19.0960**	**13.8392**	**0.0262**		**1.1051**	**1.1051**		**1.0603**	**1.0603**		**2,533.2296**	**2,533.2296**	**0.4756**		**2,545.1190**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0423	1.1948	0.3513	2.4700e-003	0.0639	8.9900e-003	0.0729	0.0184	8.6000e-003	0.0270		267.7147	267.7147	0.0251		268.3421
Worker	0.0504	0.0335	0.3647	1.1000e-003	0.1118	7.4000e-004	0.1125	0.0296	6.8000e-004	0.0303		109.4797	109.4797	2.9100e-003		109.5525
Total	**0.0927**	**1.2283**	**0.7160**	**3.5700e-003**	**0.1757**	**9.7300e-003**	**0.1854**	**0.0480**	**9.2800e-003**	**0.0573**		**377.1945**	**377.1945**	**0.0280**		**377.8946**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0575	19.0960	13.8392	0.0262		1.1051	1.1051		1.0603	1.0603	0.0000	2,533.2296	2,533.2296	0.4756		2,545.1190
Total	**2.0575**	**19.0960**	**13.8392**	**0.0262**		**1.1051**	**1.1051**		**1.0603**	**1.0603**	**0.0000**	**2,533.2296**	**2,533.2296**	**0.4756**		**2,545.1190**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0423	1.1948	0.3513	2.4700e-003	0.0639	8.9900e-003	0.0729	0.0184	8.6000e-003	0.0270		267.7147	267.7147	0.0251		268.3421
Worker	0.0504	0.0335	0.3647	1.1000e-003	0.1118	7.4000e-004	0.1125	0.0296	6.8000e-004	0.0303		109.4797	109.4797	2.9100e-003		109.5525
Total	**0.0927**	**1.2283**	**0.7160**	**3.5700e-003**	**0.1757**	**9.7300e-003**	**0.1854**	**0.0480**	**9.2800e-003**	**0.0573**		**377.1945**	**377.1945**	**0.0280**		**377.8946**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.555968	0.043848	0.210359	0.116378	0.016765	0.005795	0.025008	0.016160	0.001677	0.001586	0.004867	0.000586	0.001002

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1676	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	0.1676	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0191					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**0.1676**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0191					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**0.1676**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

CalEEMod Version: CalEEMod.2016.3.1

Date: 7/24/2017 3:56 PM

Laguna Canyon Channel Improvements
Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	0.17	7,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Land Use - Refer to CalEEMod Input Matrix Table 4

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Trips and VMT - Refer to CalEEMod Input Matrix Table 9

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	0.5
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	100.00	44.00
tblConstructionPhase	NumDays	10.00	22.00
tblConstructionPhase	NumDays	1.00	44.00
tblConstructionPhase	NumDays	1.00	21.00
tblLandUse	BuildingSpaceSquareFeet	0.00	7,500.00
tblLandUse	LandUseSquareFeet	0.00	7,500.00
tblLandUse	LotAcreage	0.00	0.17
tblOffRoadEquipment	LoadFactor	0.46	0.46
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	OffRoadEquipmentType	Concrete/Industrial Saws	Air Compressors
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Dumpers/Tenders

tblOffRoadEquipment	OffRoadEquipmentType		Sweepers/Scrubbers
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Dumpers/Tenders
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Welders
tblOffRoadEquipment	OffRoadEquipmentType		Pressure Washers
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Dumpers/Tenders
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	8.00	4.00

tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	4.00	2.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblProjectCharacteristics	OperationalYear	2018	2020
tblTripsAndVMT	HaulingTripNumber	0.00	15.00
tblTripsAndVMT	VendorTripNumber	0.00	5.00
tblTripsAndVMT	VendorTripNumber	1.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	23.00	15.00
tblTripsAndVMT	WorkerTripNumber	3.00	10.00
tblTripsAndVMT	WorkerTripNumber	23.00	10.00
tblTripsAndVMT	WorkerTripNumber	28.00	5.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	3.7209	31.8607	24.0810	0.0456	0.7059	1.8346	2.4847	0.1053	1.8008	1.8913	0.0000	4,379.3809	4,379.3809	0.5872	0.0000	4,394.0605
Maximum	**3.7209**	**31.8607**	**24.0810**	**0.0456**	**0.7059**	**1.8346**	**2.4847**	**0.1053**	**1.8008**	**1.8913**	**0.0000**	**4,379.3809**	**4,379.3809**	**0.5872**	**0.0000**	**4,394.0605**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	3.7209	31.8607	24.0810	0.0456	0.3825	1.8346	2.1612	0.0704	1.8008	1.8563	0.0000	4,379.3809	4,379.3809	0.5872	0.0000	4,394.0605
Maximum	**3.7209**	**31.8607**	**24.0810**	**0.0456**	**0.3825**	**1.8346**	**2.1612**	**0.0704**	**1.8008**	**1.8563**	**0.0000**	**4,379.3809**	**4,379.3809**	**0.5872**	**0.0000**	**4,394.0605**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**45.82**	**0.00**	**13.02**	**33.17**	**0.00**	**1.85**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1676	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.1676**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1676	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.1676**	**0.0000**	**1.0000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	3/1/2018	3/30/2018	5	22	
2	Transition Construction	Site Preparation	3/31/2018	5/31/2018	5	44	
3	Underground Rehabilitation	Site Preparation	6/1/2018	6/29/2018	5	21	
4	Outfall Construction	Building Construction	6/30/2018	8/30/2018	5	44	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction	Cranes	1	4.00	231	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Rubber Tired Dozers	1	1.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Paving	Pavers	1	7.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Demolition	Air Compressors	2	8.00	78	0.48
Demolition	Concrete/Industrial Saws	1	4.00	81	0.73
Demolition	Dumpers/Tenders	1	4.00	16	0.38
Demolition	Sweepers/Scrubbers	1	4.00	64	0.46
Demolition	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Demolition	Generator Sets	2	8.00	84	0.74
Transition Construction	Cranes	1	2.00	231	0.29
Transition Construction	Cement and Mortar Mixers	1	4.00	9	0.56
Transition Construction	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Transition Construction	Dumpers/Tenders	1	4.00	16	0.38
Transition Construction	Plate Compactors	1	4.00	8	0.43
Transition Construction	Rollers	1	4.00	80	0.38
Transition Construction	Generator Sets	2	8.00	84	0.74
Underground Rehabilitation	Air Compressors	2	8.00	78	0.48

Underground Rehabilitation	Cement and Mortar Mixers	1	4.00	9	0.56
Underground Rehabilitation	Concrete/Industrial Saws	1	4.00	81	0.73
Underground Rehabilitation	Generator Sets	2	8.00	84	0.74
Underground Rehabilitation	Pumps	1	8.00	84	0.74
Underground Rehabilitation	Welders	1	4.00	46	0.45
Underground Rehabilitation	Pressure Washers	1	4.00	13	0.30
Outfall Construction	Cement and Mortar Mixers	1	4.00	9	0.56
Outfall Construction	Cranes	1	2.00	231	0.29
Outfall Construction	Bore/Drill Rigs	1	2.00	221	0.50
Outfall Construction	Rubber Tired Loaders	1	4.00	203	0.36
Outfall Construction	Dumpers/Tenders	1	4.00	16	0.38
Outfall Construction	Generator Sets	2	8.00	84	0.74
Outfall Construction	Plate Compactors	1	4.00	8	0.43
Outfall Construction	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Outfall Construction	Rollers	1	4.00	80	0.38
Outfall Construction	Forklifts	2	6.00	89	0.20
Transition Construction	Graders	1	8.00	187	0.41
Underground Rehabilitation	Graders	1	8.00	187	0.41
Demolition	Rubber Tired Dozers	1	1.00	247	0.40
Underground Rehabilitation	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	9	15.00	5.00	15.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Outfall Construction	12	10.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Transition Construction	9	10.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Underground Rehabilitation	11	5.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5360	19.9663	17.1352	0.0285		1.3473	1.3473		1.3250	1.3250		2,713.3285	2,713.3285	0.3088		2,721.0489
Total	**2.5360**	**19.9663**	**17.1352**	**0.0285**		**1.3473**	**1.3473**		**1.3250**	**1.3250**		**2,713.3285**	**2,713.3285**	**0.3088**		**2,721.0489**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	5.8800e-003	0.2130	0.0485	5.4000e-004	0.0119	8.5000e-004	0.0127	3.2500e-003	8.1000e-004	4.0600e-003		59.3418	59.3418	6.2000e-003		59.4968
Vendor	0.0203	0.5965	0.1600	1.2600e-003	0.0320	4.4100e-003	0.0364	9.1900e-003	4.2200e-003	0.0134		137.1642	137.1642	0.0119		137.4617
Worker	0.0672	0.0457	0.5892	1.7400e-003	0.1677	1.1100e-003	0.1688	0.0445	1.0200e-003	0.0455		173.5014	173.5014	4.5900e-003		173.6162
Total	**0.0933**	**0.8551**	**0.7977**	**3.5400e-003**	**0.2115**	**6.3700e-003**	**0.2179**	**0.0569**	**6.0500e-003**	**0.0630**		**370.0073**	**370.0073**	**0.0227**		**370.5748**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5360	19.9663	17.1352	0.0285		1.3473	1.3473		1.3250	1.3250	0.0000	2,713.3285	2,713.3285	0.3088		2,721.0489
Total	**2.5360**	**19.9663**	**17.1352**	**0.0285**		**1.3473**	**1.3473**		**1.3250**	**1.3250**	**0.0000**	**2,713.3285**	**2,713.3285**	**0.3088**		**2,721.0489**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	5.8800e-003	0.2130	0.0485	5.4000e-004	0.0119	8.5000e-004	0.0127	3.2500e-003	8.1000e-004	4.0600e-003		59.3418	59.3418	6.2000e-003		59.4968
Vendor	0.0203	0.5965	0.1600	1.2600e-003	0.0320	4.4100e-003	0.0364	9.1900e-003	4.2200e-003	0.0134		137.1642	137.1642	0.0119		137.4617
Worker	0.0672	0.0457	0.5892	1.7400e-003	0.1677	1.1100e-003	0.1688	0.0445	1.0200e-003	0.0455		173.5014	173.5014	4.5900e-003		173.6162
Total	**0.0933**	**0.8551**	**0.7977**	**3.5400e-003**	**0.2115**	**6.3700e-003**	**0.2179**	**0.0569**	**6.0500e-003**	**0.0630**		**370.0073**	**370.0073**	**0.0227**		**370.5748**

3.3 Transition Construction - 2018

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	2.0183	20.1318	12.5394	0.0251		1.0277	1.0277		0.9891	0.9891		2,419.2114	2,419.2114	0.4401		2,430.2134
Total	**2.0183**	**20.1318**	**12.5394**	**0.0251**	**0.5303**	**1.0277**	**1.5580**	**0.0573**	**0.9891**	**1.0464**		**2,419.2114**	**2,419.2114**	**0.4401**		**2,430.2134**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0405	1.1929	0.3201	2.5300e-003	0.0639	8.8300e-003	0.0727	0.0184	8.4400e-003	0.0268		274.3283	274.3283	0.0238		274.9235
Worker	0.0448	0.0304	0.3928	1.1600e-003	0.1118	7.4000e-004	0.1125	0.0296	6.8000e-004	0.0303		115.6676	115.6676	3.0600e-003		115.7441
Total	**0.0853**	**1.2234**	**0.7129**	**3.6900e-003**	**0.1757**	**9.5700e-003**	**0.1852**	**0.0480**	**9.1200e-003**	**0.0572**		**389.9959**	**389.9959**	**0.0269**		**390.6676**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2068	0.0000	0.2068	0.0223	0.0000	0.0223			0.0000			0.0000
Off-Road	2.0183	20.1318	12.5394	0.0251		1.0277	1.0277		0.9891	0.9891	0.0000	2,419.2114	2,419.2114	0.4401		2,430.2134
Total	**2.0183**	**20.1318**	**12.5394**	**0.0251**	**0.2068**	**1.0277**	**1.2345**	**0.0223**	**0.9891**	**1.0115**	**0.0000**	**2,419.2114**	**2,419.2114**	**0.4401**		**2,430.2134**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0405	1.1929	0.3201	2.5300e-003	0.0639	8.8300e-003	0.0727	0.0184	8.4400e-003	0.0268		274.3283	274.3283	0.0238		274.9235
Worker	0.0448	0.0304	0.3928	1.1600e-003	0.1118	7.4000e-004	0.1125	0.0296	6.8000e-004	0.0303		115.6676	115.6676	3.0600e-003		115.7441
Total	**0.0853**	**1.2234**	**0.7129**	**3.6900e-003**	**0.1757**	**9.5700e-003**	**0.1852**	**0.0480**	**9.1200e-003**	**0.0572**		**389.9959**	**389.9959**	**0.0269**		**390.6676**

3.4 Underground Rehabilitation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.5303	0.0000	0.5303	0.0573	0.0000	0.0573			0.0000			0.0000
Off-Road	3.6580	30.6526	23.5645	0.0425		1.8255	1.8255		1.7920	1.7920		4,047.2188	4,047.2188	0.5619		4,061.2650
Total	**3.6580**	**30.6526**	**23.5645**	**0.0425**	**0.5303**	**1.8255**	**2.3557**	**0.0573**	**1.7920**	**1.8493**		**4,047.2188**	**4,047.2188**	**0.5619**		**4,061.2650**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0405	1.1929	0.3201	2.5300e-003	0.0639	8.8300e-003	0.0727	0.0184	8.4400e-003	0.0268		274.3283	274.3283	0.0238		274.9235
Worker	0.0224	0.0152	0.1964	5.8000e-004	0.0559	3.7000e-004	0.0563	0.0148	3.4000e-004	0.0152		57.8338	57.8338	1.5300e-003		57.8721
Total	**0.0629**	**1.2082**	**0.5165**	**3.1100e-003**	**0.1198**	**9.2000e-003**	**0.1290**	**0.0332**	**8.7800e-003**	**0.0420**		**332.1621**	**332.1621**	**0.0253**		**332.7956**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2068	0.0000	0.2068	0.0223	0.0000	0.0223			0.0000			0.0000
Off-Road	3.6580	30.6526	23.5645	0.0425		1.8255	1.8255		1.7920	1.7920	0.0000	4,047.2188	4,047.2188	0.5619		4,061.2650
Total	**3.6580**	**30.6526**	**23.5645**	**0.0425**	**0.2068**	**1.8255**	**2.0323**	**0.0223**	**1.7920**	**1.8143**	**0.0000**	**4,047.2188**	**4,047.2188**	**0.5619**		**4,061.2650**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0405	1.1929	0.3201	2.5300e-003	0.0639	8.8300e-003	0.0727	0.0184	8.4400e-003	0.0268		274.3283	274.3283	0.0238		274.9235
Worker	0.0224	0.0152	0.1964	5.8000e-004	0.0559	3.7000e-004	0.0563	0.0148	3.4000e-004	0.0152		57.8338	57.8338	1.5300e-003		57.8721
Total	**0.0629**	**1.2082**	**0.5165**	**3.1100e-003**	**0.1198**	**9.2000e-003**	**0.1290**	**0.0332**	**8.7800e-003**	**0.0420**		**332.1621**	**332.1621**	**0.0253**		**332.7956**

3.5 Outfall Construction - 2018

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Off-Road	2.0575	19.0960	13.8392	0.0262		1.1051	1.1051		1.0603	1.0603		2,533.2296	2,533.2296	0.4756		2,545.1190
Total	**2.0575**	**19.0960**	**13.8392**	**0.0262**		**1.1051**	**1.1051**		**1.0603**	**1.0603**		**2,533.2296**	**2,533.2296**	**0.4756**		**2,545.1190**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0405	1.1929	0.3201	2.5300e-003	0.0639	8.8300e-003	0.0727	0.0184	8.4400e-003	0.0268		274.3283	274.3283	0.0238		274.9235
Worker	0.0448	0.0304	0.3928	1.1600e-003	0.1118	7.4000e-004	0.1125	0.0296	6.8000e-004	0.0303		115.6676	115.6676	3.0600e-003		115.7441
Total	**0.0853**	**1.2234**	**0.7129**	**3.6900e-003**	**0.1757**	**9.5700e-003**	**0.1852**	**0.0480**	**9.1200e-003**	**0.0572**		**389.9959**	**389.9959**	**0.0269**		**390.6676**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.0575	19.0960	13.8392	0.0262		1.1051	1.1051		1.0603	1.0603	0.0000	2,533.2296	2,533.2296	0.4756		2,545.1190
Total	**2.0575**	**19.0960**	**13.8392**	**0.0262**		**1.1051**	**1.1051**		**1.0603**	**1.0603**	**0.0000**	**2,533.2296**	**2,533.2296**	**0.4756**		**2,545.1190**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0405	1.1929	0.3201	2.5300e-003	0.0639	8.8300e-003	0.0727	0.0184	8.4400e-003	0.0268		274.3283	274.3283	0.0238		274.9235
Worker	0.0448	0.0304	0.3928	1.1600e-003	0.1118	7.4000e-004	0.1125	0.0296	6.8000e-004	0.0303		115.6676	115.6676	3.0600e-003		115.7441
Total	**0.0853**	**1.2234**	**0.7129**	**3.6900e-003**	**0.1757**	**9.5700e-003**	**0.1852**	**0.0480**	**9.1200e-003**	**0.0572**		**389.9959**	**389.9959**	**0.0269**		**390.6676**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.555968	0.043848	0.210359	0.116378	0.016765	0.005795	0.025008	0.016160	0.001677	0.001586	0.004867	0.000586	0.001002

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1676	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	0.1676	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0191					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**0.1676**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0191					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.0000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**0.1676**	**0.0000**	**1.0000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

CalEEMod Version: CalEEMod.2016.3.1

Date: 7/24/2017 3:54 PM

Laguna Canyon Channel Improvements

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	0.17	7,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Land Use - Refer to CalEEMod Input Matrix Table 4

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Off-road Equipment - Refer to CalEEMod Input Matrix Table 6

Trips and VMT - Refer to CalEEMod Input Matrix Table 9

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadMoistureContent	0	0.5
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	100.00	44.00
tblConstructionPhase	NumDays	10.00	22.00
tblConstructionPhase	NumDays	1.00	44.00
tblConstructionPhase	NumDays	1.00	21.00
tblLandUse	BuildingSpaceSquareFeet	0.00	7,500.00
tblLandUse	LandUseSquareFeet	0.00	7,500.00
tblLandUse	LotAcreage	0.00	0.17
tblOffRoadEquipment	LoadFactor	0.46	0.46
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.50	0.50
tblOffRoadEquipment	LoadFactor	0.36	0.36
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	OffRoadEquipmentType	Concrete/Industrial Saws	Air Compressors
tblOffRoadEquipment	OffRoadEquipmentType	Tractors/Loaders/Backhoes	Dumpers/Tenders

tblOffRoadEquipment	OffRoadEquipmentType		Sweepers/Scrubbers
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Dumpers/Tenders
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Welders
tblOffRoadEquipment	OffRoadEquipmentType		Pressure Washers
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Bore/Drill Rigs
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Dumpers/Tenders
tblOffRoadEquipment	OffRoadEquipmentType		Generator Sets
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes

tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	4.00	2.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblProjectCharacteristics	OperationalYear	2018	2020
tblTripsAndVMT	HaulingTripNumber	0.00	15.00
tblTripsAndVMT	VendorTripNumber	0.00	5.00
tblTripsAndVMT	VendorTripNumber	1.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	10.00
tblTripsAndVMT	WorkerTripNumber	23.00	15.00
tblTripsAndVMT	WorkerTripNumber	3.00	10.00
tblTripsAndVMT	WorkerTripNumber	23.00	10.00
tblTripsAndVMT	WorkerTripNumber	28.00	5.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.1615	1.4822	1.0615	2.1200e-003	0.0284	0.0815	0.1099	4.9000e-003	0.0790	0.0839	0.0000	186.4681	186.4681	0.0283	0.0000	187.1749
Maximum	**0.1615**	**1.4822**	**1.0615**	**2.1200e-003**	**0.0284**	**0.0815**	**0.1099**	**4.9000e-003**	**0.0790**	**0.0839**	**0.0000**	**186.4681**	**186.4681**	**0.0283**	**0.0000**	**187.1749**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.1615	1.4822	1.0615	2.1200e-003	0.0179	0.0815	0.0994	3.7700e-003	0.0790	0.0828	0.0000	186.4679	186.4679	0.0283	0.0000	187.1747
Maximum	**0.1615**	**1.4822**	**1.0615**	**2.1200e-003**	**0.0179**	**0.0815**	**0.0994**	**3.7700e-003**	**0.0790**	**0.0828**	**0.0000**	**186.4679**	**186.4679**	**0.0283**	**0.0000**	**187.1747**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**37.06**	**0.00**	**9.57**	**23.06**	**0.00**	**1.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
1	**3-1-2018**	**5-31-2018**	0.2514	0.2514
		Highest	0.2514	0.2514

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0306	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0306**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0306	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0306**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	3/1/2018	3/30/2018	5	22	
2	Transition Construction	Site Preparation	3/31/2018	5/31/2018	5	44	
3	Underground Rehabilitation	Site Preparation	6/1/2018	6/29/2018	5	21	
4	Outfall Construction	Building Construction	6/30/2018	8/30/2018	5	44	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction	Cranes	1	4.00	231	0.29
Building Construction	Forklifts	2	6.00	89	0.20
Building Construction	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Grading	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Rubber Tired Dozers	1	1.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Paving	Cement and Mortar Mixers	4	6.00	9	0.56
Paving	Pavers	1	7.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Demolition	Air Compressors	2	8.00	78	0.48
Demolition	Concrete/Industrial Saws	1	4.00	81	0.73
Demolition	Dumpers/Tenders	1	4.00	16	0.38
Demolition	Sweepers/Scrubbers	1	4.00	64	0.46
Demolition	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Demolition	Generator Sets	2	8.00	84	0.74
Transition Construction	Cranes	1	2.00	231	0.29
Transition Construction	Cement and Mortar Mixers	1	4.00	9	0.56
Transition Construction	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Transition Construction	Dumpers/Tenders	1	4.00	16	0.38
Transition Construction	Plate Compactors	1	4.00	8	0.43
Transition Construction	Rollers	1	4.00	80	0.38
Transition Construction	Generator Sets	2	8.00	84	0.74
Underground Rehabilitation	Air Compressors	2	8.00	78	0.48

Underground Rehabilitation	Cement and Mortar Mixers	1	4.00	9	0.56
Underground Rehabilitation	Concrete/Industrial Saws	1	4.00	81	0.73
Underground Rehabilitation	Generator Sets	2	8.00	84	0.74
Underground Rehabilitation	Pumps	1	8.00	84	0.74
Underground Rehabilitation	Welders	1	4.00	46	0.45
Underground Rehabilitation	Pressure Washers	1	4.00	13	0.30
Outfall Construction	Cement and Mortar Mixers	1	4.00	9	0.56
Outfall Construction	Cranes	1	2.00	231	0.29
Outfall Construction	Bore/Drill Rigs	1	2.00	221	0.50
Outfall Construction	Rubber Tired Loaders	1	4.00	203	0.36
Outfall Construction	Dumpers/Tenders	1	4.00	16	0.38
Outfall Construction	Generator Sets	2	8.00	84	0.74
Outfall Construction	Plate Compactors	1	4.00	8	0.43
Outfall Construction	Tractors/Loaders/Backhoes	1	4.00	97	0.37
Outfall Construction	Rollers	1	4.00	80	0.38
Outfall Construction	Forklifts	2	6.00	89	0.20
Transition Construction	Graders	1	8.00	187	0.41
Underground Rehabilitation	Graders	1	8.00	187	0.41
Demolition	Rubber Tired Dozers	1	1.00	247	0.40
Underground Rehabilitation	Tractors/Loaders/Backhoes	1	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	9	15.00	5.00	15.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Outfall Construction	12	10.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Transition Construction	9	10.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Underground Rehabilitation	11	5.00	10.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Water Unpaved Roads

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0279	0.2196	0.1885	3.1000e-004		0.0148	0.0148		0.0146	0.0146	0.0000	27.0764	27.0764	3.0800e-003	0.0000	27.1534
Total	**0.0279**	**0.2196**	**0.1885**	**3.1000e-004**		**0.0148**	**0.0148**		**0.0146**	**0.0146**	**0.0000**	**27.0764**	**27.0764**	**3.0800e-003**	**0.0000**	**27.1534**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.0000e-005	2.4200e-003	5.5000e-004	1.0000e-005	1.3000e-004	1.0000e-005	1.4000e-004	4.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.5885	0.5885	6.0000e-005	0.0000	0.5901
Vendor	2.3000e-004	6.7000e-003	1.8500e-003	1.0000e-005	3.5000e-004	5.0000e-005	4.0000e-004	1.0000e-004	5.0000e-005	1.5000e-004	0.0000	1.3549	1.3549	1.2000e-004	0.0000	1.3580
Worker	7.5000e-004	5.7000e-004	6.1600e-003	2.0000e-005	1.8100e-003	1.0000e-005	1.8200e-003	4.8000e-004	1.0000e-005	4.9000e-004	0.0000	1.6637	1.6637	4.0000e-005	0.0000	1.6648
Total	**1.0500e-003**	**9.6900e-003**	**8.5600e-003**	**4.0000e-005**	**2.2900e-003**	**7.0000e-005**	**2.3600e-003**	**6.2000e-004**	**7.0000e-005**	**6.8000e-004**	**0.0000**	**3.6072**	**3.6072**	**2.2000e-004**	**0.0000**	**3.6129**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0279	0.2196	0.1885	3.1000e-004		0.0148	0.0148		0.0146	0.0146	0.0000	27.0764	27.0764	3.0800e-003	0.0000	27.1534
Total	**0.0279**	**0.2196**	**0.1885**	**3.1000e-004**		**0.0148**	**0.0148**		**0.0146**	**0.0146**	**0.0000**	**27.0764**	**27.0764**	**3.0800e-003**	**0.0000**	**27.1534**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	7.0000e-005	2.4200e-003	5.5000e-004	1.0000e-005	1.3000e-004	1.0000e-005	1.4000e-004	4.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.5885	0.5885	6.0000e-005	0.0000	0.5901
Vendor	2.3000e-004	6.7000e-003	1.8500e-003	1.0000e-005	3.5000e-004	5.0000e-005	4.0000e-004	1.0000e-004	5.0000e-005	1.5000e-004	0.0000	1.3549	1.3549	1.2000e-004	0.0000	1.3580
Worker	7.5000e-004	5.7000e-004	6.1600e-003	2.0000e-005	1.8100e-003	1.0000e-005	1.8200e-003	4.8000e-004	1.0000e-005	4.9000e-004	0.0000	1.6637	1.6637	4.0000e-005	0.0000	1.6648
Total	**1.0500e-003**	**9.6900e-003**	**8.5600e-003**	**4.0000e-005**	**2.2900e-003**	**7.0000e-005**	**2.3600e-003**	**6.2000e-004**	**7.0000e-005**	**6.8000e-004**	**0.0000**	**3.6072**	**3.6072**	**2.2000e-004**	**0.0000**	**3.6129**

3.3 Transition Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0117	0.0000	0.0117	1.2600e-003	0.0000	1.2600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0444	0.4429	0.2759	5.5000e-004		0.0226	0.0226		0.0218	0.0218	0.0000	48.2828	48.2828	8.7800e-003	0.0000	48.5024
Total	**0.0444**	**0.4429**	**0.2759**	**5.5000e-004**	**0.0117**	**0.0226**	**0.0343**	**1.2600e-003**	**0.0218**	**0.0230**	**0.0000**	**48.2828**	**48.2828**	**8.7800e-003**	**0.0000**	**48.5024**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.1000e-004	0.0268	7.3900e-003	6.0000e-005	1.3900e-003	2.0000e-004	1.5800e-003	4.0000e-004	1.9000e-004	5.9000e-004	0.0000	5.4196	5.4196	4.9000e-004	0.0000	5.4318
Worker	1.0000e-003	7.6000e-004	8.2100e-003	2.0000e-005	2.4200e-003	2.0000e-005	2.4300e-003	6.4000e-004	1.0000e-005	6.6000e-004	0.0000	2.2183	2.2183	6.0000e-005	0.0000	2.2198
Total	**1.9100e-003**	**0.0276**	**0.0156**	**8.0000e-005**	**3.8100e-003**	**2.2000e-004**	**4.0100e-003**	**1.0400e-003**	**2.0000e-004**	**1.2500e-003**	**0.0000**	**7.6379**	**7.6379**	**5.5000e-004**	**0.0000**	**7.6516**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.5500e-003	0.0000	4.5500e-003	4.9000e-004	0.0000	4.9000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0444	0.4429	0.2759	5.5000e-004		0.0226	0.0226		0.0218	0.0218	0.0000	48.2827	48.2827	8.7800e-003	0.0000	48.5023
Total	**0.0444**	**0.4429**	**0.2759**	**5.5000e-004**	**4.5500e-003**	**0.0226**	**0.0272**	**4.9000e-004**	**0.0218**	**0.0223**	**0.0000**	**48.2827**	**48.2827**	**8.7800e-003**	**0.0000**	**48.5023**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.1000e-004	0.0268	7.3900e-003	6.0000e-005	1.3900e-003	2.0000e-004	1.5800e-003	4.0000e-004	1.9000e-004	5.9000e-004	0.0000	5.4196	5.4196	4.9000e-004	0.0000	5.4318
Worker	1.0000e-003	7.6000e-004	8.2100e-003	2.0000e-005	2.4200e-003	2.0000e-005	2.4300e-003	6.4000e-004	1.0000e-005	6.6000e-004	0.0000	2.2183	2.2183	6.0000e-005	0.0000	2.2198
Total	**1.9100e-003**	**0.0276**	**0.0156**	**8.0000e-005**	**3.8100e-003**	**2.2000e-004**	**4.0100e-003**	**1.0400e-003**	**2.0000e-004**	**1.2500e-003**	**0.0000**	**7.6379**	**7.6379**	**5.5000e-004**	**0.0000**	**7.6516**

3.4 Underground Rehabilitation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.5700e-003	0.0000	5.5700e-003	6.0000e-004	0.0000	6.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0384	0.3219	0.2474	4.5000e-004		0.0192	0.0192		0.0188	0.0188	0.0000	38.5515	38.5515	5.3500e-003	0.0000	38.6853
Total	**0.0384**	**0.3219**	**0.2474**	**4.5000e-004**	**5.5700e-003**	**0.0192**	**0.0247**	**6.0000e-004**	**0.0188**	**0.0194**	**0.0000**	**38.5515**	**38.5515**	**5.3500e-003**	**0.0000**	**38.6853**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.3000e-004	0.0128	3.5300e-003	3.0000e-005	6.6000e-004	9.0000e-005	7.5000e-004	1.9000e-004	9.0000e-005	2.8000e-004	0.0000	2.5866	2.5866	2.3000e-004	0.0000	2.5925
Worker	2.4000e-004	1.8000e-004	1.9600e-003	1.0000e-005	5.8000e-004	0.0000	5.8000e-004	1.5000e-004	0.0000	1.6000e-004	0.0000	0.5294	0.5294	1.0000e-005	0.0000	0.5297
Total	**6.7000e-004**	**0.0130**	**5.4900e-003**	**4.0000e-005**	**1.2400e-003**	**9.0000e-005**	**1.3300e-003**	**3.4000e-004**	**9.0000e-005**	**4.4000e-004**	**0.0000**	**3.1160**	**3.1160**	**2.4000e-004**	**0.0000**	**3.1222**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.1700e-003	0.0000	2.1700e-003	2.3000e-004	0.0000	2.3000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0384	0.3219	0.2474	4.5000e-004		0.0192	0.0192		0.0188	0.0188	0.0000	38.5515	38.5515	5.3500e-003	0.0000	38.6853
Total	**0.0384**	**0.3219**	**0.2474**	**4.5000e-004**	**2.1700e-003**	**0.0192**	**0.0213**	**2.3000e-004**	**0.0188**	**0.0191**	**0.0000**	**38.5515**	**38.5515**	**5.3500e-003**	**0.0000**	**38.6853**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.3000e-004	0.0128	3.5300e-003	3.0000e-005	6.6000e-004	9.0000e-005	7.5000e-004	1.9000e-004	9.0000e-005	2.8000e-004	0.0000	2.5866	2.5866	2.3000e-004	0.0000	2.5925
Worker	2.4000e-004	1.8000e-004	1.9600e-003	1.0000e-005	5.8000e-004	0.0000	5.8000e-004	1.5000e-004	0.0000	1.6000e-004	0.0000	0.5294	0.5294	1.0000e-005	0.0000	0.5297
Total	**6.7000e-004**	**0.0130**	**5.4900e-003**	**4.0000e-005**	**1.2400e-003**	**9.0000e-005**	**1.3300e-003**	**3.4000e-004**	**9.0000e-005**	**4.4000e-004**	**0.0000**	**3.1160**	**3.1160**	**2.4000e-004**	**0.0000**	**3.1222**

3.5 Outfall Construction - 2018

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Off-Road	0.0453	0.4201	0.3045	5.8000e-004		0.0243	0.0243		0.0233	0.0233	0.0000	50.5584	50.5584	9.4900e-003	0.0000	50.7957
Total	**0.0453**	**0.4201**	**0.3045**	**5.8000e-004**		**0.0243**	**0.0243**		**0.0233**	**0.0233**	**0.0000**	**50.5584**	**50.5584**	**9.4900e-003**	**0.0000**	**50.7957**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.1000e-004	0.0268	7.3900e-003	6.0000e-005	1.3900e-003	2.0000e-004	1.5800e-003	4.0000e-004	1.9000e-004	5.9000e-004	0.0000	5.4196	5.4196	4.9000e-004	0.0000	5.4318
Worker	1.0000e-003	7.6000e-004	8.2100e-003	2.0000e-005	2.4200e-003	2.0000e-005	2.4300e-003	6.4000e-004	1.0000e-005	6.6000e-004	0.0000	2.2183	2.2183	6.0000e-005	0.0000	2.2198
Total	**1.9100e-003**	**0.0276**	**0.0156**	**8.0000e-005**	**3.8100e-003**	**2.2000e-004**	**4.0100e-003**	**1.0400e-003**	**2.0000e-004**	**1.2500e-003**	**0.0000**	**7.6379**	**7.6379**	**5.5000e-004**	**0.0000**	**7.6516**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0453	0.4201	0.3045	5.8000e-004		0.0243	0.0243		0.0233	0.0233	0.0000	50.5583	50.5583	9.4900e-003	0.0000	50.7956
Total	**0.0453**	**0.4201**	**0.3045**	**5.8000e-004**		**0.0243**	**0.0243**		**0.0233**	**0.0233**	**0.0000**	**50.5583**	**50.5583**	**9.4900e-003**	**0.0000**	**50.7956**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.1000e-004	0.0268	7.3900e-003	6.0000e-005	1.3900e-003	2.0000e-004	1.5800e-003	4.0000e-004	1.9000e-004	5.9000e-004	0.0000	5.4196	5.4196	4.9000e-004	0.0000	5.4318
Worker	1.0000e-003	7.6000e-004	8.2100e-003	2.0000e-005	2.4200e-003	2.0000e-005	2.4300e-003	6.4000e-004	1.0000e-005	6.6000e-004	0.0000	2.2183	2.2183	6.0000e-005	0.0000	2.2198
Total	**1.9100e-003**	**0.0276**	**0.0156**	**8.0000e-005**	**3.8100e-003**	**2.2000e-004**	**4.0100e-003**	**1.0400e-003**	**2.0000e-004**	**1.2500e-003**	**0.0000**	**7.6379**	**7.6379**	**5.5000e-004**	**0.0000**	**7.6516**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.555968	0.043848	0.210359	0.116378	0.016765	0.005795	0.025008	0.016160	0.001677	0.001586	0.004867	0.000586	0.001002

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0306	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Unmitigated	0.0306	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.4800e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0271					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0306**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.4800e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0271					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0306**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

CalEEMod Version: CalEEMod.2016.3.1

Date: 7/24/2017 4:08 PM

Construction Mitigation Summary

Phase	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Demolition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Outfall Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Transition Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Underground Rehabilitation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

OFFROAD Equipment Mitigation

Equipment Type	Fuel Type	Tier	Number Mitigated	Total Number of Equipment	DPF	Oxidation Catalyst
Air Compressors	Diesel	No Change	0	5	No Change	0.00
Cement and Mortar Mixers	Diesel	No Change	0	7	No Change	0.00
Concrete/Industrial Saws	Diesel	No Change	0	3	No Change	0.00
Cranes	Diesel	No Change	0	3	No Change	0.00
Forklifts	Diesel	No Change	0	4	No Change	0.00
Graders	Diesel	No Change	0	3	No Change	0.00
Pavers	Diesel	No Change	0	1	No Change	0.00
Rollers	Diesel	No Change	0	3	No Change	0.00
Rubber Tired Dozers	Diesel	No Change	0	2	No Change	0.00
Tractors/Loaders/Backhoes	Diesel	No Change	0	10	No Change	0.00
Bore/Drill Rigs	Diesel	No Change	0	1	No Change	0.00
Dumpers/Tenders	Diesel	No Change	0	3	No Change	0.00
Generator Sets	Diesel	No Change	0	8	No Change	0.00
Plate Compactors	Diesel	No Change	0	2	No Change	0.00
Pressure Washers	Diesel	No Change	0	1	No Change	0.00
Pumps	Diesel	No Change	0	1	No Change	0.00
Rubber Tired Loaders	Diesel	No Change	0	1	No Change	0.00
Sweepers/Scrubbers	Diesel	No Change	0	1	No Change	0.00
Welders	Diesel	No Change	0	1	No Change	0.00

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	Unmitigated tons/yr						Unmitigated mt/yr					
Air Compressors	1.71200E-002	1.15000E-001	1.06310E-001	1.70000E-004	8.63000E-003	8.63000E-003	0.00000E+000	1.46387E+001	1.46387E+001	1.39000E-003	0.00000E+000	1.46735E+001
Bore/Drill Rigs	1.66000E-003	2.31900E-002	1.15600E-002	5.00000E-005	6.60000E-004	6.00000E-004	0.00000E+000	4.73543E+000	4.73543E+000	1.47000E-003	0.00000E+000	4.77228E+000
Cement and Mortar Mixers	1.60000E-003	1.00300E-002	8.40000E-003	2.00000E-005	3.90000E-004	3.90000E-004	0.00000E+000	1.24880E+000	1.24880E+000	1.30000E-004	0.00000E+000	1.25204E+000
Concrete/Industrial Saws	5.58000E-003	4.20900E-002	4.00300E-002	7.00000E-005	2.87000E-003	2.87000E-003	0.00000E+000	5.77981E+000	5.77981E+000	4.50000E-004	0.00000E+000	5.79099E+000
Cranes	6.24000E-003	7.45400E-002	2.75600E-002	6.00000E-005	3.23000E-003	2.97000E-003	0.00000E+000	5.75585E+000	5.75585E+000	1.79000E-003	0.00000E+000	5.80064E+000
Dumpers/Tenders	2.02000E-003	1.28300E-002	6.90000E-003	2.00000E-005	5.00000E-004	5.00000E-004	0.00000E+000	1.52031E+000	1.52031E+000	1.60000E-004	0.00000E+000	1.52439E+000
Forklifts	5.88000E-003	5.19600E-002	3.99700E-002	5.00000E-005	4.15000E-003	3.81000E-003	0.00000E+000	4.60395E+000	4.60395E+000	1.43000E-003	0.00000E+000	4.63979E+000
Generator Sets	6.62100E-002	5.38850E-001	4.90880E-001	8.60000E-004	3.43200E-002	3.43200E-002	0.00000E+000	7.40422E+001	7.40422E+001	5.34000E-003	0.00000E+000	7.41757E+001
Graders	1.68900E-002	2.31640E-001	6.22300E-002	2.20000E-004	7.53000E-003	6.93000E-003	0.00000E+000	1.97520E+001	1.97520E+001	6.15000E-003	0.00000E+000	1.99058E+001
Plate Compactors	8.80000E-004	5.53000E-003	4.63000E-003	1.00000E-005	2.10000E-004	2.10000E-004	0.00000E+000	6.88140E-001	6.88140E-001	7.00000E-005	0.00000E+000	6.89930E-001
Pressure Washers	2.50000E-004	1.71000E-003	1.29000E-003	0.00000E+000	9.00000E-005	9.00000E-005	0.00000E+000	1.86170E-001	1.86170E-001	2.00000E-005	0.00000E+000	1.86670E-001
Pumps	5.58000E-003	4.38400E-002	3.99600E-002	7.00000E-005	2.90000E-003	2.90000E-003	0.00000E+000	5.93468E+000	5.93468E+000	4.50000E-004	0.00000E+000	5.94590E+000
Rollers	5.60000E-003	5.41600E-002	4.20400E-002	6.00000E-005	3.73000E-003	3.43000E-003	0.00000E+000	5.20053E+000	5.20053E+000	1.62000E-003	0.00000E+000	5.24100E+000
Rubber Tired Dozers	1.60000E-003	1.72700E-002	6.02000E-003	1.00000E-005	8.40000E-004	7.70000E-004	0.00000E+000	1.07296E+000	1.07296E+000	3.30000E-004	0.00000E+000	1.08131E+000
Rubber Tired Loaders	4.75000E-003	5.88700E-002	1.91900E-002	7.00000E-005	2.00000E-003	1.84000E-003	0.00000E+000	6.30682E+000	6.30682E+000	1.96000E-003	0.00000E+000	6.35590E+000
Sweepers/Scrubbers	1.70000E-003	1.45300E-002	1.09800E-002	1.00000E-005	1.21000E-003	1.11000E-003	0.00000E+000	1.26386E+000	1.26386E+000	3.90000E-004	0.00000E+000	1.27370E+000
Tractors/Loaders/ Backhoes	1.00800E-002	9.96400E-002	8.85300E-002	1.20000E-004	7.06000E-003	6.49000E-003	0.00000E+000	1.07507E+001	1.07507E+001	3.35000E-003	0.00000E+000	1.08344E+001
Welders	2.32000E-003	8.83000E-003	9.76000E-003	1.00000E-005	6.00000E-004	6.00000E-004	0.00000E+000	9.88160E-001	9.88160E-001	1.90000E-004	0.00000E+000	9.92900E-001

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	Mitigated tons/yr						Mitigated mt/yr					
Air Compressors	1.71200E-002	1.15000E-001	1.06310E-001	1.70000E-004	8.63000E-003	8.63000E-003	0.00000E+000	1.46387E+001	1.46387E+001	1.39000E-003	0.00000E+000	1.46734E+001
Bore/Drill Rigs	1.66000E-003	2.31900E-002	1.15600E-002	5.00000E-005	6.60000E-004	6.00000E-004	0.00000E+000	4.73542E+000	4.73542E+000	1.47000E-003	0.00000E+000	4.77228E+000
Cement and Mortar Mixers	1.60000E-003	1.00300E-002	8.40000E-003	2.00000E-005	3.90000E-004	3.90000E-004	0.00000E+000	1.24880E+000	1.24880E+000	1.30000E-004	0.00000E+000	1.25204E+000
Concrete/Industrial Saws	5.58000E-003	4.20900E-002	4.00300E-002	7.00000E-005	2.87000E-003	2.87000E-003	0.00000E+000	5.77980E+000	5.77980E+000	4.50000E-004	0.00000E+000	5.79099E+000
Cranes	6.24000E-003	7.45400E-002	2.75600E-002	6.00000E-005	3.23000E-003	2.97000E-003	0.00000E+000	5.75584E+000	5.75584E+000	1.79000E-003	0.00000E+000	5.80064E+000
Dumpers/Tenders	2.02000E-003	1.28300E-002	6.90000E-003	2.00000E-005	5.00000E-004	5.00000E-004	0.00000E+000	1.52031E+000	1.52031E+000	1.60000E-004	0.00000E+000	1.52439E+000
Forklifts	5.88000E-003	5.19600E-002	3.99700E-002	5.00000E-005	4.15000E-003	3.81000E-003	0.00000E+000	4.60395E+000	4.60395E+000	1.43000E-003	0.00000E+000	4.63978E+000
Generator Sets	6.62100E-002	5.38850E-001	4.90880E-001	8.60000E-004	3.43200E-002	3.43200E-002	0.00000E+000	7.40421E+001	7.40421E+001	5.34000E-003	0.00000E+000	7.41756E+001
Graders	1.68900E-002	2.31640E-001	6.22300E-002	2.20000E-004	7.53000E-003	6.93000E-003	0.00000E+000	1.97520E+001	1.97520E+001	6.15000E-003	0.00000E+000	1.99057E+001
Plate Compactors	8.80000E-004	5.53000E-003	4.63000E-003	1.00000E-005	2.10000E-004	2.10000E-004	0.00000E+000	6.88140E-001	6.88140E-001	7.00000E-005	0.00000E+000	6.89930E-001
Pressure Washers	2.50000E-004	1.71000E-003	1.29000E-003	0.00000E+000	9.00000E-005	9.00000E-005	0.00000E+000	1.86170E-001	1.86170E-001	2.00000E-005	0.00000E+000	1.86670E-001
Pumps	5.58000E-003	4.38300E-002	3.99600E-002	7.00000E-005	2.90000E-003	2.90000E-003	0.00000E+000	5.93467E+000	5.93467E+000	4.50000E-004	0.00000E+000	5.94590E+000
Rollers	5.60000E-003	5.41600E-002	4.20400E-002	6.00000E-005	3.73000E-003	3.43000E-003	0.00000E+000	5.20052E+000	5.20052E+000	1.62000E-003	0.00000E+000	5.24100E+000
Rubber Tired Dozers	1.60000E-003	1.72700E-002	6.02000E-003	1.00000E-005	8.40000E-004	7.70000E-004	0.00000E+000	1.07296E+000	1.07296E+000	3.30000E-004	0.00000E+000	1.08131E+000
Rubber Tired Loaders	4.75000E-003	5.88700E-002	1.91900E-002	7.00000E-005	2.00000E-003	1.84000E-003	0.00000E+000	6.30681E+000	6.30681E+000	1.96000E-003	0.00000E+000	6.35589E+000
Sweepers/Scrubbers	1.70000E-003	1.45300E-002	1.09800E-002	1.00000E-005	1.21000E-003	1.11000E-003	0.00000E+000	1.26386E+000	1.26386E+000	3.90000E-004	0.00000E+000	1.27370E+000
Tractors/Loaders/Backhoes	1.00800E-002	9.96400E-002	8.85300E-002	1.20000E-004	7.06000E-003	6.49000E-003	0.00000E+000	1.07507E+001	1.07507E+001	3.35000E-003	0.00000E+000	1.08344E+001
Welders	2.32000E-003	8.83000E-003	9.76000E-003	1.00000E-005	6.00000E-004	6.00000E-004	0.00000E+000	9.88160E-001	9.88160E-001	1.90000E-004	0.00000E+000	9.92900E-001

Equipment Type	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Air Compressors	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.36624E-006	1.36624E-006	0.00000E+000	0.00000E+000	6.81503E-007
Bore/Drill Rigs	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	2.11174E-006	2.11174E-006	0.00000E+000	0.00000E+000	0.00000E+000
Cement and Mortar Mixers	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Concrete/Industrial Saws	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.73016E-006	1.73016E-006	0.00000E+000	0.00000E+000	0.00000E+000
Cranes	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.73736E-006	1.73736E-006	0.00000E+000	0.00000E+000	0.00000E+000
Dumpers/Tenders	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Forklifts	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	2.15527E-006
Generator Sets	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.21552E-006	1.21552E-006	0.00000E+000	0.00000E+000	1.21334E-006
Graders	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.01255E-006	1.01255E-006	0.00000E+000	0.00000E+000	1.50710E-006
Plate Compactors	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Pressure Washers	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Pumps	0.00000E+000	2.28102E-004	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.68501E-006	1.68501E-006	0.00000E+000	0.00000E+000	0.00000E+000
Rollers	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.92288E-006	1.92288E-006	0.00000E+000	0.00000E+000	0.00000E+000
Rubber Tired Dozers	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Rubber Tired Loaders	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	1.58559E-006	1.58559E-006	0.00000E+000	0.00000E+000	1.57334E-006
Sweepers/Scrubbers	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000
Tractors/Loaders/Backhoes	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	9.30172E-007	9.30172E-007	0.00000E+000	0.00000E+000	9.22989E-007
Welders	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000	0.00000E+000

Fugitive Dust Mitigation

Yes/No	Mitigation Measure	Mitigation Input		Mitigation Input		Mitigation Input	
No	Soil Stabilizer for unpaved Roads	PM10 Reduction	0.00	PM2.5 Reduction	0.00		
No	Replace Ground Cover of Area Disturbed	PM10 Reduction	0.00	PM2.5 Reduction	0.00		
Yes	Water Exposed Area	PM10 Reduction	61.00	PM2.5 Reduction	61.00	Frequency (per day)	3.00
Yes	Unpaved Road Mitigation	Moisture Content %	0.50	Vehicle Speed (mph)	15.00		
Yes	Clean Paved Road	% PM Reduction	0.00				

		Unmitigated		Mitigated		Percent Reduction	
Phase	Source	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Demolition	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Demolition	Roads	0.00	0.00	0.00	0.00	0.00	0.00
Outfall Construction	Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00
Outfall Construction	Roads	0.00	0.00	0.00	0.00	0.00	0.00
Transition Construction	Fugitive Dust	0.01	0.00	0.00	0.00	0.61	0.61
Transition Construction	Roads	0.00	0.00	0.00	0.00	0.00	0.00
Underground Rehabilitation	Fugitive Dust	0.01	0.00	0.00	0.00	0.61	0.62
Underground Rehabilitation	Roads	0.00	0.00	0.00	0.00	0.00	0.00

Operational Percent Reduction Summary

Category	ROG	NOx	CO	SO2	Exhaust PM10	Exhaust PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Percent Reduction												
Architectural Coating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Consumer Products	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mobile	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Indoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Outdoor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Operational Mobile Mitigation

Project Setting:

Mitigation	Category	Measure	% Reduction	Input Value 1	Input Value 2	Input Value 3
No	Land Use	Increase Density	0.00			
No	Land Use	Increase Diversity	-0.01	0.13		
No	Land Use	Improve Walkability Design	0.00			
No	Land Use	Improve Destination Accessibility	0.00			
No	Land Use	Increase Transit Accessibility	0.25			
No	Land Use	Integrate Below Market Rate Housing	0.00			
	Land Use	Land Use SubTotal	0.00			
No	Neighborhood Enhancements	Improve Pedestrian Network				
No	Neighborhood Enhancements	Provide Traffic Calming Measures				
No	Neighborhood Enhancements	Implement NEV Network	0.00			
	Neighborhood Enhancements	Neighborhood Enhancements Subtotal	0.00			
No	Parking Policy Pricing	Limit Parking Supply	0.00			
No	Parking Policy Pricing	Unbundle Parking Costs	0.00			
No	Parking Policy Pricing	On-street Market Pricing	0.00			
	Parking Policy Pricing	Parking Policy Pricing Subtotal	0.00			
No	Transit Improvements	Provide BRT System	0.00			
No	Transit Improvements	Expand Transit Network	0.00			
No	Transit Improvements	Increase Transit Frequency	0.00			
	Transit Improvements	Transit Improvements Subtotal	0.00			
		Land Use and Site Enhancement Subtotal	0.00			
No	Commute	Implement Trip Reduction Program				
No	Commute	Transit Subsidy				
No	Commute	Implement Employee Parking "Cash Out"				
No	Commute	Workplace Parking Charge				
No	Commute	Encourage Telecommuting and Alternative	0.00			
No	Commute	Market Commute Trip Reduction Option	0.00			
No	Commute	Employee Vanpool/Shuttle	0.00		2.00	
No	Commute	Provide Ride Sharing Program				
	Commute	Commute Subtotal	0.00			
No	School Trip	Implement School Bus Program	0.00			
		Total VMT Reduction	0.00			

Area Mitigation

Measure Implemented	Mitigation Measure	Input Value
No	Only Natural Gas Hearth	
No	No Hearth	
No	Use Low VOC Cleaning Supplies	
No	Use Low VOC Paint (Residential Interior)	50.00
No	Use Low VOC Paint (Residential Exterior)	50.00
No	Use Low VOC Paint (Non-residential Interior)	100.00
No	Use Low VOC Paint (Non-residential Exterior)	100.00
No	Use Low VOC Paint (Parking)	100.00
No	% Electric Lawnmower	
No	% Electric Leafblower	
No	% Electric Chainsaw	

Energy Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
No	Exceed Title 24		
No	Install High Efficiency Lighting		
No	On-site Renewable		

Appliance Type	Land Use Subtype	% Improvement
ClothWasher		30.00
DishWasher		15.00
Fan		50.00
Refrigerator		15.00

Water Mitigation Measures

Measure Implemented	Mitigation Measure	Input Value 1	Input Value 2
No	Apply Water Conservation on Strategy		
No	Use Reclaimed Water		
No	Use Grey Water		
No	Install low-flow bathroom faucet	32.00	
No	Install low-flow Kitchen faucet	18.00	
No	Install low-flow Toilet	20.00	
No	Install low-flow Shower	20.00	
No	Turf Reduction		
No	Use Water Efficient Irrigation Systems	6.10	
No	Water Efficient Landscape		

Solid Waste Mitigation

Mitigation Measures	Input Value
Institute Recycling and Composting Services Percent Reduction in Waste Disposed	

APPENDIX B

Biological Resources Letter Report

DUDEK

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July 13, 2017 9851-06

Ms. Lisa Penna
City of Laguna Beach
505 Forest Avenue
Laguna Beach, California 92651

Subject: Biological Resources Letter Report for the Laguna Canyon Channel Improvements Project, City of Laguna Beach, California

Dear Ms. Penna:

On June 22, 2017, Dudek biologists conducted a general biological survey of the proposed Laguna Canyon Channel Improvements Project (project) located along the existing Laguna Canyon Channel between Beach Street and the ocean outfall in Laguna Beach, California (project site). This report describes the results of a biological reconnaissance of the study area and discusses survey methods, vegetation communities, and sensitive biological resources present or potentially present on site; the relationship of the project to regional conservation planning; an analysis of proposed impacts; and recommended mitigation.

PROJECT LOCATION AND DESCRIPTION

The project site is located within the City of Laguna Beach, Orange County, California, and includes a portion of the Laguna Canyon Channel (Orange County Facility No. I02) between Beach Street and the ocean outfall. The study area is located within Sections 23 and 26, Township 7 South, Range 9 West, on the Laguna Beach U.S. Geological Survey 7.5-minute quadrangle map (1981); latitude 33.543329° and longitude −117.784020°. Appendix A, Figures 1 and 2, show the regional location and local vicinity, respectively.

The 0.39-acre project site includes portions of the existing Laguna Canyon Channel (transition structure, box culvert, and outfall structure). Laguna Canyon Channel consists of a combination of natural channel, which occurs north of the study area, and improved channel and culvert sections located within the study area. For this analysis, two potential construction staging areas for materials and equipment were investigated just north of the outfall structure and west of the intersection of the Laguna Canyon Channel and Forest Avenue, plus a 100-foot buffer, for a total of 8.69 acres (study area).

The transition structure is an approximately 50-foot-long-by-8.5-foot-tall portion of the channel just north of Beach Street. This structure is concrete lined and includes vertical banks. The box culvert structure extends from Beach Street to the boardwalk at Main Beach just west of South Coast Highway.[1] The box culvert ranges from a double 6-foot-by-10-foot culvert (21-foot-wide section) for the first 20 feet under Beach Street to a single 6-foot-high-by-12-foot-wide reinforced concrete box. The outfall structure is a double 6.5-foot-high-by-11-foot-wide reinforced concrete box under the boardwalk at Main Beach that discharges seasonal flows to the beach.

The proposed project will involve the rehabilitation of the box culvert via various concrete patching methods and the removal and replacement of the transition and outfall structures. With the exception of changing the geometry of the transition structure to better accept upstream stormwater flows, the transition and outfall structures will be replaced in-kind within their existing footprints.

Several commercial buildings surround the project site to the north, south, east, and west. The Pacific Ocean is southwest of the project. Elevations at the project site range from approximately 0 to 40 feet above mean sea level.

METHODS

To evaluate the natural resources found or potentially occurring on the property, literature searches and database reviews were conducted by Dudek. The most recent versions of the California Natural Diversity Database and special-status species lists (CDFW 2017a–e) and the California Native Plant Society (CNPS) *Inventory of Rare and Endangered Plants* (2017) were reviewed to identify sensitive biological resources present or potentially present for the U.S. Geological Survey 7.5-minute quadrangle on which the project site is located (i.e., Laguna Beach) and the five surrounding quadrangles (i.e., El Toro, San Juan Capistrano, Dana Point, Tustin, and Newport Beach). Potentially occurring sensitive biological resources were also compiled by the California Department of Fish and Wildlife (CDFW) (2017a–e). Appendix B summarizes the current federal and state species sensitivity categories. Additionally, Dudek reviewed the *Laguna Beach Biological Resources Inventory* (Marsh et al. 1983).

Dudek biologist Ryan Henry conducted a general biological survey of the property on June 22, 2017. The survey was conducted from 9:30 a.m. to 11:00 a.m., and weather conditions

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[1] Note that the California Department of Transportation "squash box" located under South Coast Highway is not a part of this project and will remain in place untouched.

were favorable, with overcast skies, wind speeds from 2 to 5 miles per hour, and a temperature of 62 degrees Fahrenheit (°F). All native and naturalized plant species that encountered on the project site were identified and recorded. The potential for sensitive plant and wildlife species to occur on the project site was evaluated based on the vegetation communities and soils present. Vegetation communities and land covers on site were mapped in the field directly onto maps with an aerial photography base. An essential fish habitat assessment was conducted to evaluate potential impacts/disturbances associated with proposed construction activities to fish, fish habitat, and other marine resources within and adjacent to the project site. Essential fish habitat is regulated under the Magnuson-Stevens Fishery Conservation and Management Act, protecting waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. 1801 et seq.), which also includes eelgrass beds. Substrates include soft substrates (sand), hard (rocky) substrates, structures underlying waters, and associated biological communities. In addition, a formal investigation of the extent and distribution of U.S. Army Corps of Engineers jurisdictional waters of the United States, Regional Water Quality Control Board jurisdictional waters of the state, and CDFW jurisdictional streambed and associated riparian habitat was conducted.

Latin and common names for plant species with a California Rare Plant Rank (CRPR; formerly CNPS List) follow the CNPS *Inventory of Rare and Endangered Plants of California* (2017). For plant species without a CRPR, Latin names follow the "Jepson Interchange List of Currently Accepted Names of Native and Naturalized Plants of California" (Jepson Flora Project 2017), and common names follow the U.S. Department of Agriculture Natural Resources Conservation Service Plants Database (USDA 2017). Plant community classifications follow the Orange County Habitat Classification System (Gray and Bramlet 1992; Jones & Stokes 1993). Latin and common names of animals follow Crother (2008) for reptiles and amphibians, American Ornithologists' Union (2016) for birds, Wilson and Reeder (2005) for mammals, North American Butterfly Association (2016) or San Diego Natural History Museum for butterflies (2002), and Moyle (2002) for fish.

Dudek geographic information systems specialist Andrew Greis mapped biological resources into a geographic information system coverage and provided figures using ArcGIS software.

RESULTS

Site Description

The 8.69-acre study area is characterized by an urban setting and consists of flood control channels, commercial developments, ornamental landscaping, and cleared/graded land covers.

Areas adjacent to the project site include existing commercial buildings to the north, northwest, and southeast and the Pacific Ocean to the south. Representative photographs of the study area are included in Appendix C.

Soils

Two soil types are mapped within the study area: Beaches (115) and Capistrano sandy loam, 2% to 9% slopes (135). Descriptions provided below are summarized from U.S. Department of Agriculture Natural Resources Conservation Service (Wachtell 1978):

- **Beaches (115).** Although not part of a typical soil series, the beaches mapping unit consists of sandy, gravelly, or cobbly coastal shores affected by tidal action. This mapping unit supports little to no vegetation and has a high erosion potential.
- **Capistrano sandy loam, 2% to 9% slopes (135).** These soils occur on gently sloping to moderately sloping, well-drained soils formed in granitic and sedimentary alluvium on alluvial fans and plains. The shallow to very deep soils occur mostly as long, narrow areas in small valleys.

Vegetation Communities and Land Covers

Vegetation communities and land covers were classified according to the Orange County Habitat Classification System (Gray and Bramlet 1992). Descriptions of each vegetation community or land cover are provided below. Table 1 summarizes the extent of vegetation communities and land covers within the study area. Appendix A, Figure 3, is a map of the vegetation communities and land covers.

Table 1
Summary of Vegetation Communities and Land Covers

Vegetation Community/Land Cover	Study Area (acres)
Marine and Coastal Habitats	
Sandy beach	0.92
Watercourses	
Flood control channels	0.14
Developed Areas	
Urban	6.23
Transportation	0.78
Parks and ornamental plantings	0.38

Table 1
Summary of Vegetation Communities and Land Covers

Vegetation Community/Land Cover	Study Area (acres)
Disturbed Areas	
Cleared or graded	0.24
Total	**8.69**

Marine and Coastal Habitats

Sandy Beach Mapping Unit

The sandy beach mapping unit is not recognized by the Natural Communities List (CDFG 2010) but is identified by Gray and Bramlet (1992). This land cover type, also described by Jones & Stokes (1993) as beach (sand), consists of open beach sand that typically supports little to no vegetation. This land cover within the study area was unvegetated. A high level of beach recreation and human activity occurs within the study area.

Watercourses

Flood Control Channels Mapping Unit

The flood control channels mapping unit is not recognized by the Natural Communities List (CDFG 2010) but is identified by Gray and Bramlet (1992). This land cover type, also described by Jones & Stokes (1993), consists of constructed stormwater structures that are usually unvegetated but vary greatly and may support riparian habitats.

Developed Areas

Urban Mapping Unit

The urban mapping unit is not recognized by the Natural Communities List (CDFG 2010) but is identified by Gray and Bramlet (1992). This land cover type, also described by Jones & Stokes (1993) as urban and commercial, consists of areas occupied by residential and commercial structures, paving, and other impermeable surfaces that typically do not support vegetation or habitat for species; however, non-native ornamental landscaping may occur within the mapping unit.

Transportation Mapping Unit

The transportation mapping unit is not recognized by the Natural Communities List (CDFG 2010) but is identified by Gray and Bramlet (1992). This land cover type, also described by Jones & Stokes (1993), consists of major paved vehicular access roads that lack vegetation.

Parks and Ornamental Plantings Mapping Unit

The parks and ornamental plantings mapping unit is not recognized by the Natural Communities List (CDFG 2010) but is identified by Gray and Bramlet (1992). This land cover type, also described by Jones & Stokes (1993) as ornamental landscaping, consists of plantings of exotic, and sometimes native, species introduced as landscaping that is actively maintained.

This land cover within the study area is occupied by lily-of-the-Nile (*Agapanthus orientalis*), society garlic (*Tulbaghia violacea*), sweet alyssum (*Lobularia maritima*), magnolia (*Magnolia grandiflora*), Indian hawthorn (*Rhaphiolepis indica*), bird-of-paradise (*Strelitzia reginae*), Bermuda grass (*Cynodon dactylon*), and Washington fan palm (*Washingtonia robusta*).

Disturbed Areas

Cleared or Graded Mapping Unit

The cleared or graded mapping unit is not recognized by the Natural Communities List (CDFG 2010) but is identified by Gray and Bramlet (1992). This land cover type, also described by Jones & Stokes (1993) as disturbed or barren, consists of areas that lack vegetation but still retain a pervious surface or that are dominated by a sparse cover of ruderal vegetation such as Maltese star-thistle (*Centaurea melitensis*), wild oat (*Avena fatua*), black mustard (*Brassica nigra*), spiny sowthistle (*Sonchus asper*), and prickly lettuce (*Lactuca serriola*).

Floral Diversity

A total of 62 species of vascular plants were recorded within the study area, including 16 native (26%) and 46 non-native (74%) species. The low plant diversity reflects the small size of the study area and its proximity to adjacent disturbed and developed areas. Plant species observed on site are listed in Appendix D.

Wildlife

The property represents a small fragment of native habitat (beaches) that is surrounded by existing development (roads and retail/commercial buildings) on three sides and bordered by the Pacific Ocean to the south. Therefore, wildlife use is expected to be limited.

Nine bird species were detected within the study area, including American crow (*Corvus brachyrhynchos*), house finch (*Carpodacus mexicanus*), lesser goldfinch (*Carduelis psaltria*), and Heermann's gull (*Larus heermanni*). No active bird nesting was observed during the fieldwork, but the various shrubs in the study area could support nesting birds. No amphibian or reptile species were observed during the survey; however, a common and widespread species such as western fence lizard (*Sceloporus occidentalis*) is likely to occur on site. One mammal species was detected during the survey: domestic dog (*Canis lupus familiaris*). Additionally, the California ground squirrel (*Spermophilus beecheyi*) could occur on site. Wildlife species detected within the study area are listed in Appendix D.

Special-Status Plant Species

Special-status plants include those listed as threatened or endangered by the USFWS and CDFW, or that are candidates for listing, and species identified as rare by the CNPS (particularly CRPR 1A, presumed extinct in California; CRPR 1B, rare, threatened, or endangered throughout its range; and CRPR 2, rare or endangered in California, more common elsewhere). A total of 55 special-status plant species were reported in the California Natural Diversity Database, USFWS, and CNPS databases as occurring in the vicinity of the study area. However, no special-status plant species were observed within the study area during the site visit.

Table E-1 in Appendix E lists the special-status plant species that are known to occur within a 10-mile radius of the project site (CDFW 2017e) or are identified as occurring or potentially occurring according to the City's biological inventory (Marsh et al. 1983). For each species listed, a determination is made regarding the potential for the species to occur on site based on information gathered during the field reconnaissance, including the location of the site, habitats present, current site conditions, and past and present land use.

A number of species listed in Table E-1 including summery holly (*Comarostaphylis diversifolia* ssp. *diversifolia*), cliff spurge (*Euphorbia misera*), and Nuttall's scrub oak (*Quercus dumosa*) are conspicuous (i.e., large, woody shrubs) and readily observed if present within a small site. Unless observed during the reconnaissance survey, it is assumed that such conspicuous and readily observed species are not present on site. In addition, the presence or absence of certain species of perennial herbs can reliably be determined by observation of vegetative structures that remain beyond their respective blooming periods. The state- and federally listed threatened Laguna Beach dudleya (*Dudleya stolonifera*) typically blooms during the spring and summer but is expected to be detectable, if present on site, based on the observation of vegetative structures.

Based on the species ranges, vegetation communities/land covers (e.g., developed, ornamental), and soils present on the project site, there is little to no potential for special-status plants to occur within the study area.

Sensitive Wildlife Species

Special-status wildlife includes those species listed as threatened or endangered by the USFWS and CDFW, or that are candidates for listing, and designated as special species of concern by CDFW. A total of 54 special-status wildlife species were reported in the California Natural Diversity Database and USFWS databases as occurring in the vicinity of the study area. However, no special-status wildlife species were observed within the study area during the site visit.

Table E-2 in Appendix E lists the special-status wildlife species that are known to occur in the vicinity of the site (CDFW 2017e) or are identified as occurring or potentially occurring according to the City's biological inventory (Marsh et al. 1983). For each species listed, a determination is made regarding the potential use of the site based on information gathered during the field reconnaissance, known habitat preferences, and knowledge of their relative distributions in the area.

Based on the species ranges, and vegetation communities/land covers (e.g., developed, ornamental, and beach) and urban pressures present on the project site, there is little to no potential for special-status wildlife to occur.

Jurisdictional Waters and Significant Drainage Courses

The study area was analyzed to determine the presence and distribution of jurisdictional aquatic resources and significant drainage courses, as defined by the City's General Plan (1992). Results of the formal jurisdictional delineation conducted throughout the entire study area identified the reach of one drainage feature (Laguna Canyon Channel) (Appendix A, Figure 4). No "significant drainage course" as identified in the City's General Plan occurs within the study area.

The Laguna Canyon Channel storm drain system conveys flows from approximately 9 square miles of tributary drainage area reaching beyond the State Route 73 to the Pacific Ocean. The current drainage system within the study area is characterized by a reinforced, open concrete channel north of Forest Avenue and underground pre-cast concrete box culverts of varying sizes through downtown Laguna Beach. Most of this channel occurs underground, but a small portion just north of Beach Street is a reinforced, open concrete channel. The open concrete channels were determined to be jurisdictional non-wetland waters regulated by the U.S. Army Corps of Engineers, Regional Water Quality Control Board, CDFW, and California Coastal Commission. The mean high tide line of the Pacific Ocean was mapped at 8 feet, which occurs just outside of the study area.

Approximately 0.04 acres within the study area are U.S. Army Corps of Engineers, Regional Water Quality Control Board, CDFW, and California Coastal Commission jurisdictional. However, final determinations of jurisdictional extents cannot be made until the resource agencies have verified the findings of this investigation.

Essential Fish Habitat

The project is located adjacent to Laguna Beach State Marine Reserve (SMR), which extends seaward from the mean high tide line. In a SMR, it is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource, except under a scientific collecting permit issued by the CDFW or specific authorization from the California Fish and Game Commission for research, restoration, or monitoring purposes (14 CCR 632(a)(1)(A)). The project is also located adjacent to an area designated as essential fish habitat in the Pacific Coast Groundfish Fishery Management Plan (2016). The Fishery Management Plan manages 85 species over a large and ecologically diverse area extending from the Pacific coast border with Mexico to the Pacific coast border between Washington and Canada.

The substrate immediately surrounding the southwestern portion of the project site consists of a dry sandy beach with minimal wrack of common kelp and algal species that are frequently cleaned by beach maintenance crews. The relatively exposed coastline and associated wave action within the project vicinity precludes the establishment of eelgrass beds (*Zostera marina*). Dislodged Torrey's surfgrass (*Phyllospadix torreyi*) was present on shore in the swash zone just outside the study area. The nearest rocky intertidal habitat that was exposed on the survey date was approximately 1,200 feet seaward and west from the existing outlet structure. Species potentially present in this intertidal habitat include starburst anemone (*Anthopleura sola*), bat stars (*Patiria miniata*), and California grunion (*Leuresthes tenuis*), which is present along the Southern California shoreline in the spring and summer (primarily from March through August) during nighttime spawning runs. No marine mammals were observed. Shorebird species observed were various gull species (*Larus* sp.). No shorebirds or seabirds were observed roosting or perching on any of the rocks in the general vicinity.

Regional Resource Planning Context

Policies and guidance for resource planning in the City are provided by the City's Open Space/Conservation Element of the General Plan (1992), which also serves as the City's certified Local Coastal Program pursuant to the 1976 California Coastal Act. According to the City's Open Space/Conservation Element of the General Plan (1992), the project site is not located within a very high value habitat, high value habitat, or moderate value habitat environmentally sensitive area. Further, the project site is located within the boundaries of the Downtown Specific Plan.

The project site occurs just outside of 1 of the 124 Southern California marine protected areas. The Laguna Beach SMR encompasses 5.2 miles of shoreline habitat and 6.33 square miles of protected ocean. The Laguna Beach SMR protects resources by prohibiting the recreational and/or commercial take of all marine resources (i.e., injure, damage, or possess any living, geological, or cultural marine resource). The SMR is bounded by the mean high tide line and straight lines connecting the following points in the order listed: 33°33.224' north latitude, 117°49.184' west longitude; 33°30.211' north latitude, 117°49.200' west longitude; 33°30.713' north latitude, 117°49.200' west longitude; and 33°30.713' north latitude, 117°45.264' west longitude.

Additionally, the project site occurs within the Laguna Canyon Channel watershed at one of the "local outfall" discharge locations identified on the Water Quality Environmental Sensitive Area Map (1992). The portion of the project site occurring parallel to the coast occurs within the 200-foot buffer of the Pacific Ocean water quality environmental sensitive area.

The project site is located over 1,000 feet from the Orange County Central and Coastal Natural Community Conservation Plan habitat reserve, which contains 32,818 acres of intact natural habitat. This reserve provides large blocks of intact natural vegetation communities providing habitat, wildlife corridors, and habitat linkages for a range of species.

The 0.39-acre project site is constrained by development to the north, west, and east. To the south, the project site is contiguous with a narrow strip of beach (sand) and the Pacific Ocean. The beach (sand) land cover on site is not a sensitive vegetation community. Additionally, no sensitive plant or wildlife species were observed within the study area, and the diversity of native plant species is limited.

Wildlife Corridors and Habitat Linkages

Wildlife corridors are linear features that connect large patches of natural open space and provide avenues for the migration of animals. Habitat linkages are small patches that join larger blocks of habitat and help reduce the adverse effects of habitat fragmentation; they may be continuous habitat or discrete habitat islands that function as stepping stones for wildlife dispersal. Due to the limited size and constrained limits of the habitat on site, the property has very little potential to facilitate wildlife movement or function as a habitat linkage.

IMPACTS AND MITIGATION

The proposed project consists of the reconstruction of portions of the Laguna Canyon Channel and outfall structure to alleviate historic flooding issues. The proposed improvements would occur in the same footprint as the existing structure and result in direct temporary impacts. Two potential construction staging areas for materials and equipment were evaluated as illustrated on Figure 5 (Appendix A) and summarized in Table 2.

Table 2
Temporary Impacts to Vegetation Communities and Land Covers

Vegetation Community/Land Cover	Project Site and Potential Construction Staging Area 1 (Main Beach) (acres)	Project Site and Potential Construction Staging Area 2 (City Yard) (acres)
Marine and Coastal Habitats		
Sandy beach	0.07	—
Watercourses		
Flood control channels	0.04	0.04
Developed Areas		
Urban	0.28	0.40
Parks and ornamental plantings	0.05	0.04
Disturbed Areas		
Cleared or graded	0.04	0.03
Total	**0.48**	**0.51**

Based on the site-specific assessment, none of the vegetation communities and land covers on the project site are sensitive or considered very high value habitat, high value habitat, or moderate value habitat according to the City's General Plan (1992). No special-status plant or wildlife species would be significantly impacted by the proposed project. Approximately 0.04 acres of jurisdictional non-wetland waters would be impacted by the proposed project.

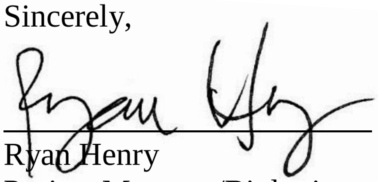
Potential impacts resulting from construction of the project are expected to be minimal and temporary to the managed fish species occurring in the nearshore coastal habitat. It is anticipated that individuals of managed pelagic or groundfish species that occur in the adjacent nearshore vicinity of the project site would not be affected by construction activities or have to relocate to another area of open water or other shallow water habitat to avoid any disturbances caused by construction activities. No adverse effects are expected from construction activities that will impact recruitment or populations of the protected species within Laguna Beach SMR or affect nighttime spawning runs of California grunion (if they occur in the general vicinity). A review of the current habitat data does not indicate that eelgrass (*Zostera marina*) is present within the vicinity of the proposed construction site, and kelp forests are located outside the direct influence of proposed construction activities on the project site, which further reduces the potential for occurrence of managed species near the site.

Dudek recommends the following measures to avoid and minimize potential environmental effects resulting from the residential construction:

- Implement standard construction best management practices to control erosion and construction debris.
- Avoid the use of any invasive, non-native plant species rated as "high" or "moderate" by the California Invasive Plant Council's Invasive Plant Inventory (2017) for future landscaping of the site.
- Avoid construction activities during the bird breeding season (generally March through August) to ensure compliance with the federal Migratory Bird Treaty Act. If avoidance of the bird breeding season is not feasible, then a pre-construction nesting bird survey should be conducted by a qualified biologist to ensure birds are not engaged in active nesting within 100 feet of the project's construction limits. If nesting birds are discovered during pre-construction surveys, then the qualified biologist should identify an appropriate buffer where no ground-breaking activities are allowed to occur until after the birds have fledged from the nest.
- Avoid nighttime construction activities, especially between March and August, to avoid impacts to marine aquatic resources such as the California grunion.

If you have any questions about the contents of this report, please call me at 949.373.8321.

Sincerely,



Ryan Henry
Project Manager/Biologist

Att.: Appendix A – Figures
1 – Regional Map
2– Vicinity Map
3– Vegetation Community and Land Covers Map

4 – Jurisdictional Aquatic Resources Map
5 – Proposed Project Impact Map
Appendix B – Species Sensitivity Categories
Appendix C – Site Photographs
Appendix D – Species Compendium
Appendix E – Special-Status Species Detected or Potentially Occurring in the Study Area

cc: Thomas Ryan, Dudek

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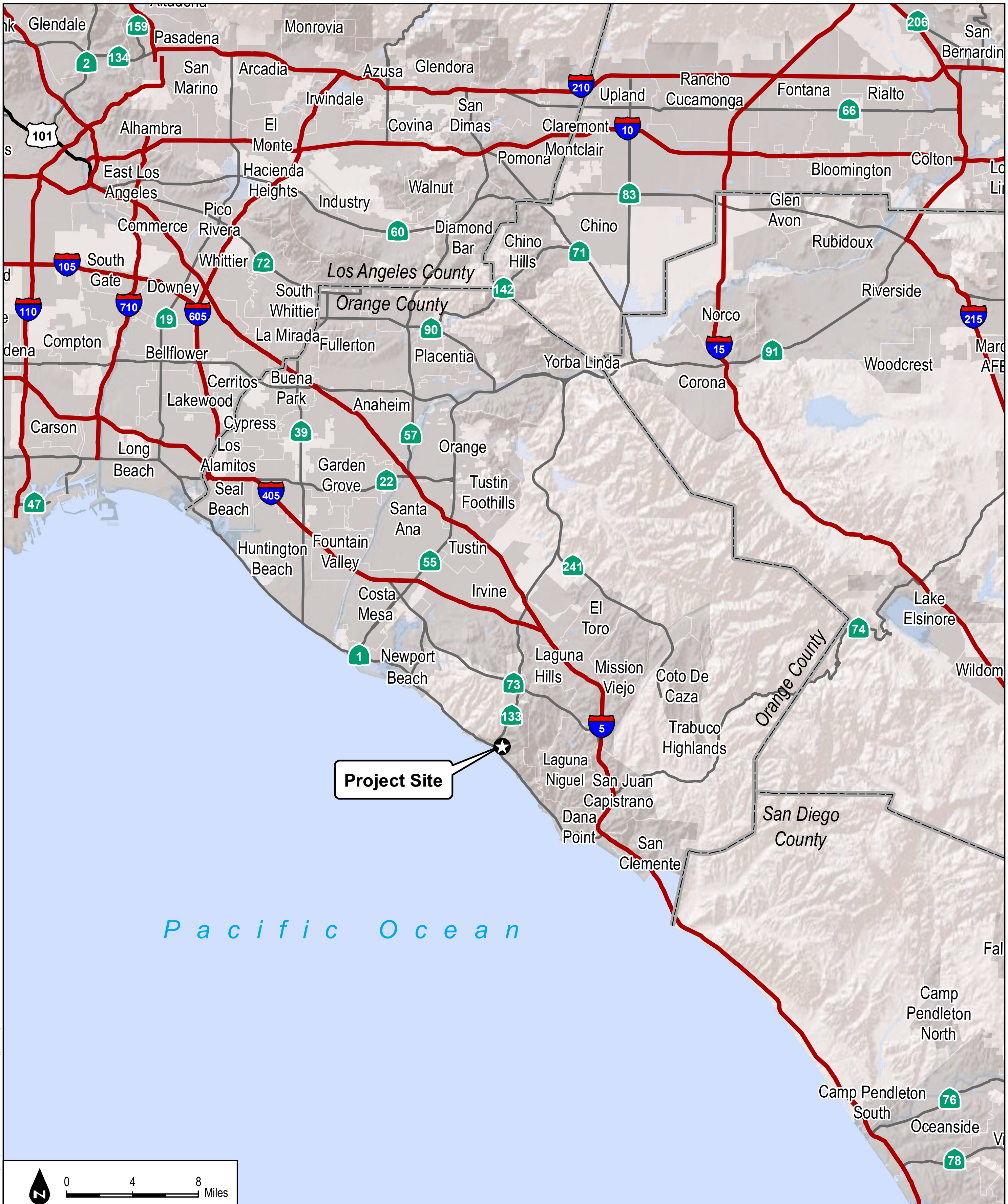
APPENDIX A

Figures



SOURCE: ESRI 2017

DUDEK

FIGURE 1

Regional Map

Laguna Canyon Channel Improvements Project

SOURCE: USGS 7.5-Minute Series Laguna Beach Quadrangle.

DUDEK

FIGURE 2
Vicinity Map

Laguna Canyon Channel Improvements Project

DUDEK

SOURCE: Bing Maps, 2017; Dudek 2017

FIGURE 3

Vegetation Community and Land Covers Map

Laguna Canyon Channel Improvements Project

DUDEK

SOURCE: Bing Maps, 2017; Dudek 2017

FIGURE 4

Jurisdictional Aquatic Resources Map

Laguna Canyon Channel Improvements Project

DUDEK

SOURCE: Bing Maps, 2017; Dudek 2017

FIGURE 5

Proposed Project Impact Map

Laguna Canyon Channel Improvements Project

APPENDIX B

Species Sensitivity Categories

APPENDIX B
Species Sensitivity Categories

FEDERAL

- **Endangered**. Taxa threatened throughout all or a significant portion of their range.
- **Threatened.** Taxa likely to become endangered in the foreseeable future.
- **Candidate.** Taxa for which the USFWS currently has on file substantial information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened species.
- **Federal Species of Concern.** Taxa that were formerly Category 2 Candidates for listing as threatened or endangered. This category is an "unofficial" designation for species that may warrant listing, but for which substantial information to support the listing is lacking.

STATE OF CALIFORNIA

- **Endangered.** Taxa which are in serious danger of becoming extinct throughout all, or a significant portion, of their range due to one or more causes including loss of habitat, change in habitat, over exploitation, predation, competition, or disease (Section 2062 of the Fish and Game Code).
- **Threatened.** Taxa which, although not presently threatened with extinction, are likely to become endangered species in the foreseeable future (Section 2067 of the Fish and Game Code).
- **Rare.** Taxa which, although not presently threatened with extinction, are present in such small numbers throughout their range that they may become endangered if the present environment worsens (Section 1901 of the Fish and Game Code).
- **Candidate.** Taxa which the Fish and Game Commission has formally noticed as being under review by the Department in addition to the list of threatened and endangered species.
- **Species of Special Concern.** Taxa that appear to be vulnerable to extinction because of declining populations, limited ranges, and/or continuing threats.
- **Watch List.** "Taxa to Watch" that were created in the *California Bird Species of Special Concern* (2008). The birds on this Watch List are 1) not on the current Special Concern list but were on previous lists and they have not been state listed under CESA; 2) were previously state or federally listed and now are on neither list; or 3) are on the list of "Fully Protected" species.

CALIFORNIA NATIVE PLANT SOCIETY

The CDFW and CNPS, a private organization dedicated to protection of California native plants, in collaboration with the Rare Plant Status Review groups, which comprise over 300 botanical experts from government, academia, non-government organizations, and the private sector, produced a ranked inventory of rare, threatened, and endangered vascular plant species within California ("the Rare Plant Rank" [RPR]). The rare plant inventory includes rank assignments, geographic distribution, and qualitative characterization of plant species not protected under federal or state endangered species legislation.

The CNPS's 8th Edition of the CNPS's *Inventory of Rare and Endangered Plants* (2014) separates plants of interest into five categories of rarity as presented in the table below. The list serves as the candidate list for listing as threatened and endangered by CDFW.

Summary of CNPS RPR Definitions

California RPR	Comments
1A	Plant species presumed extirpated in California because they have not been seen or collected in the wild or plants, which are presumed extinct.
1B	Plant species that are generally rare throughout their range that are also judged to be vulnerable to other threats such as declining habitat.
2A	Plant species that are presumed extirpated in California, but more common in other states
2B	Plant species rare, threatened, or endangered in California but more common in other states
3	Plant species for which additional information is needed before rarity can be determined – A Review List
4	Species of limited distribution or infrequent throughout a broader area in California; and while CDFG/CNPS cannot call these plant species "rare" from a statewide perspective, they are uncommon enough that their status should be monitored regularly – A Watch List

APPENDIX C

Site Photographs

APPENDIX C
Site Photographs

Photograph 1: Laguna Canyon Channel (Transition Structure) looking west

Photograph 2: Laguna Canyon Channel (Outfall Structure) looking northeast

APPENDIX D

Species Compendium

APPENDIX D
Species Compendium

PLANTS

VASCULAR SPECIES

EUDICOTS

AIZOACEAE—FIG-MARIGOLD FAMILY

* *Carpobrotus edulis*—hottentot fig

* *Mesembryanthemum crystallinum*—common iceplant

* *Mesembryanthemum nodiflorum*—slenderleaf iceplant

BRASSICACEAE—MUSTARD FAMILY

* *Cakile maritima*—European searocket

PLUMBAGINACEAE—LEADWORT FAMILY

* *Limonium perezii*—Perez's sea lavender

MONOCOTS

AGAVACEAE—AGAVE FAMILY

Hesperoyucca whipplei—chaparral yucca

ARECACEAE—PALM FAMILY

* *Washingtonia robusta*—Washington fan palm

ASPHODELACEAE—ASPHODEL FAMILY

* *Aloe maculata*—no common name

ZOSTERACEAE—SEA GRASSES FAMILY

Phyllospadix torreyi—surfgrass

* signifies introduced (non-native) species

WILDLIFE

AMPHIBIAN

FROGS

HYLIDAE—TREEFROGS

Pseudacris hypochondriaca—Baja California treefrog

BIRD

FINCHES

FRINGILLIDAE—FRINGILLINE & CARDUELINE FINCHES & ALLIES

Spinus psaltria—lesser goldfinch
Haemorhous mexicanus—house finch

JAYS, MAGPIES AND CROWS

CORVIDAE—CROWS AND JAYS

Corvus brachyrhynchos—American crow

PIGEONS AND DOVES

COLUMBIDAE—PIGEONS AND DOVES

Zenaida macroura—mourning dove

TERNS AND GULLS

LARIDAE—GULLS, TERNS, AND SKIMMERS

Larus heermanni—Heermann's gull

MAMMAL

DOMESTIC

CANIDAE—WOLVES AND FOXES

* *Canis lupus familiaris*—domestic dog

INVERTEBRATES

SEA ANEMONES

ACTINIIDAE—SEA ANEMONES

Anthopleura sola—starburst anemone

STARFISH

ASTERINIDAE—SEA STARS

Patiria miniata—bat star

* signifies introduced (non-native) species

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APPENDIX E

Special-Status Species Detected or Potentially Occurring in the Study Area

APPENDIX E
Special-Status Species Detected or Potentially Occurring in the Study Area

Table E-1

Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Potential to Occur
red sand-verbena	None/None/4.2	Coastal dunes/perennial herb/Feb–Nov/0–328	Not expected to occur. No suitable habitat present within project site.
chaparral sand-verbena	None/None/1B.1	Chaparral, coastal scrub, desert dunes; sandy/annual herb/Jan–Sep/246–5249	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
aphanisma	None/None/1B.2	Coastal bluff scrub, coastal dunes, coastal scrub; sandy or gravelly/annual herb/Mar–June/3–1001	Not expected to occur. No suitable habitat present within project site.
Coulter's saltbush	None/None/1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, valley and foothill grassland; alkaline or clay/perennial herb/Mar–Oct/10–1509	Not expected to occur. No suitable habitat present within project site.
South Coast saltscale	None/None/1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, playas/annual herb/Mar–Oct/0–459	Not expected to occur. No suitable habitat present within project site.
Parish's brittlescale	None/None/1B.1	Chenopod scrub, playas, vernal pools; alkaline/annual herb/June–Oct/82–6234	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
Davidson's saltscale	None/None/1B.2	Coastal bluff scrub, coastal scrub; alkaline/annual herb/Apr–Oct/33–656	Not expected to occur. No suitable habitat present within project site.
thread-leaved brodiaea	FT/CE/1B.1	Chaparral (openings), cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools; often clay/perennial bulbiferous herb/Mar–June/82–3675	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
Catalina mariposa lily	None/None/4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland/perennial bulbiferous herb/(Feb) Mar–June/49–2297	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
intermediate mariposa lily	None/None/1B.2	Chaparral, coastal scrub, valley and foothill grassland; rocky, calcareous/perennial bulbiferous herb/May–July/344–2805	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
Lewis' evening-primrose	None/None/3	Coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland; sandy or clay/annual herb/Mar–May (June)/0–984	Not expected to occur. No suitable habitat present within project site.

Table E-1

Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Potential to Occur
southern tarplant	None/None/1B.1	Marshes and swamps (margins), valley and foothill grassland (vernally mesic), vernal pools/annual herb/May–Nov/0–1575	Not expected to occur. No suitable habitat present within project site.
Orcutt's pincushion	None/None/1B.1	Coastal bluff scrub (sandy), coastal dunes/annual herb/Jan–Aug/0–328	Not expected to occur. No suitable habitat present within project site.
salt marsh bird's-beak	FE/CE/1B.2	Coastal dunes, marshes and swamps (coastal salt)/annual herb (hemiparasitic)/May–Oct/0–98	Not expected to occur. No suitable habitat present within project site.
seaside cistanthe	None/None/4.2	Coastal bluff scrub, coastal scrub, valley and foothill grassland; sandy/annual herb/(Feb) Mar–June (Aug)/16–984	Not expected to occur. No suitable habitat present within project site.
summer holly	None/None/1B.2	Chaparral, cismontane woodland/perennial evergreen shrub/Apr–June/98–2592	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
small-flowered morning-glory	None/None/4.2	Chaparral (openings), coastal scrub, valley and foothill grassland; clay, serpentinite seeps/annual herb/Mar–July/98–2297	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
paniculate tarplant	None/None/4.2	Coastal scrub, valley and foothill grassland, vernal pools; usually vernally mesic, sometimes sandy/annual herb/Apr–Nov/82–3084	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
western dichondra	None/None/4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland/perennial rhizomatous herb/(Jan) Mar–July/164–1640	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
slender-horned spineflower	FE/CE/1B.1	Chaparral, cismontane woodland, coastal scrub (alluvial fan); sandy/annual herb/Apr–June/656–2493	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
Blochman's dudleya	None/None/1B.1	Coastal bluff scrub, chaparral, coastal scrub, valley and foothill grassland; rocky, often clay or serpentinite/perennial herb/Apr–June/16–1476	Not expected to occur. No suitable habitat present within project site.
many-stemmed dudleya	None/None/1B.2	Chaparral, coastal scrub, valley and foothill grassland; often clay/perennial herb/Apr–July/49–2592	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.

Table E-1

Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Potential to Occur
Laguna Beach dudleya	FT/CT/1B.1	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland; rocky/perennial stoloniferous herb/May–July/33–853	Not expected to occur. Conspicuous species not observed and no suitable habitat present within project site.
San Diego button-celery	FE/CE/1B.1	Coastal scrub, valley and foothill grassland, vernal pools; mesic/annual / perennial herb/Apr–June/66–2034	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
cliff spurge	None/None/2B.2	Coastal bluff scrub, coastal scrub, Mojavean desert scrub; rocky/perennial shrub/Dec–Aug (Oct)/33–1640	Not expected to occur. Conspicuous species not observed and no suitable habitat present within project site.
Palmer's grapplinghook	None/None/4.2	Chaparral, coastal scrub, valley and foothill grassland; clay/annual herb/Mar–May/66–3133	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
Los Angeles sunflower	None/None/1A	Marshes and swamps (coastal salt and freshwater)/perennial rhizomatous herb/Aug–Oct/33–5495	Not expected to occur. No suitable habitat present within project site.
Tecate cypress	None/None/1B.1	Closed-cone coniferous forest, chaparral; clay, gabbroic or metavolcanic/perennial evergreen tree/N.A./262–4921	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
vernal barley	None/None/3.2	Coastal dunes, coastal scrub, valley and foothill grassland (saline flats and depressions), vernal pools/annual herb/Mar–June/16–3281	Not expected to occur. No suitable habitat present within project site.
mesa horkelia	None/None/1B.1	Chaparral (maritime), cismontane woodland, coastal scrub; sandy or gravelly/perennial herb/Feb–July (Sep)/230–2657	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
decumbent goldenbush	None/None/1B.2	Chaparral, coastal scrub (sandy, often in disturbed areas)/perennial shrub/Apr–Nov/33–443	Not expected to occur. No suitable habitat present within project site.
southwestern spiny rush	None/None/4.2	Coastal dunes (mesic), meadows and seeps (alkaline seeps), marshes and swamps (coastal salt)/perennial rhizomatous herb/(Mar) May–June/10–2953	Not expected to occur. No suitable habitat present within project site.
Coulter's goldfields	None/None/1B.1	Marshes and swamps (coastal salt), playas, vernal pools/annual herb/Feb–June/3–4003	Not expected to occur. No suitable habitat present within project site.

Table E-1

Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Potential to Occur
Robinson's pepper-grass	None/None/4.3	Chaparral, coastal scrub/annual herb/Jan–July/3–2904	Not expected to occur. No suitable habitat present within project site.
California box-thorn	None/None/4.2	Coastal bluff scrub, coastal scrub/perennial shrub/(Dec) Mar–Aug/16–492	Not expected to occur. No suitable habitat present within project site.
cliff malacothrix	None/None/4.2	Coastal bluff scrub, coastal scrub/perennial rhizomatous herb/Mar–Sep/10–656	Not expected to occur. No suitable habitat present within project site.
intermediate monardella	None/None/1B.3	Chaparral, cismontane woodland, lower montane coniferous forest (sometimes); usually understory/perennial rhizomatous herb/Apr–Sep/1312–4101	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
mud nama	None/None/2B.2	Marshes and swamps (lake margins, riverbanks)/annual / perennial herb/Jan–July/16–1640	Not expected to occur. No suitable habitat present within project site.
Gambel's water cress	FE/CT/1B.1	Marshes and swamps (freshwater or brackish)/perennial rhizomatous herb/Apr–Oct/16–1083	Not expected to occur. No suitable habitat present within project site.
prostrate vernal pool navarretia	None/None/1B.1	Coastal scrub, meadows and seeps, valley and foothill grassland (alkaline), vernal pools; mesic/annual herb/Apr–July/10–3970	Not expected to occur. No suitable habitat present within project site.
coast woolly-heads	None/None/1B.2	Coastal dunes/annual herb/Apr–Sep/0–328	Not expected to occur. No suitable habitat present within project site.
chaparral nolina	None/None/1B.2	Chaparral, coastal scrub; sandstone or gabbro/perennial evergreen shrub/(Mar) May–July/459–4183	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
California Orcutt grass	FE/CE/1B.1	Vernal pools/annual herb/Apr–Aug/49–2165	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
Allen's pentachaeta	None/None/1B.1	Coastal scrub (openings), valley and foothill grassland/annual herb/Mar–June/246–1706	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
south coast branching phacelia	None/None/3.2	Chaparral, coastal dunes, coastal scrub, marshes and swamps (coastal salt); sandy, sometimes rocky/perennial herb/Mar–Aug/16–984	Not expected to occur. No suitable habitat present within project site.

Table E-1

Common Name	Status (Federal/State/CRPR)	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range (feet)	Potential to Occur
white rabbit-tobacco	None/None/2B.2	Chaparral, cismontane woodland, coastal scrub, riparian woodland; sandy, gravelly/perennial herb/(July) Aug–Nov (Dec)/0–6890	Not expected to occur. No suitable habitat present within project site.
Nuttall's scrub oak	None/None/1B.1	Closed-cone coniferous forest, chaparral, coastal scrub; sandy, clay loam/perennial evergreen shrub/Feb–Apr (Aug)/49–1312	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
Sanford's arrowhead	None/None/1B.2	Marshes and swamps (assorted shallow freshwater)/perennial rhizomatous herb/May–Oct (Nov)/0–2133	Not expected to occur. No suitable habitat present within project site.
chaparral ragwort	None/None/2B.2	Chaparral, cismontane woodland, coastal scrub; sometimes alkaline/annual herb/Jan–Apr/49–2625	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
salt spring checkerbloom	None/None/2B.2	Chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub, playas; alkaline, mesic/perennial herb/Mar–June/49–5020	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
estuary seablite	None/None/1B.2	Marshes and swamps (coastal salt)/perennial herb/May–Oct (Jan)/0–16	Not expected to occur. No suitable habitat present within project site.
woolly seablite	None/None/4.2	Coastal bluff scrub, coastal dunes, marshes and swamps (margins of coastal salt)/perennial evergreen shrub/Jan–Dec/0–164	Not expected to occur. No suitable habitat present within project site.
San Bernardino aster	None/None/1B.2	Cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, valley and foothill grassland (vernally mesic); near ditches, streams, springs/perennial rhizomatous herb/July–Nov/7–6693	Not expected to occur. No suitable habitat present within project site.
Parry's tetracoccus	None/None/1B.2	Chaparral, coastal scrub/perennial deciduous shrub/Apr–May/541–3281	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.
big-leaved crownbeard	FT/CT/1B.1	Chaparral (maritime), coastal scrub/perennial herb/Apr–July/148–673	Not expected to occur. The project site is outside of the species' known elevation range and there is no suitable habitat present.

Table E-2

Common Name	Status (Federal/State)	Habitat	Potential to Occur
arroyo toad	FE/SSC	Semi-arid areas near washes, sandy riverbanks, riparian areas, palm oasis, Joshua tree, mixed chaparral and sagebrush; stream channels for breeding (typically third order); adjacent stream terraces and uplands for foraging and wintering	Not expected to occur. No suitable habitat present within project site.
western spadefoot	None/SSC	Primarily grassland and vernal pools, but also in ephemeral wetlands that persist at least 3 weeks in chaparral, coastal scrub, valley–foothill woodlands, pastures, and other agriculture	Not expected to occur. No suitable habitat present within project site.
western pond turtle	None/SSC	Slow-moving permanent or intermittent streams, ponds, small lakes, and reservoirs with emergent basking sites; adjacent uplands used for nesting and during winter	Not expected to occur. The project site is outside of the species' known geographic range.
California glossy snake	None/SSC	Commonly occurs in desert regions throughout southern California. Prefers open sandy areas with scattered brush. Also found in rocky areas.	Not expected to occur. No suitable habitat present within project site.
orange-throated whiptail	None/WL	Low-elevation coastal scrub, chaparral, and valley–foothill hardwood	Not expected to occur. No suitable habitat present within project site.
San Diegan tiger whiptail	None/None	Hot and dry areas with sparse foliage, including chaparral, woodland, and riparian areas.	Not expected to occur. No suitable habitat present within project site.
red diamondback rattlesnake	None/None	Coastal scrub, chaparral, oak and pine woodlands, rocky grasslands, cultivated areas, and desert flats	Not expected to occur. No suitable habitat present within project site.
Blainville's horned lizard	None/None	Open areas of sandy soil in valleys, foothills, and semi-arid mountains including coastal scrub, chaparral, valley–foothill hardwood, conifer, riparian, pine–cypress, juniper, and annual grassland habitats	Not expected to occur. No suitable habitat present within project site.
coast patch-nosed snake	None/SSC	Brushy or shrubby vegetation; requires small mammal burrows for refuge and overwintering sites	Not expected to occur. No suitable habitat present within project site.
two-striped gartersnake	None/SSC	Streams, creeks, pools, streams with rocky beds, ponds, lakes, vernal pools	Not expected to occur. No suitable habitat present within project site.
Cooper's hawk	None/WL	Nests and forages in dense stands of live oak, riparian woodlands, or other woodland habitats often near water	Not expected to occur. No suitable habitat present within project site.

Table E-2

Common Name	Status (Federal/State)	Habitat	Potential to Occur
tricolored blackbird	BCC/PSE, SSC	Nests near freshwater, emergent wetland with cattails or tules, but also in Himalayan blackberry; forages in grasslands, woodland, and agriculture	Not expected to occur. No suitable habitat present within project site.
Southern California rufous-crowned sparrow	None/WL	Nests and forages in open coastal scrub and chaparral with low cover of scattered scrub interspersed with rocky and grassy patches	Not expected to occur. No suitable habitat present within project site.
grasshopper sparrow	None/SSC	Nests and forages in moderately open grassland with tall forbs or scattered shrubs used for perches	Not expected to occur. No suitable habitat present within project site.
burrowing owl	BCC/SSC	Nests and forages in grassland, open scrub, and agriculture, particularly with ground squirrel burrows	Not expected to occur. No suitable habitat present within project site.
ferruginous hawk	BCC/WL	Winters and forages in open, dry country, grasslands, open fields, agriculture	Not expected to occur. No suitable habitat present within project site.
coastal cactus wren	BCC/SSC	Southern cactus scrub patches	Not expected to occur. No suitable habitat present within project site.
western snowy plover	FT, BCC/SSC	On coasts nests on sandy marine and estuarine shores; in the interior nests on sandy, barren or sparsely vegetated flats near saline or alkaline lakes, reservoirs, and ponds	Low potential to occur. There is very marginal nesting/foraging habitat that has not been disturbed within the study area. This beach experiences heavy public use.
western yellow-billed cuckoo	FT, BCC/SE	Nests in dense, wide riparian woodlands and forest with well-developed understories	Not expected to occur. No suitable habitat present within project site.
white-tailed kite	None/FP	Nests in woodland, riparian, and individual trees near open lands; forages opportunistically in grassland, meadows, scrubs, agriculture, emergent wetland, savanna, and disturbed lands	Not expected to occur. No suitable habitat present within project site.
California horned lark	None/WL	Nests and forages in grasslands, disturbed lands, agriculture, and beaches; nests in alpine fell fields of the Sierra Nevada	Not expected to occur. No suitable habitat present within project site.
yellow-breasted chat	None/SSC	Nests and forages in dense, relatively wide riparian woodlands and thickets of willows, vine tangles, and dense brush	Not expected to occur. No suitable habitat present within project site.

Table E-2

Common Name	Status (Federal/State)	Habitat	Potential to Occur
California black rail	BCC/ST, FP	Tidal marshes, shallow freshwater margins, wet meadows, and flooded grassy vegetation; suitable habitats are often supplied by canal leakage in Sierra Nevada foothill populations	Not expected to occur. No suitable habitat present within project site.
osprey	None/WL	Large waters (lakes, reservoirs, rivers) supporting fish; usually near forest habitats, but widely observed along the coast	Not expected to occur. No suitable habitat present within project site.
Belding's savannah sparrow	None/SE	Nests and forages in coastal saltmarsh dominated by pickleweed (*Salicornia* spp.)	Not expected to occur. No suitable habitat present within project site.
coastal California gnatcatcher	FT/SSC	Nests and forages in various sage scrub communities, often dominated by California sagebrush and buckwheat; generally avoids nesting in areas with a slope of greater than 40%; majority of nesting at less than 1,000 feet above mean sea level	Not expected to occur. No suitable habitat present within project site.
Ridgway's rail	None/None	Coastal wetlands, brackish areas, coastal saline emergent wetlands	Not expected to occur. The project site is outside of the species' known geographic range and there is no suitable habitat present.
bank swallow	None/ST	Nests in riparian, lacustrine, and coastal areas with vertical banks, bluffs, and cliffs with sandy soils; open country and water during migration	Not expected to occur. No suitable habitat present within project site.
yellow warbler	BCC/SSC	Nests and forages in riparian and oak woodlands, montane chaparral, open ponderosa pine, and mixed-conifer habitats	Not expected to occur. No suitable habitat present within project site.
California least tern	FE/SE, FP	Forages in shallow estuaries and lagoons; nests on sandy beaches or exposed tidal flats	Low potential to occur. There is very marginal habitat that has not been disturbed within the study area. This beach experiences heavy public use.
least Bell's vireo	FE/SE	Nests and forages in low, dense riparian thickets along water or along dry parts of intermittent streams; forages in riparian and adjacent shrubland late in nesting season	Not expected to occur. No suitable habitat present within project site.
tidewater goby	FE/SSC	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County, to the mouth of the Smith River	Not expected to occur. No suitable habitat present within project site.

Table E-2

Common Name	Status (Federal/State)	Habitat	Potential to Occur
arroyo chub	None/SSC	Warm, fluctuating streams with slow-moving or backwater sections of warm to cool streams at depths >40 centimeters (16 inches); substrates of sand or mud	Not expected to occur. No suitable habitat present within project site.
Santa Ana speckled dace	None/SSC	Headwaters of the Santa Ana and San Gabriel Rivers; may be extirpated from the Los Angeles River system	Not expected to occur. The project site is outside of the species' known geographic range and there is no suitable habitat present.
Dulzura pocket mouse	None/SSC	Open habitat, coastal scrub, chaparral, oak woodland, chamise chaparral, mixed-conifer habitats; disturbance specialist; 0 to 3,000 feet above mean sea level	Not expected to occur. No suitable habitat present within project site.
Mexican long-tongued bat	None/SSC	Desert and montane riparian, desert succulent scrub, desert scrub, and pinyon–juniper woodland; roosts in caves, mines, and buildings	Not expected to occur. No suitable habitat present within project site.
western mastiff bat	None/SSC	Chaparral, coastal and desert scrub, coniferous and deciduous forest and woodland; roosts in crevices in rocky canyons and cliffs where the canyon or cliff is vertical or nearly vertical, trees, and tunnels	Not expected to occur. No suitable habitat present within project site.
hoary bat	None/None	Forest, woodland riparian, and wetland habitats; also juniper scrub, riparian forest, and desert scrub in arid areas; roosts in tree foliage and sometimes cavities, such as woodpecker holes	Not expected to occur. No suitable habitat present within project site.
Yuma myotis	None/None	Riparian, arid scrublands and deserts, and forests associated with water (streams, rivers, tinajas); roosts in bridges, buildings, cliff crevices, caves, mines, and trees	Not expected to occur. No suitable habitat present within project site.
San Diego desert woodrat	None/SSC	Coastal scrub, desert scrub, chaparral, cacti, rocky areas	Not expected to occur. No suitable habitat present within project site.
big free-tailed bat	None/SSC	Rocky areas; roosts in caves, holes in trees, buildings, and crevices on cliffs and rocky outcrops; forages over water	Not expected to occur. No suitable habitat present within project site.
Pacific pocket mouse	FE/SSC	fine-grained sandy substrates in open coastal strand, coastal dunes, and river alluvium	Not expected to occur. No suitable habitat present within project site.
southern California saltmarsh shrew	None/SSC	Saltmarsh, saltgrass, dense willow, bulrush	Not expected to occur. The project site is outside of the species' known geographic range and there is no suitable habitat present.

Table E-2

Common Name	Status (Federal/State)	Habitat	Potential to Occur
American badger	None/SSC	Dry, open, treeless areas; grasslands, coastal scrub, agriculture, and pastures, especially with friable soils	Not expected to occur. No suitable habitat present within project site.
San Diego fairy shrimp	FE/None	Vernal pools, non-vegetated ephemeral pools	Not expected to occur. No suitable habitat present within project site.
western tidal-flat tiger beetle	None/None	Inhabits estuaries and mudflats along the coast of Southern California	Not expected to occur. No suitable habitat present within project site.
sandy beach tiger beetle	None/None	Inhabits areas adjacent to non-brackish water along the coast of California from San Francisco Bay to northern Mexico	Not expected to occur. No suitable habitat present within project site.
western beach tiger beetle	None/None	Mudflats and beaches in coastal Southern California	Not expected to occur. No suitable habitat present within project site.
Oblivious tiger beetle	None/None	Inhabited the Southern California coastline, from La Jolla north to the Orange County line. Occupied saline mudflats and moist sandy spots in estuaries of small streams in the lower zone. Has not been observed in 20 years. The oblivious tiger beetle (*C. l. oblivios*a) is no longer the accepted name for this species (ITIS 2016).	Not expected to occur. No suitable habitat present within project site.
globose dune beetle	None/None	Inhabitant of coastal sand dune habitat; erratically distributed from Ten Mile Creek in Mendocino County south to Ensenada, Mexico	Not expected to occur. No suitable habitat present within project site.
monarch	None/None	Wind-protected tree groves with nectar sources and nearby water sources	Not expected to occur. No suitable habitat present within project site.
wandering skipper	None/None	Saltmarsh	Not expected to occur. No suitable habitat present within project site.
Riverside fairy shrimp	FE/None	Vernal pools, non-vegetated ephemeral pools	Not expected to occur. No suitable habitat present within project site.
mimic tryonia (=California brackishwater snail)	None/None	Inhabits coastal lagoons, estuaries, and saltmarshes, from Sonoma County south to San Diego County	Not expected to occur. No suitable habitat present within project site.

APPENDIX C

Cultural Resources Assessment

20371 Lake Forest Drive, A2
Lake Forest, CA 92630
949.356.6660
www.dukecrm.com

September 22, 2017

Collin Ramsey, Project Manager
Dudek and Associates
27372 Calle Arroyo
San Juan Capistrano, CA 92675

Subject: Cultural Resources Assessment for the Laguna Canyon Channel Improvement Project, City of Laguna Beach, Orange County, California (DUKE CRM Project C-0209)

Dear Mr. Ramsey:

Duke Cultural Resources Management, LLC (DUKE CRM) is under contract to Dudek and Associates (DUDEK) to perform a cultural resources assessment of the proposed Laguna Canyon Channel Improvement Project, located in the City of Laguna Beach, Orange County, California. This report has been prepared to comply with the California Environmental Quality Act (CEQA). DUKE CRM conducted research, a field survey, and a historical evaluation in order to identify any cultural resources that may be impacted by the proposed project.

The project is located in downtown Laguna Beach and includes a 1,000-foot portion of the Laguna Canyon Channel (Orange County Facility No. I02) between Beach Street and the ocean outfall, southwest of South Coast Highway. The study area is located within Sections 23 and 26, Township 7 South, Range 9 West, on the *Laguna Beach* U.S. Geological Survey 7.5-minute quadrangle map (1981). See Attachment A for project maps.

The 0.39-acre project site includes portions of the existing Laguna Canyon Channel (transition structure, box culvert, and outfall structure). Laguna Canyon Channel consists of a combination of natural channel, which occurs north of the project, and improved channel and culvert sections located within the project. For this analysis, two potential construction staging areas for materials and equipment were investigated just north of the outfall structure and west of the intersection of the Laguna Canyon Channel and Forest Avenue.

The transition structure is an approximately 50-foot-long-by-8.5-foot-tall portion of the channel just north of Beach Street. This structure is concrete lined and includes vertical banks. The box culvert structure extends from Beach Street to the boardwalk at Main Beach, just southwest of South Coast Highway. The box culvert ranges from a double 6-foot-by-10-foot culvert (21-foot-wide section) for the first 20 feet under Beach Street to a single 6-foot-high-by-12-foot-wide reinforced concrete box. The outfall structure is a double 6.5-foot-high-by-11-foot-wide reinforced concrete box under the boardwalk at Main Beach that discharges seasonal flows to the beach.

The proposed project will involve the rehabilitation of the box culvert via various concrete patching methods and the removal and replacement of the transition and outfall structures. With the exception of changing the geometry of the transition structure to better accept upstream stormwater flows, the transition and outfall structures will be replaced in-kind within their existing footprints. It is anticipated that there will be minimal and limited soil disturbance directly around the storm drain. There will be no changes above ground, meaning that no buildings, structures, or roads will be impacted by the project.

Several commercial buildings surround the project site to the north, south, east, and west. The Pacific Ocean is southwest of the project. Elevations at the project site range from approximately 0 to 40 feet above mean sea level.

Records Search

On June 29, 2017, Sarah Nava, conducted a records search at the South Central Coastal Information Center (SCCIC). The SCCIC is part of the California Historical Resources Information System (CHRIS) and is located at California State University, Fullerton. The records search included a review of all recorded historic and prehistoric archaeological sites within a 1 mile radius of the project area, as well as a review of known cultural resource survey and excavation reports. In addition, Ms. Nava examined the California State Historic Property Data File (HPD), which includes the National Register of Historic Places (National Register), California Register of Historical Resources, California Historical Landmarks (CHL), and California Points of Historical Interest (CPHI). Forty-one cultural resource reports and forty-one cultural resources are mapped within 1 mile of the project boundary. Eight reports include the project boundaries and one resource is mapped within (vertically above) the project. No impacts to this or any resource are expected. Table 1 summarizes cultural resource studies within the project area and Table 2 summarizes cultural resources found within ¼ mile of the project.

Table 1- Prior Cultural Resource Studies located within the Project

Report No.	Report	Author	Year
OR-00741	Archaeolgical Survey Report For the Proposed Widening of Route ORA-133, Between Canton Acres Drive and I-405 Pm. 1.09-8.23 07-210-003940	Romani, John F.	1984
OR-01926	Archaeological Survey Report of Aliso Water Management Agency Project Committees 7, 11-A and 15, Orange County, California	Ezell, Paul H., and Carrico, Richard L.	1977
OR-01937	Historic Property Survey Laguna Cayon Road Orange County, California	Anonymous	1985
OR-02545	Cultural Resources Investigation and Historic Property Survey for the Proposed Community Senior Center on Third Street, City of Laguna Beach, Orange County, California	Ferguson, Charles and McKenna, Jeanette A.	2002
OR-03504	Historic Building Assessment, Heisler Building 400-424 South Coast Highway, City of Laguna Beach, Orange County, California	Tibbet, Casey	2007
OR-04179	Laguna Beach Historic Resources Inventory	unknown	2008
OR-04285	Cultural Resources Assessment for Proposed Laguna Canyon Road Pedestrian Pathway Project, Laguna Beach, Orange County, California	Switalski, Hubert and Larkin, Robert	2013
OR-04449	Cultural Resources Records Search and Site Visit Results for T-Mobile West, LLC Candidate LA02251A (CM251 Benson) 465 Forest Avenue, Laguna Beach, Orange County, California	Bonner, Diane, Wills, Carrie, and Crawford, Kathleen	2014

Forty-one cultural resources are recorded in the 1 mile radius of the project area. Twenty resources are within a ¼ mile radius and are listed in Table 2. One of these resources, the New Lynn Theatre (now called, Laguna Cinemas South Coast Theatre) is shown within the project boundaries; however the Laguna Canyon Channel is situated below the property and will have no direct effect on the resource itself. The Laguna Cinemas South Coast Theatre was evaluated as eligible for the National Register of Historic Places in 1980 as part of a historic survey. None of the other 19 resources are located adjacent to the project.

Table 2, Cultural Resources within ¼ mile of the project area

Primary No.	Description	Approximate Distance
P-30-000005	Shell, ground stone, and bone fragments within a midden	¼ Mile From Project
P-30-000285	One human burial	¼ Mile From Project
P-30-000578	Quartz flakes, fire affecyed rock, shell, midden	1/8 Mile From Project
P-30-001744	Dense shell midden	¼ Mile From Project
P-30-157866	"New Lynn Theatre", Mediterranean Revival theatre building	Above Project Boundary
P-30-157869	"Isch Building", Spanish Mediterranean Revival building	1/8 Mile From Project
P-30-157873	"Hotel Laguna", Mission Revival hotel building	¼ Mile From Project
P-30-158236	Unknown	¼ Mile From Project
P-30-158304	368 Third Street, Laguna Beach. Single Family Residence	¼ Mile From Project
P-30-158305	374 Third Street, Laguna Beach. Single Family Residence	¼ Mile From Project
P-30-158306	386 Third Street, Laguna Beach, Multi-Family Residence	¼ Mile From Project
P-30-158307	390 and 390 ½ Third Street, Laguna Beach. Multi-Family Residence	¼ Mile From Project
P-30-158308	394 Third Street, Laguna Beach. Multi-Family Residence	¼ Mile From Project
P-30-158468	Unknown	¼ Mile From Project
P-30-158486	"Cliff Drive Vicinity", Varied ocean oriented summer homes	¼ Mile From Project
P-30-177470	Laguna Canyon Road	1/8 Mile From Project
P-30-177540	465 Forest Avenue, Laguna Beach. 1-3 Story Commercial Building	¼ Mile From Project
P-30-177625	399 Loma Terrace, Laguna Beach. Multi-Family Residence	¼ Mile From Project
P-30-177626	389 Loma Terrace, Laguna Beach. Single Family Residence	¼ Mile From Project
P-30-177627	380 Third Street, Laguna Beach. Multi-Family Residence	¼ Mile From Project

Field Survey

A reconnaissance survey of the project area and immediate surroundings was conducted by Sarah Nava on July 21, 2017. Ground visibility within the project was poor overall (less than 5%) due to the built environment. The project boundaries are obscured by asphalt, concrete or other modern construction. The survey confirmed that the project area is characterized as built environment and that exposed areas of soil adjacent to and beneath the bridge are highly disturbed by construction related earth disturbing activities and dredging of the channel. No archaeological resources were identified during the survey. See Figures 1-4 below for project overviews.

Historical Evaluation of the Laguna Canyon Channel

The regulatory framework for this historic resource study and the evaluation lies within the guidelines imposed for the California Environmental Quality Act (CEQA) and the California Register of Historic Resources (CRHR) under Public Resources Code section 5024.1.

Figure 1 – Laguna Canyon Channel Project location, view to the northeast from Beach Street

Figure 2 – Historic "New Lynn Theatre" located above Laguna Canyon Channel, view to the northeast

Figure 3 – Close-up of southwestern-most end of channel located southwest of South Coast Highway, view to the north east.

Figure 4 - Southwestern-most end of channel located southwest of South Coast Highway, view to the north east

California Register of Historic Resources

CEQA guidelines define a significant cultural resource as "a resource listed in or eligible for listing on the CRHR. A historical resource may be eligible for inclusion in the CRHR if it:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important to prehistory or history.

Even if a resource is not listed on, or determined eligible for listing on, the CRHR, the lead agency may consider the resource to be an "historical resource" for the purposes of CEQA provided that the lead agency determination is supported by substantial evidence (CEQA Guidelines 14 CCR 15064.5).

According to the state guidelines, a project with an effect that may cause a substantial adverse change in the significance of a historical resource or a unique archaeological resource is a project that may have a significant effect on the environment (14 CCR 15064.5[b]). CEQA further states that a substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired. Actions that would materially impair the significance of a historical resource are any actions that would demolish or adversely alter those physical characteristics of a historical resource that convey its significance and qualify it for inclusion in the CRHR or in a local register or survey that meet the requirements of PRC 5020.1(k) and 5024.1(g).

In addition, the property was evaluated for significance under the City of Laguna Beach Historic Preservation Ordinance, Chapter 25.45.

The subject property, otherwise referred to as the Laguna Canyon Channel, was evaluated for the CRHR as an individual property with its period of significance beginning in 1929-1930, when it was built, and terminating in 1968, prior to the major reconstruction of the upper section of the channel between Beach Street and Forest Avenue. Determining the significance of the Laguna Canyon Channel is predicated on the property being associated with an event or events, or a person or person of significance in the history of Laguna Beach or Orange County, and the structure's engineering significance that retains a sufficient level of integrity in order to convey its historic character.

The Laguna Canyon Channel is not considered eligible for the CRHR and is not significant as defined in Chapter 25.45 of the City's Historic Preservation Ordinance. Therefore, it is not considered an historical resource under CEQA. See Attachment 2 for the site record (DPR 523 Series) for more details regarding the historic evaluation of the property.

Impacts Analysis and Recommendations

DUKE CRM evaluated the proposed project for impacts to cultural resources according to CEQA. Based on a lack of previously recorded prehistoric archaeological sites within the project boundary, minimal ground disturbance associated with the project, and the heavily disturbed nature of the soils from decades of construction and ground disturbance associated with road building and other commercial construction, the discovery of intact archaeological resources is unlikely. Out of context materials have limited scientific value and most likely would not be significant cultural resources under CEQA. If encountered, these materials may have cultural value to the local Native American tribes. Given this preliminary information the sensitivity of this property for archaeological resources is considered low, meaning that there is little potential to impact archaeological resources. DUKE CRM does not recommend archaeological monitoring of the project property.

The potential for impacts to historic built environment resources is very limited. The Laguna Canyon Channel is not eligible for the CRHR and it is not significant as defined in Chapter 25.45 of the City's Historic Preservation Ordinance; therefore it is not a historical resources under CEQA. The project will not involve impacts to any adjacent buildings, structures, or roads; nor will the visual setting be changed by the project. Therefore DUKE CRM recommends a finding of no impacts to cultural resources for the purposes of CEQA.

If previously unidentified cultural materials are un-earthed during construction, work shall be halted in that area until a qualified archaeologist can assess the significance of the find. If human remains are encountered, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC. The MLD may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.

Thank you for contacting DUKE CRM on this request. If you have any questions or comments, you can contact DUKE CRM at (949) 356-6660 or by e-mail at curt@dukecrm.com.

Sincerely,

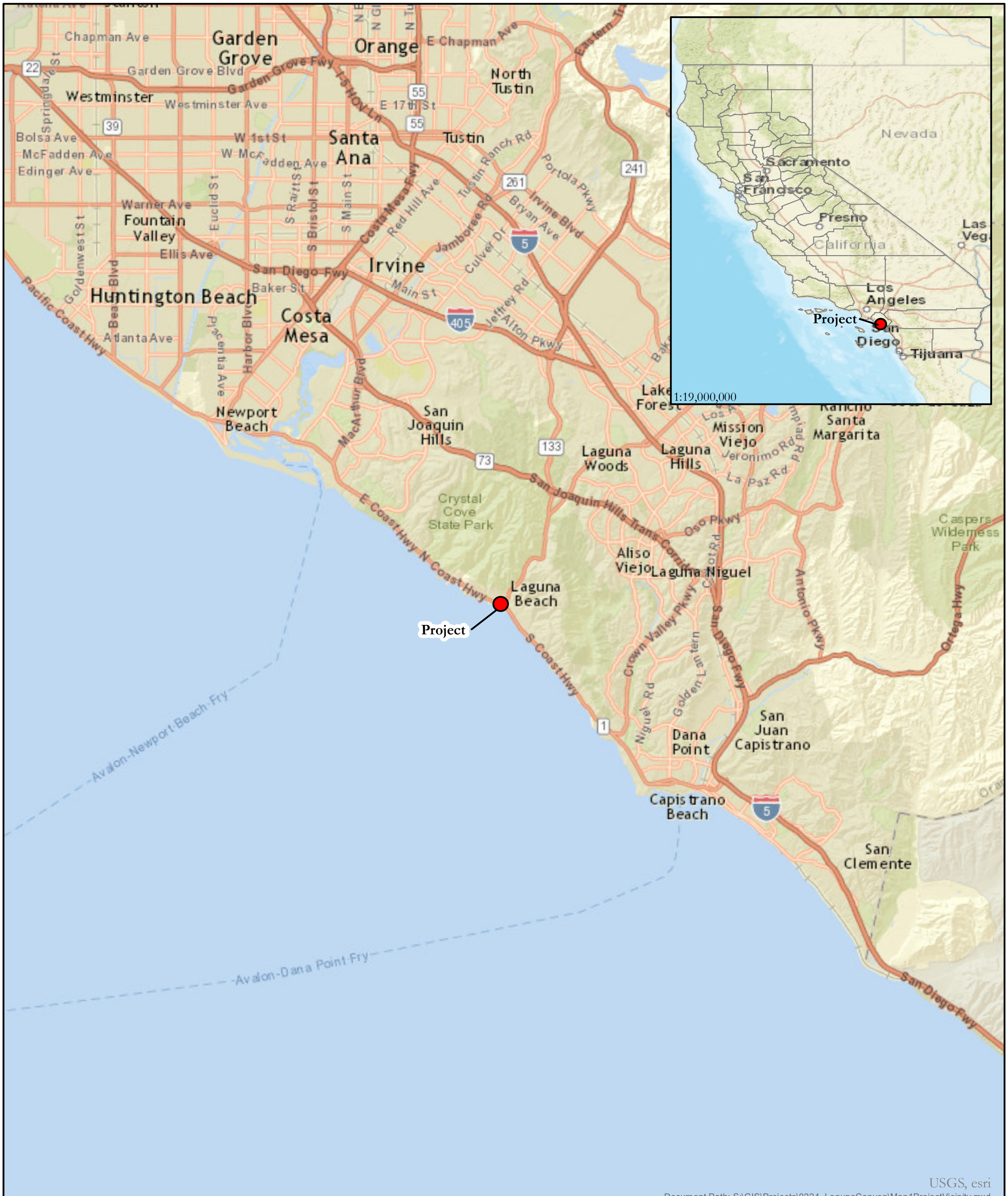
DUKE CULTURAL RESOURCES MANAGEMENT, LLC

Curt Duke, M.A. RPA
Archaeologist/President

Attachment 1: Project Maps
Attachment 2: DPR 523 Site Record

ATTACHMENT 1

Project Maps



Map 1- Project Vicinity

Laguna Canyon Channel Improvements

DUKE CRM

0 4 8 Miles

1 inch = 4 miles 1:253,440

N

Map 2 Project Location

Laguna Canyon Channel Improvements

DUKE CRM

Laguna Beach USGS
7.5-Min. Quadrangle
T7S, R9W, sec26

Project Boundary

0 2,000 4,000 Feet

1 inch = 2,000 feet 1:24,000

N

Map 3- Project Aerial

Laguna Canyon Channel Improvements

DUKE CRM

Project Boundary

0 100 200 Feet

N

1 inch = 100 feet 1:1,200

ATTACHMENT 2

DPR 523 Site Record

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #______________________________
HRI # ______________________________
Trinomial ______________________________
NRHP Status Code ________________________

Other Listings __________________________
Review Code __________ **Reviewer** ___________________ **Date** _________

 ***Resource Name or #:** Laguna Canyon Channel

P1. Other Identifier: Laguna Canyon Drain or Culvert
***P2. Location:** ☐ Not for Publication ■ Unrestricted ***a. County:** Orange
***b. USGS 7.5' Quad:** Laguna Beach, California
c. Address: Forest Avenue to west of the Pacific Coast Highway **City:** Laguna Beach **Zip:** 92651
d. UTM: N/A
e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate): The subject property is located between Forest Avenue on the north, underneath Beach Street, and west to its terminus below or west of the Pacific Coast Highway.
***P3a. Description:**

The subject property consists of a subterranean concrete and steel flood control drainage channel or culvert located in the heart of Laguna Beach, Orange County, California. The channel is almost entirely below grade with its terminus on the west side of the Pacific Coast Highway, where it drains into the ocean. The channel runs northeast to southwest from Forest Avenue/Third Street southwest crossing Beach Street, thence crossing under the Pacific Coast Highway, before it terminus west of the highway. Constructed in 1929-1930 (Figure 1), the trapezoidal concrete and steel box channel or culvert measures approximately 14'-6" wide x 8'-0"- 10'-0" high, according to Orange County Flood Control District Plans (1969). The sides of the reinforced concrete channel were poured in place, supported by vertical and horizontal 1/2"- 5/8" steel bars (refer to Primary Record, Page 2 of 2).

P3b. Resource Attributes: HP11 – Engineering structure
***P4. Resources Present:** ☐ Building ■ Structure ☐ Object ☐ Site ☐ District ☐ Element of District

P5a. Photograph or Drawing (Photograph required for buildings, structures, and objects.)

P5b. Description of Photo: View looking southwest at the covered channel as it crossing under Beach Street.
***P6. Date Constructed/Age and Sources:** ■ Historic
Forest Avenue to Pacific Ocean section (1929-1930); Beach Street to Forest Avenue improvements (1969). Laguna Beach, California. Assessment District No. 3, "Laguna Canyon Channel." August 1928; Laguna Canyon Channel from Beach Street to Forest Avenue, Facility No. 102, August 1969.
***P7. Owner and Address:** City of Laguna Beach, 505 Forest Avenue, Laguna Beach, CA 92651
***P8. Recorded by:** Dana E. Supernowicz, Architectural Historian, Historic Resource Associates, 2001 Sheffield Drive, El Dorado Hills, CA 95762.
***P9. Date Recorded:** July 2017
***P10. Type of Survey:** ■ Architectural
Describe: Architectural Recordation and Evaluation per CEQA.
***P11. Report Citation:** Historical Evaluation Study of the Laguna Canyon Channel Improvement Project, Laguna Beach, Orange County, California 92651. Prepared for Duke Cultural Resources Management, LLC, 20371 Lake Forest Drive, Suite A2, Lake Forest, CA 92630. Prepared by Historic Resource Associates, 2001 Sheffield Drive, El Dorado Hills, CA 95762. July 2017.

***Attachments:** Building, Structure, and Object Record; Photograph Record

*Required Information

***P3a. Description: (Continued):**

Additional reinforcement was provided by alternate transverse steel and concrete bars that were run approximately every 11'-0" over the channel, and steel and concrete piles set 4'-0" and 5'-0" on center along the breadth of the channel. The storm water channel was created by taking right-of-way from adjoining lots as part of the original Assessment District.

In 1969 improvements were made to the channel between Beach Street and Forest Avenue, just west of Laguna City Hall that included a new boxed vs. trapezoidal-shaped channel. Today, the channel or culvert varies throughout the project, with the most vertically restricted section located at the squash box (outlet) below Pacific Coast Highway. The squash box is a double 11' wide by 4.5' high RCB and the remainder of the upstream project channel reach is a single 12' wide by 6' high RCB, that transitions from a double 10' wide by 6' high RCB bridge structure at Beach Street. Upstream of Beach Street, the channel is primarily a rectangular or box concrete section with some culvert underpasses (DUDEK 2016).

***Resource Name or #:** Laguna Canyon Channel **NRHP Status Code:** 6Z

B1. Historic Name: Improvement District 3 Flood Control Channel
B2. Common Name: Laguna Canyon Channel
B3. Original Use: Flood control or storm water channel or culvert **B4. Present Use:** Same
***B5. Architectural Style:** Trapezoidal Channel/Sluice or Culvert
***B6. Construction History:** According to Engineering plans prepared by the Laguna Beach Improvement District No. 3, the flood control channel was designed in 1928 by City of Laguna Beach Civil Engineer A.J. Stead. Construction began in February 1929 after the Oberg Brothers of Los Angeles were awarded the contract. The concrete channel was completed by 1930. The upper portion of the channel from Beach Street to Forest Avenue was rebuilt in 1969 (Figure 1).
***B7. Moved?** ■ No ☐ Yes ☐ Unknown **Date:** N/A **Original Location:**
***B8. Related Features:** The subject property runs from the northeast to the southwest through central Laguna Beach, crossing Beach Street and the Pacific Coast Highway before it empties into the Pacific Ocean. The largely underground flood control channel is flanked by commercial buildings and residential homes as it bisects the community of Laguna Beach.
B9a. Architect: Designed by A.J. Stead, Laguna Beach City Engineer **B9b. Builder:** Oberg Brothers (Los Angeles)
***B10. Significance: Theme:** Engineering/Flood Control **Area:** Laguna Beach **Period of Significance:** 1928-1969
Property Type: Engineering Structure **Applicable Criteria:** CRHR 1-3

The historic context for the Laguna Canyon Flood Control Channel was essentially a box culvert or sluice, whose significance lies both in measures to prevent flooding in the City of Laguna Beach and in applied engineering related to flood control systems during the late 1920s. The Laguna Canyon Channel was part of much more widespread efforts in Orange County to address flooding that each year damaged infrastructure, as well as damaging houses and farmland. One of the main factors in the construction of the Laguna Canyon Flood Control Channel was that when Laguna Beach was incorporated as a city in 1927, an assessment district (No. 3) was created to assist in funding projects like the flood control channel. The newly formed city of Laguna Beach hired A.J. Stead as the city engineer and it was Stead that designed the boxed culvert or sluice and provide engineered drawings to the city in order to prepare for bidding out the work (refer to BSO, Page 2 of 23).

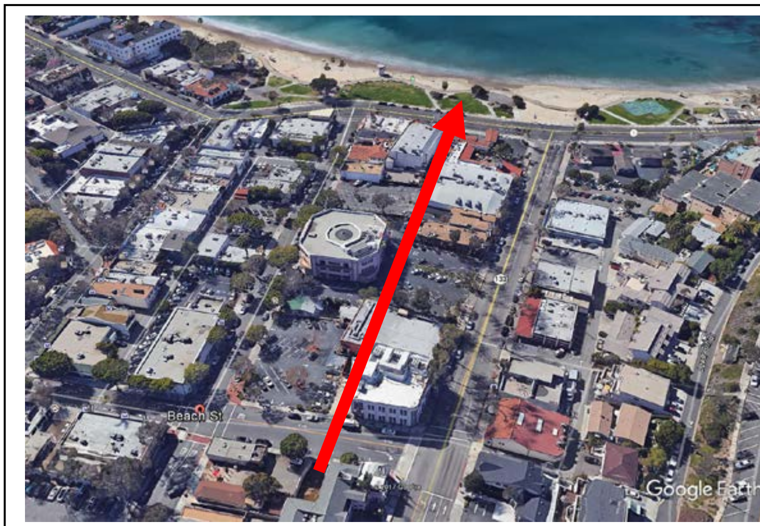
B11. Additional Resource Attributes:

B12. References:
City of Laguna Beach, Laguna Beach, California. Assessment District No. 3, "Laguna Canyon Channel." August 1928; City of Laguna Beach, Laguna Canyon Channel from Beach Street to Forest Avenue, Facility No. 102. August 1969; City of Laguna Beach. *City of Laguna Beach Historic Resource Element*. July 1981; City of Laguna Beach. *Laguna Canyon Flood Mitigation Task Force Report*. November 10, 2011 (refer to BSO, Page 23 of 23).

B13. Remarks: None.
B14. Evaluator: Dana E. Supernowicz, Architectural Historian, Historic Resource Associates, 2001 Sheffield Drive, El Dorado Hills, CA 95762.
Date of Evaluation: July 2017

(This space reserved for official comments.)

AERIAL PHOTOGRAPH (Google Earth 2016)
The red arrow approximates the channel between Beach Street and the outlet of the channel west of the Pacific Coast Highway



***B10. Significance: (Continued):**

FIGURE 1: View looking northeast from the terminus of the storm water channel (red arrow) west of the Pacific Coast Highway.

While the history of Laguna Beach is often romanticized by its avant-garde artists, beautiful beaches, picturesque cliffs above the ocean, and mysterious canyons, the city struggled for years with developing reliable infrastructure that included roads, highways, sewers, a reliable domestic water system, and flood control (Hallan-Gibson 1986; Goddard and Goddard 1988; Visit Laguna Beach Website 2014). Historic photographs of Laguna Beach illustrate the historical development of the community and the challenges it faced dealing with steep topography to the east and a vast ocean to the west (Figures 2 and 3).

***B10. Significance: (Continued):**

FIGURE 2: Early view of Laguna Beach, circa 1910s. Note the bridge sagging atop one of the city's numerous drainages south of Laguna Canyon. This is possibly the bridge along Glenneyre Street, looking north (courtesy Orange County Historical Society, Santa Ana, California).

***B10. Significance: (Continued):**

FIGURE 3. Early view of Laguna Beach showing the topography shortly after the town was laid out, looking south, circa 1900. Laguna Canyon is depicted by the red arrow (Courtesy Orange County Historical Society, Santa Ana, California).

As depicted in Figures 1-3, the geomorphology, topography and drainage patterns of Laguna Beach are such that without flood control measures, the City would sustain significant damage during flood events. One of the earliest pieces of legislation associated with flood control in Orange County was enacted on May 23, 1927, known as the Orange County Flood Control District (OCFCD), which was under authorization of the Orange County Flood Control Act, Chapter 723 of the State of California Statutes of 1927, and created to provide: control of flood and storm waters of the district (which is the boundary of the County of Orange) and of streams flowing into the district (such as: the Santa Ana River or San Juan Creek); to mitigate the effects of tides and waves; and to protect the harbors, waterways, public highways and property in the district from such waters (Orange County Public Works, Flood Division Website 2017). The Orange County Flood Control Act of 1927 established the mechanism for local governments, such as Laguna Beach, which was incorporated on June 29, 1927, to enact special assessment districts to levy taxes on homeowners and businesses for infrastructure improvement. The incorporation of the city in 1927 was certainly key to creating the means to construct flood control measures within the city's boundaries.

During the 1910s and 1920s, the lower end of Laguna Canyon was commonly referred to as the "slough." The slough or canyon was a constant problem for residents, since bridges that crossed it along 3rd Street (Beach Street) were often forced to turn-around due to high water or flood damage. A similar phenomenon occurred along the Pacific Coast Highway, where the slough entered the ocean. During the mid to late 1920s, the Pacific Coast Highway was under construction and many of the bridges that forded small creeks, sloughs, and tributaries to the ocean were poorly constructed and constantly in need of repair.

***B10. Significance: (Continued):**

One of the first mentions of improving water flow in the slough was noted in the *Santa Ana Register* on May 7, 1927:

> "Improvements Projected at Laguna Beach." Definite steps toward street and other improvements to follow the Coast Boulevard and Forest Avenue betterments have been made by the Laguna Beach planning committee. The board of supervisors will be asked by the committee to appropriate money for an engineering survey of Laguna Beach, upon which a plan for future development may be based. The program includes improvement of the slough with a box drain from the bridge on Third Street to the bridge over Coast highway. This will be covered and make an alley. The estimated cost, between $70,000 and $80,000, would be split up over the drainage area affected, half of the amount to be borne by the abutting property owners (*Santa Ana Register* 1927:19).

It was clear from the newspaper article that the newly formed City of Laguna Beach had a number of infrastructure projects in mind, including the construction of a culvert or drain channel at the lower end of Laguna Canyon. In 1928, Laguna Beach City Engineer A.J. Stead completed plans for the proposed Improvement District No. 3. Illustrated in Sheet 1 of the plans (Figure 4), the proposed improvement district flanked the Laguna Canyon Slough and encompassed most of the city boundaries. Figure 4 illustrates the slough and proposed culvert or sluice running from east to west through the heart of the city.

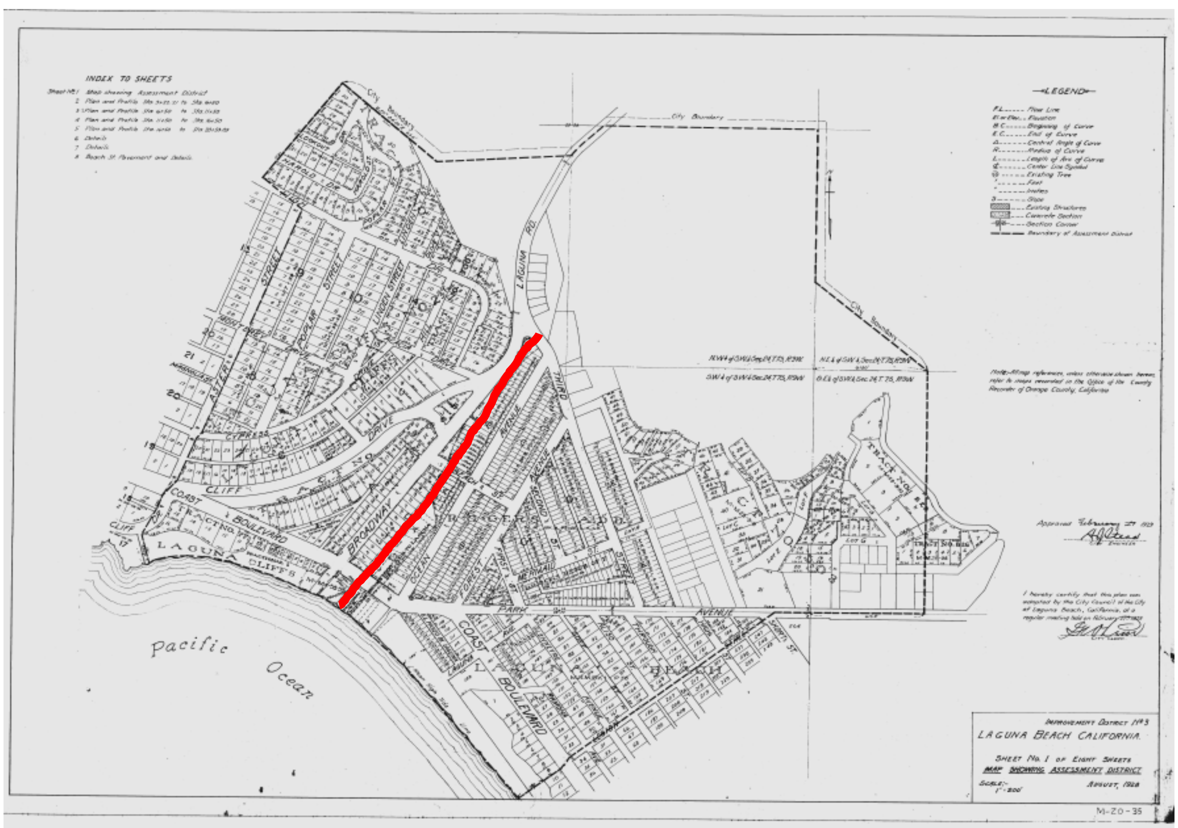


FIGURE 4: Assessment District No. 3 Laguna Beach, CA channel plat overview map 1928 (Courtesy City of Laguna Beach, CA). The red line marks the approximate location of the Laguna Canyon Channel as depicted in 1928.

***B10. Significance: (Continued):**

Bids for the construction of the drain went out in 1929, and on April 26, 1929, the *Santa Ana Register* reported that:

> Oberg brothers, Los Angeles were awarded the contract for the improvement of the slough from Third street to the ocean when the city council met Wednesday evening. Their bid for the job was $52,136. The lowest bid of the 23 opened a week ago that of another Los Angeles firm for $50,962, but an irregularity in the bond caused the next lowest bid to be accepted, that of Oberg brothers. This was on the report of City Engineer A. J. Stead (*Santa Ana Register* 1929).

Based upon newspaper accounts, the Oberg Brothers were a fairly large firm that performed a great deal of bridge and drainage related projects in Los Angeles and Orange County from the late 1920s through the 1950s. The firm built a similar drain canal in San Clemente in the 1930s.

Laguna City Engineer Arthur J. Stead was reportedly born in Illinois around 1886. Stead lived in Los Angeles during the 1920s while working for the City of Laguna Beach. By the early 1930s he appears to have relocated to Laguna Beach and worked for the city until 1939, when he left the city and was engaged in doing carpentry work. Stead lived for a time on Ocean Avenue near the channel project (United States Federal Census, Laguna Beach 1930 and 1940; South Orange County City Directory 1938-1939). The engineering drawings for the channel, completed in 1928 by Laguna City Engineer A.J. Stead are depicted in Figures 5-9.

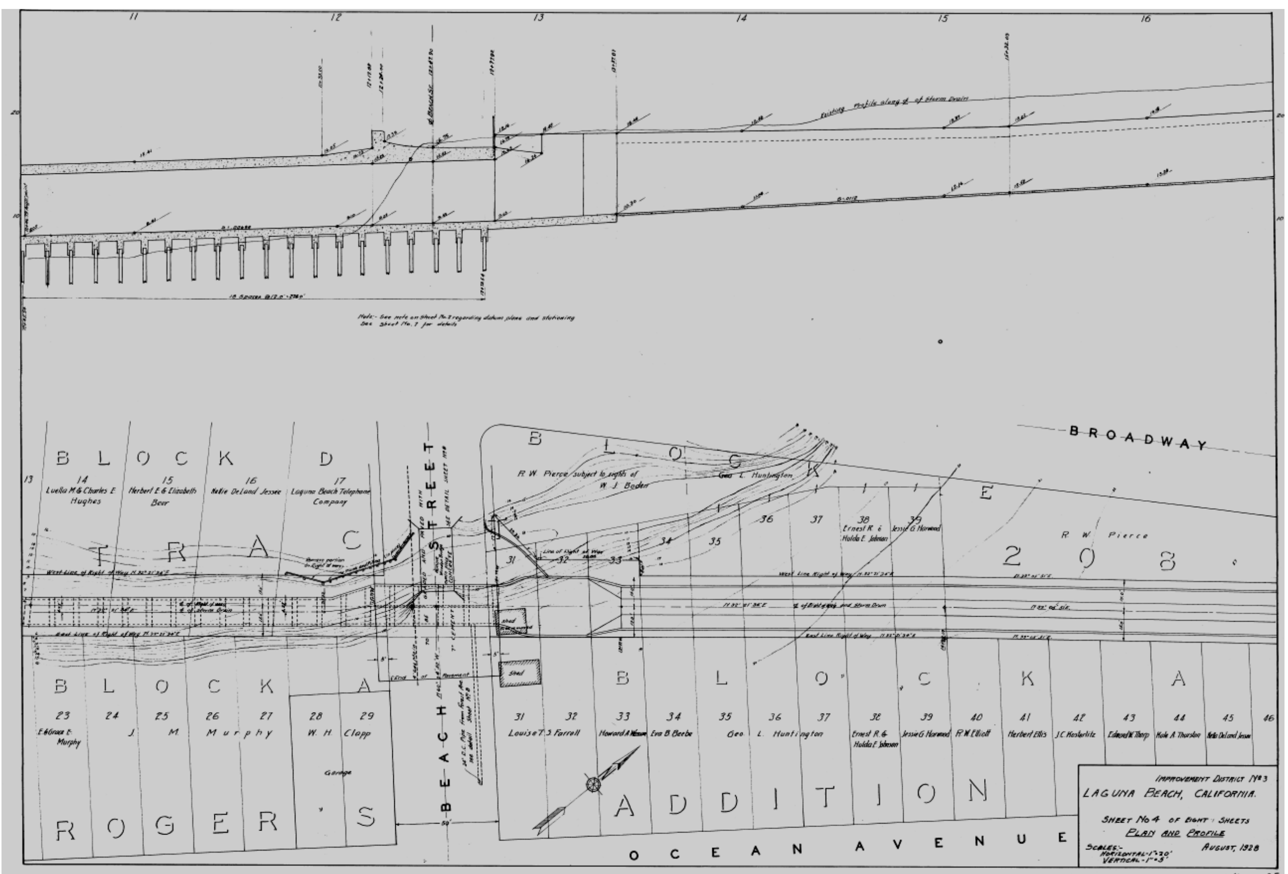


FIGURE 5: Sheet No. 4 illustrating the channel from east of Beach Street to west of Beach Street.

***B10. Significance: (Continued):**

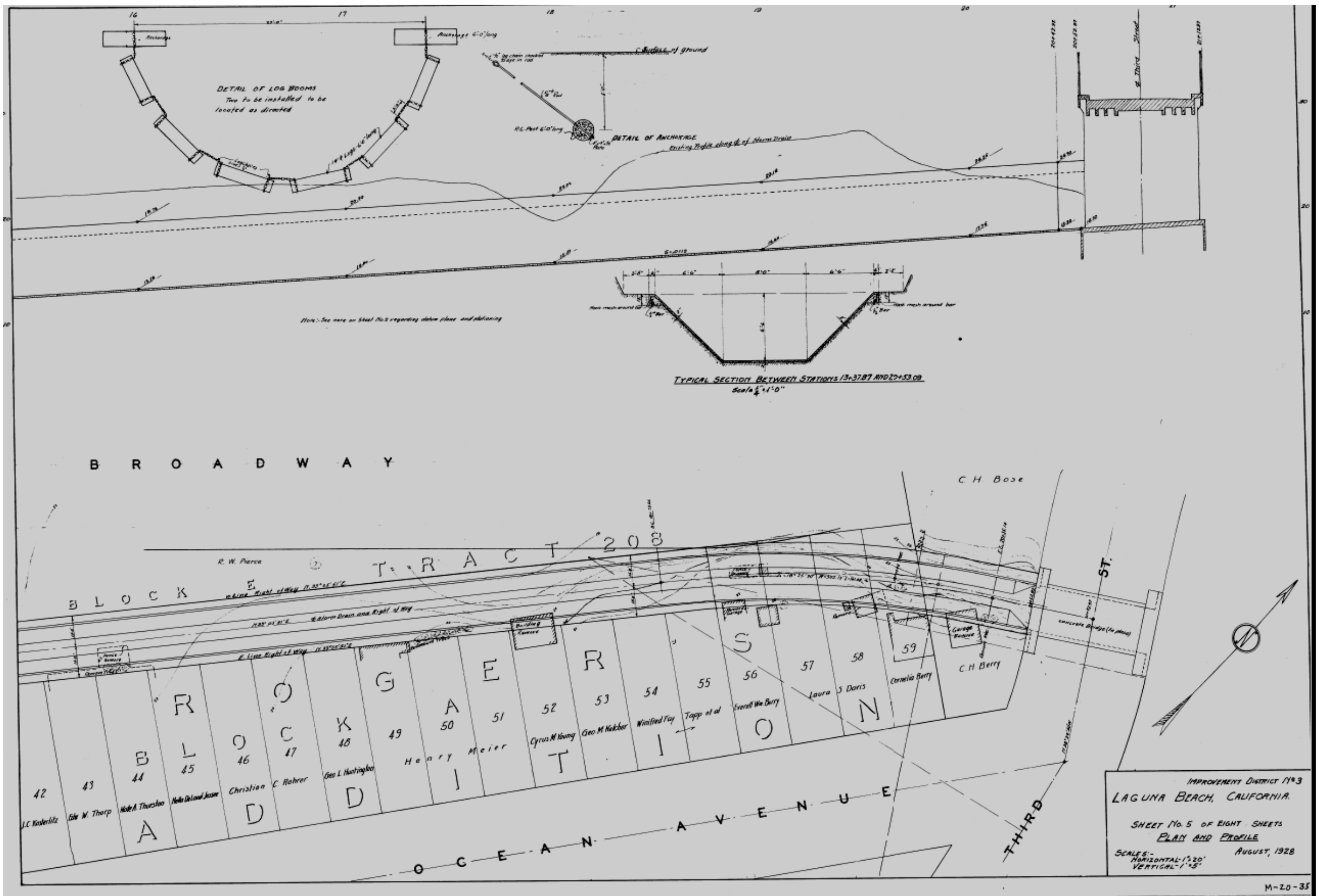


FIGURE 6: Sheet No. 5 illustrating the channel as it crosses 3rd Street headed was south of Broadway. Note the trapezoidal or "V" shape of the channel, a common design for ditches and canals.

***B10. Significance: (Continued):**

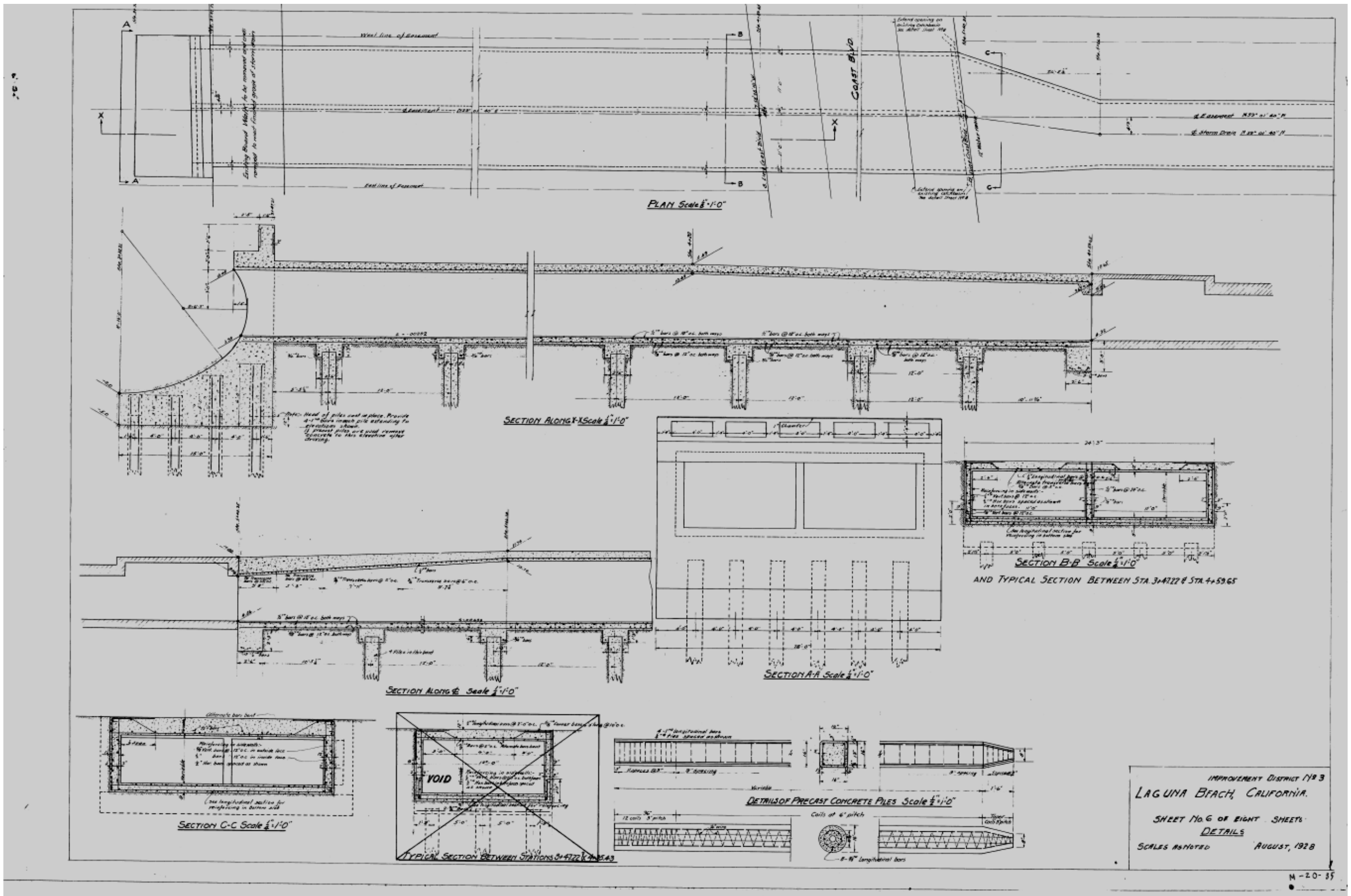


FIGURE 7: Sheet No. 6 illustrating a cross-section of the channel.

***B10. Significance: (Continued):**

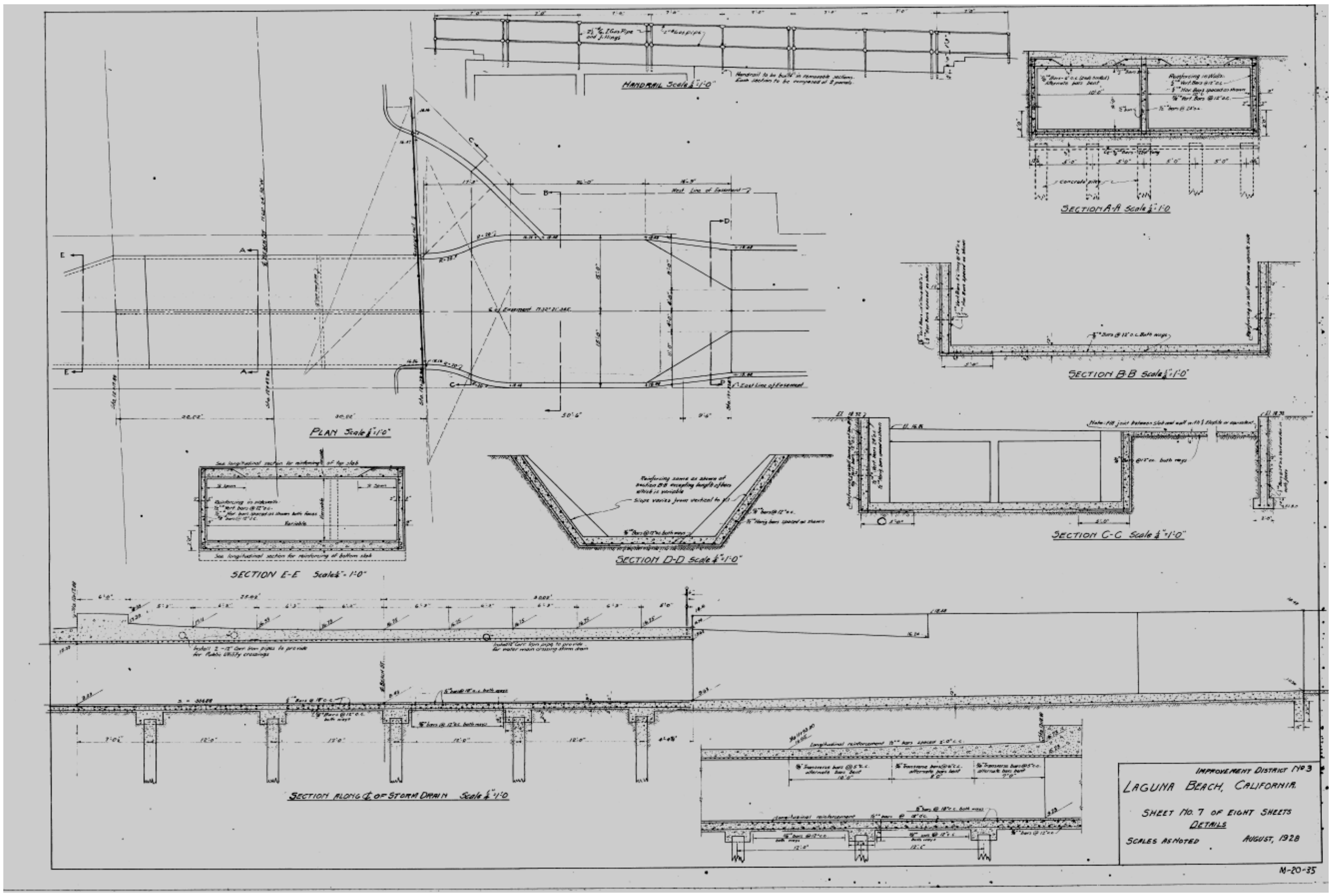


FIGURE 8: Sheet No. 7 illustrating a cross-section of the channel.

***B10. Significance: (Continued):**

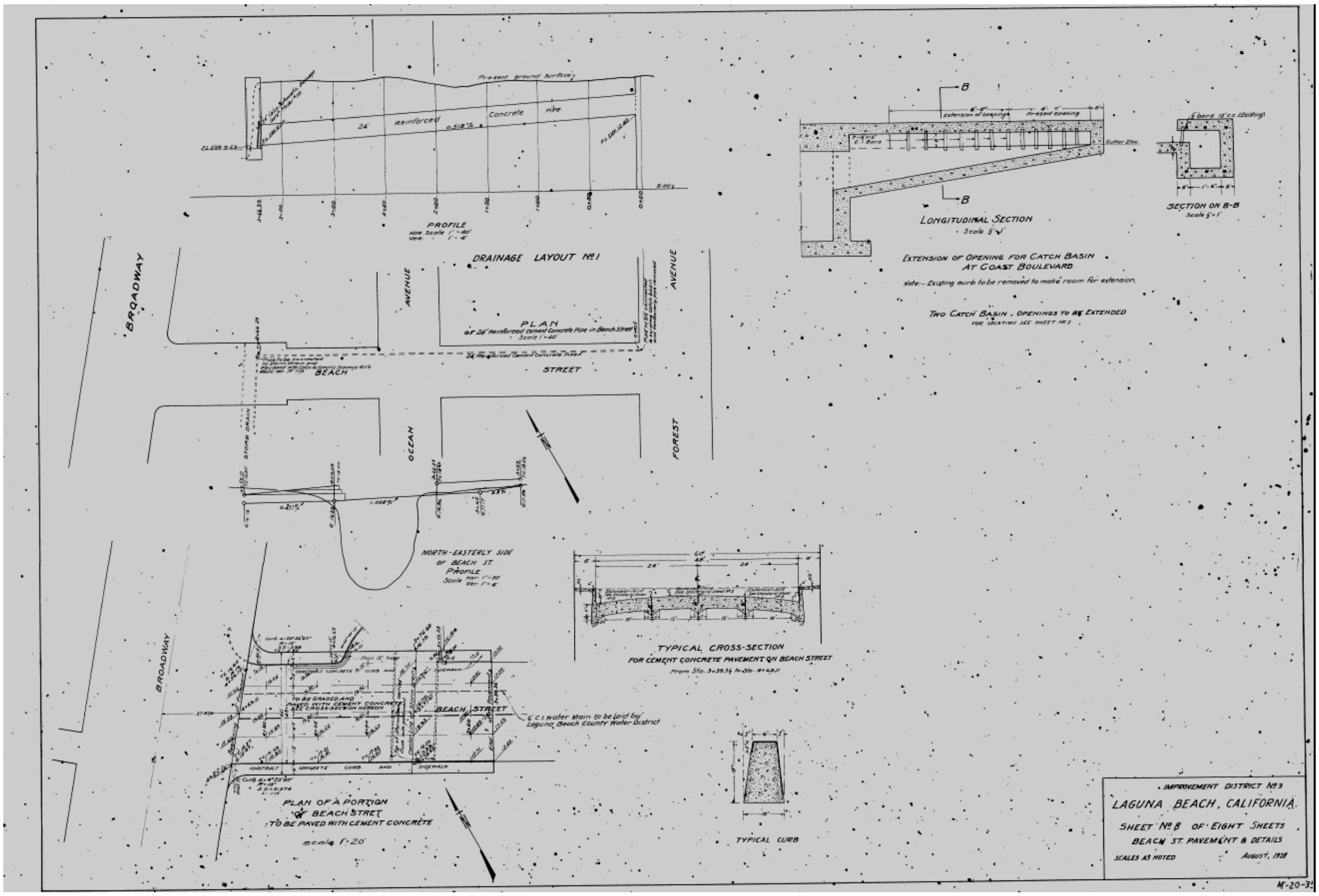


FIGURE 9: Sheet No. 7 illustrating a cross-section of the channel and drainage layout.

***B10. Significance: (Continued):**

On July 5, 1929 the *Santa Ana Register* reported that:

> "Will Control Beach Slough with Piling" – Laguna Beach. Centrifugal east piling, the latest development in piling, is being used in the improving of the slough, which runs through this city, and which is in course of being made a boxed-in water sluice. The work is being done by Oberg brothers.
>
> Centrifugal east piling is very dense, so that water does not penetrate it and rust out the steel reinforcement as has occurred where porous concrete has been used, especially when salt water comes into contact with the piles. When the water system was laid, gunnite coated steel water pipe was used, a new departure. Also, reinforced centrifugal east concrete pipe was laid, also new at that time. These have made the water system studied by engineers and held up as a model of construction methods.
>
> Work on the slough is going ahead as rapidly as the conditions permit, with a cofferdam installed at the outlet, and piling being driven for the bridge at Beach Street, which was taken out so that the bed of the slough could be dredged and straightened. The conditions encountered when the work was started revealed the fact that piling would not be required as closely spaced as was originally believed. On the other hand, it was found that piling would be required of greater length than the first study of conditions indicated for a portion of the work (*Santa Ana Register*, July 5, 1929:16).

The concept of using centrifugal castings was nothing new by the late 1920s. The first centrifugal casting was performed in England in the early 19th Century by A. G. Eckhardt of Soho. Centrifugal casting or rotocasting was a casting technique that was typically used to cast thin-walled cylinders. It was used to cast such materials as metal, glass, and concrete. It was noted for the high quality of the results attainable, particularly for precise control of their metallurgy and crystal structure. Unlike most other casting techniques, centrifugal casting was chiefly used to manufacture stock materials in standard sizes for further machining, rather than shaped parts tailored to a particular end-use. Since the 19th Century casting techniques were improved and by the early 1900s, when Portland cement and concrete became widely available, the technique was used in concert with these materials. In the case of the Laguna Beach Channel, centrifugal castings were made for the pilings that supported the walls of the trapezoidal culvert or sluice box.

Trapezoidal channels, drains, or culverts of concrete date to the early 1900s and were commonly used for bridges and under roadways or highways, as well as for water conveyance systems. Reinforced concrete was the standard by the 1910s. The box culvert was generally described as a four-sided drainage or sluice structure with a square or rectangular opening. The box culvert, or in this case a trapezoidal culvert, can carry a roadway or other such structure atop it, or it can be built well below the roadway with earth fill between the structure and the road, or other such improvement. The size and shape of the culvert or sluice is related to the hydrologic flow of water through it during major rain events. If the culvert is too small to accept high volumes of water, then flooding occurs and often damage to the culvert itself. Another concern was if the culvert was plugged, as is often the case with mud-flows in erodible hillslopes, it could back-up water that resulted in flooding, as was the case in Laguna Beach during the 2010 winter storm (Figure 10).

***B10. Significance: (Continued):**

FIGURE 10: Modern flood damage in central Laguna Beach following a 2010 winter storm (courtesy Laguna Beach Indy Website 2017).

During the 1940s, Laguna Canyon residents brought up the question of flood control, as more attention appears to have focused on other flood concerns, particularly along the Santa Ana River in Orange County. Shortages of building material, including steel and concrete, however, resulted in little work being carried out during World War II. Despite shortages of materials, in 1941, the Laguna Canyon Mutual Improvement Association had been formed to address concerns about canyon flooding. The Association made up of homeowners and businesses that lived or worked along the canyon. The fact that newspapers ran stories about flood control concerns in the canyon suggests that the flood issues had not been entirely resolved by the channel built in 1929-1930. There were also up-canyon issues that needed to be addressed. No major work on the channel appears to have been carried out in the 1950s. However, between 1930, when the Laguna Canyon Channel was completed, through the 1960s, periodic maintenance occurred to its structure.

Following disastrous flooding in the winter of 1969, a contract was awarded to Belczak and Goudseune, Inc., for improvements to the channel east of Beach Street. According to a newspaper article in the *Long Beach Independent* on June 13, 1969:

> Flood control work in Laguna Canyon, where a major disaster occurred during the winter rains, will be concentrated first within the section of the City of Laguna Beach. Chief Engineer H. George Osborne of the Orange County Flood Control District said extensive damage occurred on a flood ditch between Forest Avenue and Beach Street, when flood waters ripped out concrete lining of a trapezoidal ditch and ate away much soil, undermining streets and walls. Replacement will cost an estimated $100,000, plus engineering he estimated. . . . (*Long Beach Independent*, June 13, 1969).

***B10. Significance: (Continued):**

The following are plans for the 1969 improved Laguna Canyon Channel between Beach and Forest Streets (Figures 11-16).

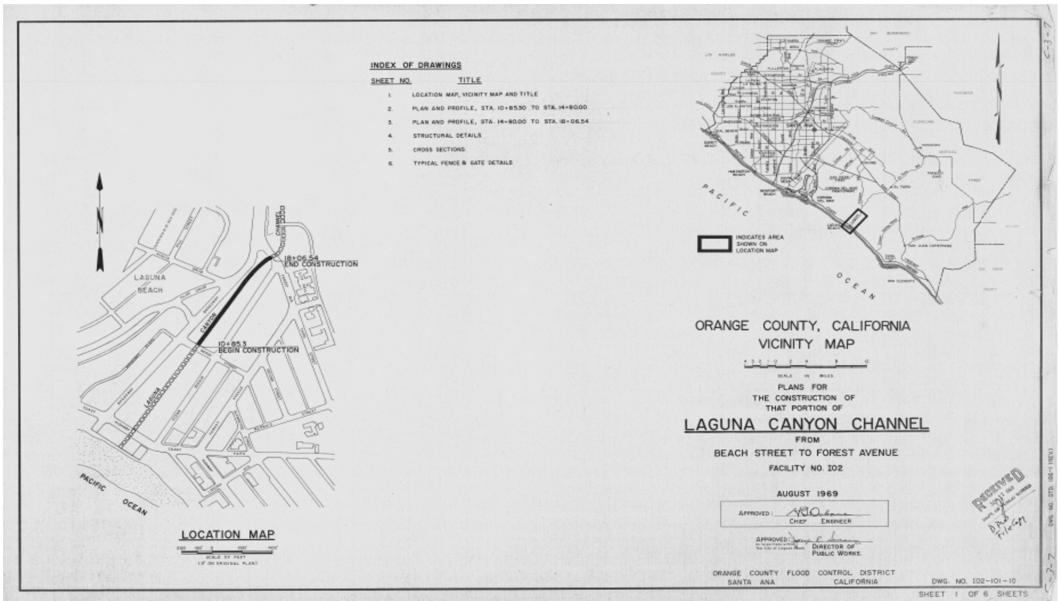


FIGURE 11: Laguna Canyon Channel Vicinity Map 1969

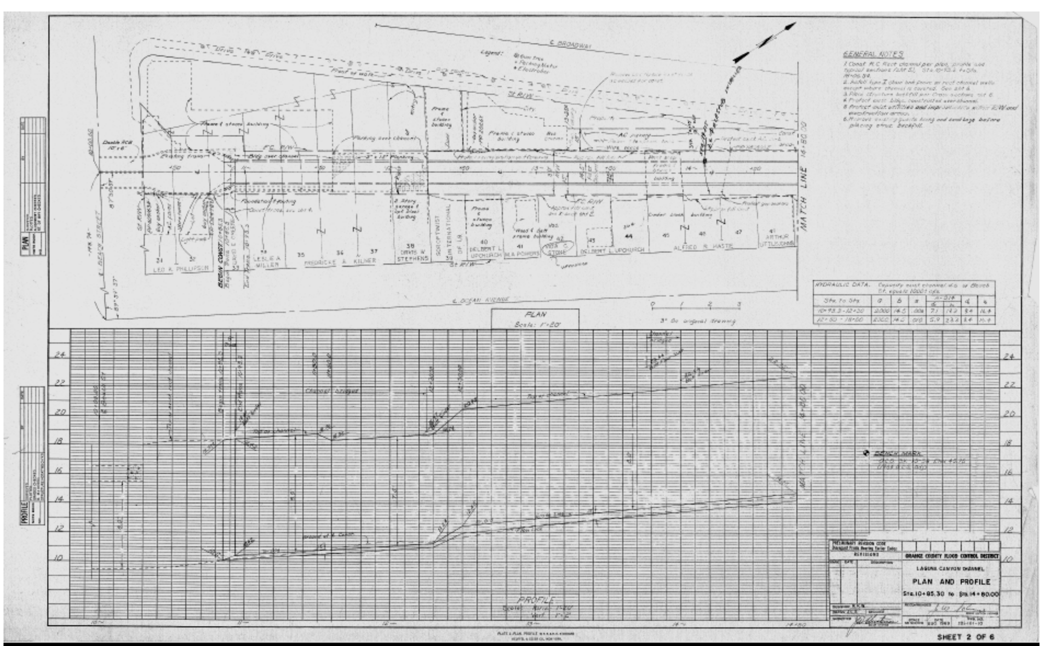


FIGURE 12: Plan and Profile of the improved channel 1969 (Sheet 2 of 6)

***B10. Significance: (Continued):**

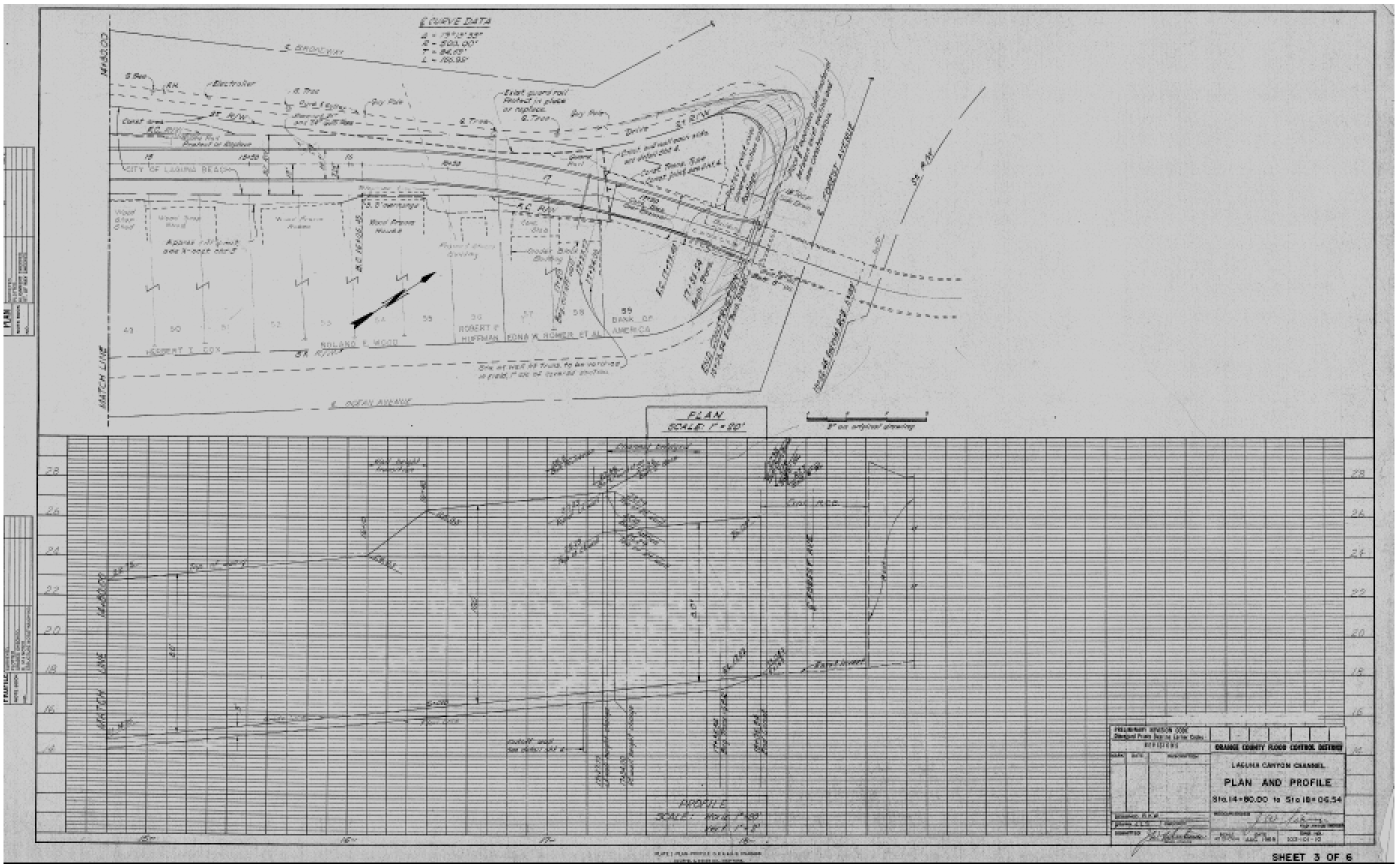


FIGURE 13: Plan and Profile of the improved channel 1969 (Sheet 3 of 6)

***B10. Significance: (Continued):**

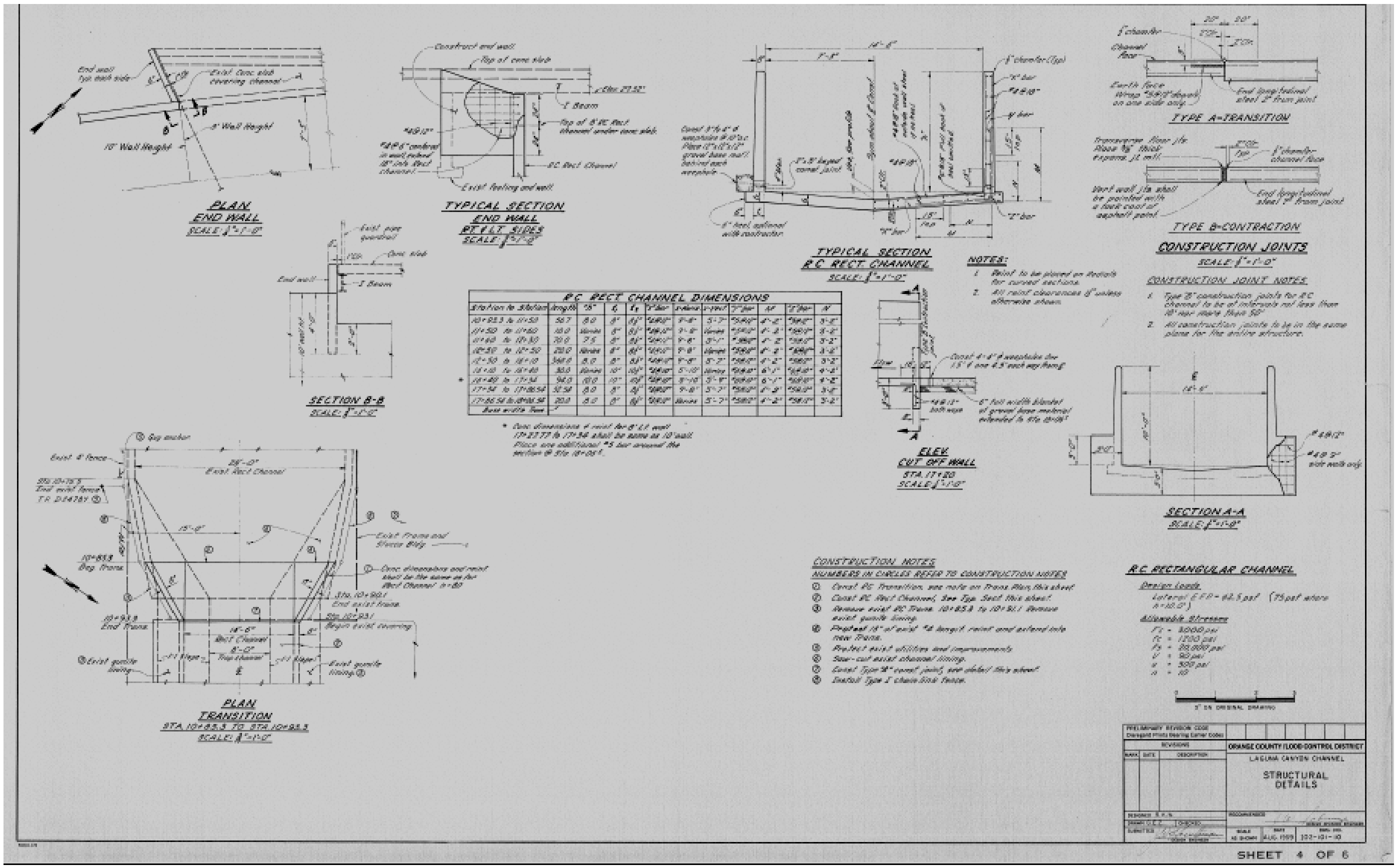


FIGURE 14: Structural Details 1969 Channel Plan (Sheet 4 of 6)

***B10. Significance: (Continued):**

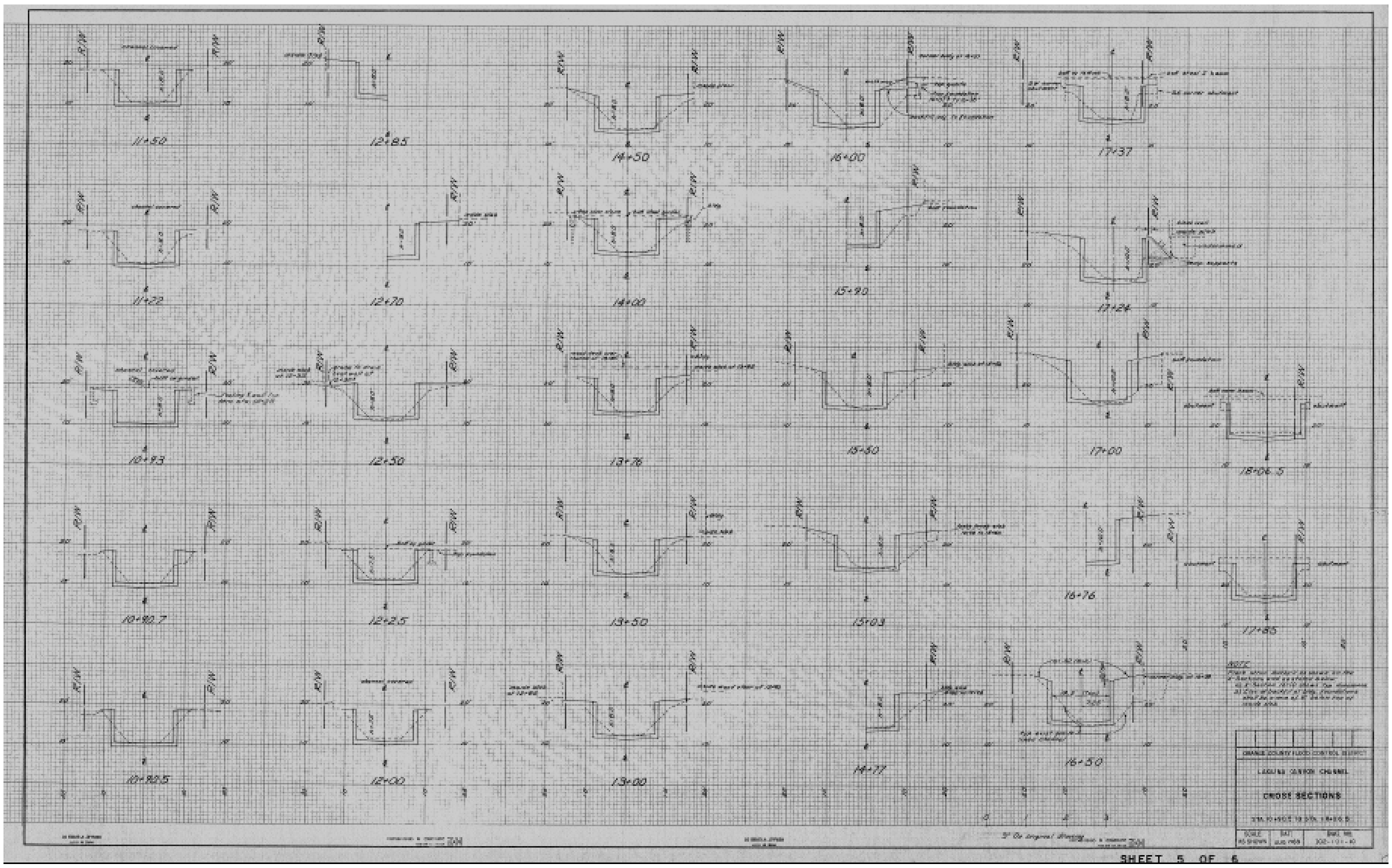


FIGURE 15: Structural Details 1969 Channel Plan (Sheet 5 of 6)

***B10. Significance: (Continued):**

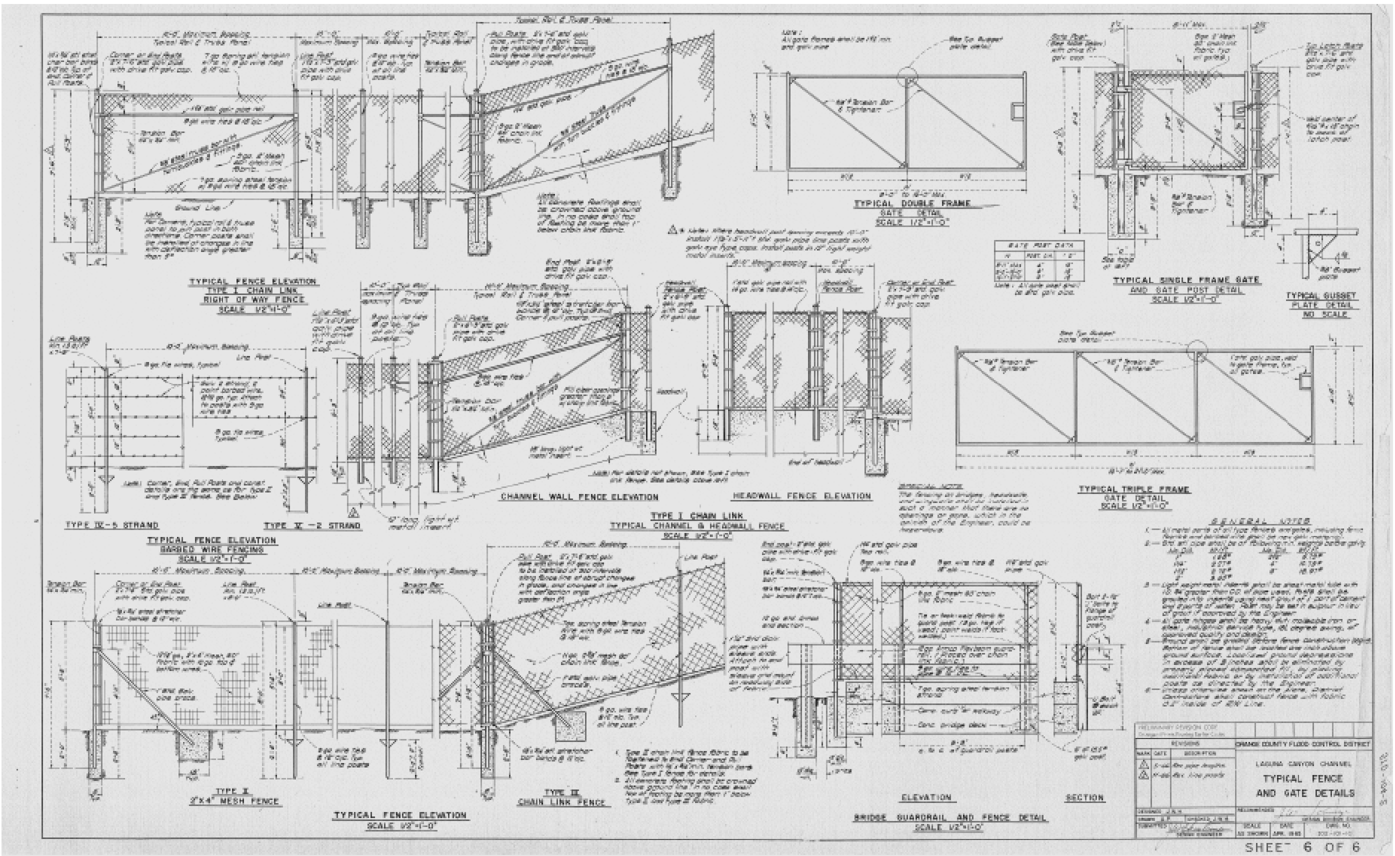


FIGURE 16: Fence Details Laguna Canyon Channel 1969

Based upon the 1969 plan revisions to the Laguna Canyon Channel as it was described in the engineering drawings, the channel was rebuilt from Beach Street to Forest Avenue to address the damage that occurred from the previous years. The new channel was designed as a box culvert rather than a trapezoidal-shaped channel as it was originally designed. The lower leg of the channel from Beach Street to the Coast Highway was apparently left intact with the exception of minor repairs over the years.

***B10. Significance: (Continued):**

The following are photographs taken in 2016 by DUDEK, an environmental firm, inside the channel between Beach Street and the Pacific Coast Highway:

FIGURE 17: Spalling of interior concrete in the channel

FIGURE 18: Drain opening in the channel

FIGURE 19: More concrete channel spalling

***B10. Significance: (Continued):**

REGULATORY FRAMEWORK

California Environmental Quality Act (CEQA) and California Register of Historic Resources (CRHR) Criteria

The regulatory framework for this historic resource study and the evaluation lies within the guidelines imposed for the California Environmental Quality Act (CEQA) and the California Register of Historic Resources (CRHR) under Public Resources Code section 5024.1. CEQA guidelines define a significant cultural resource as "a resource listed in or eligible for listing on the CRHR. A historical resource may be eligible for inclusion in the CRHR if it:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important to prehistory or history.

Even if a resource is not listed in, or determined eligible for listing in, the CRHR, the lead agency may consider the resource to be an "historical resource" for the purposes of CEQA provided that the lead agency determination is supported by substantial evidence (CEQA Guidelines 14 CCR 15064.5).

According to the state guidelines, a project with an effect that may cause a substantial adverse change in the significance of a historical resource or a unique archaeological resource is a project that may have a significant effect on the environment (14 CCR 15064.5[b]). CEQA further states that a substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired. Actions that would materially impair the significance of a historical resource are any actions that would demolish or adversely alter those physical characteristics of a historical resource that convey its significance and qualify it for inclusion in the CRHR or in a local register or survey that meet the requirements of PRC 5020.1(k) and 5024.1(g).

The subject property, otherwise referred to as the Laguna Beach Channel, was evaluated for the CRHR as an individual property with its period of significance beginning in 1929-1930, when it was built, and terminating in 1968, prior to the major reconstruction of the upper section of the channel between Beach Street and Forest Avenue.

SIGNIFICANCE STATEMENT

Determining the significance of the Laguna Canyon Flood Control Channel is predicated on the property being associated with an event or events, or a person or person of significance in the history of Laguna Beach or Orange County, and the structure's engineering significance that retains a sufficient level of integrity in order to convey its historic character. Integrity is defined by the National Park Service as follows:

Location

Location is the place where the historic property was constructed or the place where the historic event occurred. The relationship between the property and its location is often important to understanding why the property was created or why something happened. The actual location of a historic property, complemented by its setting, is particularly important in recapturing the sense of historic events and persons. Except in rare cases, the relationship between a property and its historic associations is destroyed if the property is moved.

***B10. Significance: (Continued):**

Design

Design is the combination of elements that create the form, plan, space, structure, and style of a property. It results from conscious decisions made during the original conception and planning of a property (or its significant alteration) and applies to activities as diverse as community planning, engineering, architecture, and landscape architecture. Design includes such elements as organization of space, proportion, scale, technology, ornamentation, and materials. A property's design reflects historic functions and technologies as well as aesthetics. It includes such considerations as the structural system; massing; arrangement of spaces; pattern of fenestration; textures and colors of surface materials; type, amount, and style of ornamental detailing; and arrangement and type of plantings in a designed landscape. Design can also apply to districts, whether they are important primarily for historic association, architectural value, information potential, or a combination thereof. For districts significant primarily for historic association or architectural value, design concerns more than just the individual buildings or structures located within the boundaries. It also applies to the way in which buildings, sites, or structures are related: for example, spatial relationships between major features; visual rhythms in a streetscape or landscape plantings; the layout and materials of walkways and roads; and the relationship of other features, such as statues, water fountains, and archeological sites.

Setting

Setting is the physical environment of a historic property. Whereas location refers to the specific place where a property was built or an event occurred, setting refers to the *character* of the place in which the property played its historical role. It involves *how*, not just where, the property is situated and its relationship to surrounding features and open space.

Setting often reflects the basic physical conditions under which a property was built and the functions it was intended to serve. In addition, the way in which a property is positioned in its environment can reflect the designer's concept of nature and aesthetic preferences.

The physical features that constitute the setting of a historic property can be either natural or manmade, including such elements as:

- Topographic features (a gorge or the crest of a hill);
- Vegetation;
- Simple manmade features (paths or fences); and
- Relationships between buildings and other features or open space.

These features and their relationships should be examined not only within the exact boundaries of the property, but also between the property and its *surroundings*. This is particularly important for districts.

Materials

Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property. The choice and combination of materials reveal the preferences of those who created the property and indicate the availability of particular types of materials and technologies. Indigenous materials are often the focus of regional building traditions and thereby help define an area's sense of time and place.

A property must retain the key exterior materials dating from the period of its historic significance. If the property has been rehabilitated, the historic materials and significant features must have been preserved. The property must also be an actual historic resource, not a recreation; a recent structure fabricated to look historic is not eligible. Likewise, a property whose historic features and materials have been lost and then reconstructed is usually not eligible (refer to Criteria Consideration E in Part VII: *How to Apply the Criteria Considerations* for the conditions under which a reconstructed property can be eligible.)

***B10. Significance: (Continued):**

Workmanship

Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory. It is the evidence of artisans' labor and skill in constructing or altering a building, structure, object, or site. Workmanship can apply to the property as a whole or to its individual components. It can be expressed in vernacular methods of construction and plain finishes or in highly sophisticated configurations and ornamental detailing. It can be based on common traditions or innovative period techniques. Workmanship is important because it can furnish evidence of the technology of a craft, illustrate the aesthetic principles of a historic or prehistoric period, and reveal individual, local, regional, or national applications of both technological practices and aesthetic principles. Examples of workmanship in historic buildings include tooling, carving, painting, graining, turning, and joinery.

Feeling

Feeling is a property's expression of the aesthetic or historic sense of a particular period of time. It results from the presence of physical features that, taken together, convey the property's historic character. For example, a rural historic district retaining original design, materials, workmanship, and setting will relate the feeling of agricultural life in the 19th century. A grouping of prehistoric petroglyphs, unmarred by graffiti and intrusions and located on its original isolated bluff, can evoke a sense of tribal spiritual life.

Association

Association is the direct link between an important historic event or person and a historic property. A property retains association if it is the place where the event or activity occurred and is sufficiently intact to convey that relationship to an observer. Like feeling, association requires the presence of physical features that convey a property's historic character. For example, a Revolutionary War battlefield whose natural and manmade elements have remained intact since the 18th century will retain its quality of association with the battle. Because feeling and association depend on individual perceptions, their retention *alone* is never sufficient to support eligibility of a property for the National Register.

Determination of Integrity and Eligibility for the Laguna Canyon Channel

Location - The Laguna Canyon Flood Control Channel retains its original location or linear course through the center of the Laguna Beach.

Design - The design of the upper section of the channel (Beach Street to Forest Avenue) has been modified since its construction in 1929-1930.

Setting - The setting of the property has been somewhat degraded by modern infill, however, because the channel is subterranean above-ground or surface changes do not dramatically affect its integrity of setting.

Materials - The original materials of the concrete and steel structure are largely intact on the section between Forest Avenue and the Pacific Coast Highway. The drain opening at the beach west of the highway has been rebuilt, as has the upper section of the channel from Beach Street to Forest Avenue.

Workmanship - The original workmanship of the structure has been compromised on its eastern end between Beach Street and Forest Avenue, however, the western leg of the structure retains original workmanship albeit in poor condition.

Feeling - The feeling of the structure is not a significant concern since the structure is largely subterranean.

Association - The structure retains an association with flood control efforts in Laguna Beach beginning in the late 1920s and continuing through to the present.

***B10. Significance: (Continued):**

Is the property eligible for CEQA and the CRHR under Criterion 1? No

The subject property is not eligible for the CRHR under Criteria 1. Although the Laguna Canyon Channel was one of the first large scale projects at flood control in Laguna Beach, the channel does not appear to represent a significant event in the history of the city. The observation is borne out by historical newspapers that, while making mention of the channel, did not describe it as an important achievement in stopping flood events in the city. In fact, for the next fifty years following its construction, flooding persisted to ravage people living in Laguna Canyon and calls were constantly made to improve the channel, which was accomplished in part in 1969 with the upper part of the channel having been reconstructed. Another factor was that the channel lay below grade and was largely unseen with the exception of the outlet across the Pacific Coast Highway.

Is the property eligible for CEQA and the CRHR under Criterion 2? No

There has been no evidence found to suggest that the channel is associated with a person or persons of significance in Laguna Beach. No documentation has been found to suggest that Arthur J. Stead, the first City Engineer of Laguna Beach, was a person of significance in the history of the city. Stead remained with the city for just over a decade and played an important role in many other infrastructure projects in the city, particularly improvements to the city's roads and sewer system.

Is the property eligible for CEQA and the CRHR under Criterion 3? No

The channel was designed by A.J. Stead in 1928 and reflects a technology that was pretty well established by the third decade of the twentieth century. The only aspect of the channel that appears to reflect a more sophisticated approach was the use of centrifugal columns, a technology that dates to the early nineteenth century. By the beginning of the twentieth century engineering and construction companies had pioneered the use of box and trapezoidal culverts or channels throughout the United States. The fact that the lower channel has lasted as long as it has is in part due to the engineering prescribed by Stead and the use of reinforced concrete and steel to support the superstructure.

Is the property eligible for CEQA and the CRHR under Criterion 4? No

The channel, although of relatively sound engineering design, does not possess scientific data. The engineering drawings for the channel are extant, and, therefore, the characteristics of the design are discernable without additional scientific research or inquiry.

Does the property represent a significant resource under the current City of Laguna Beach Historic Preservation Ordinance, Chapter 25.45 - HISTORIC PRESERVATION (11-2-2016; updated 1-9-2017)? No

The subject property does not match any categories of resources that as of July 2017 are considered to be potential significant resources within the City of Laguna Beach, based upon former historic resource inventories or the current city Historic Preservation Ordinance, Chapter 25.45. Furthermore, based upon its below grade location, lack of integrity, and deterioration, it is unlikely that the property would be deemed to have historic significance within the context of the City's Historic Preservation guidelines.

CONCLUSION

In summary, taking into consideration the aforementioned criteria for determining the eligibility of the Laguna Canyon Channel, it is recommended that the engineering structure does not meet the threshold to be considered eligible under CEQA for inclusion on the CRHR under any of the criteria.

B12. References: (Continued):

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USGS 7.5’ *Laguna Beach, California* Topographic Quadrangle Map

APPENDIX D

Laguna Canyon Channel Facility Evaluation Report

FINAL REPORT

INSPECTION SERVICES AND PROJECT REPORT

IMPROVEMENTS TO LAGUNA CANYON CHANNEL FROM BEACH STREET TO THE OCEAN OUTLET

PREPARED FOR

City of Laguna Beach

Public Works Department

PREPARED BY

Dudek

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San Juan Capistrano, California 92675

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February 2017

DUDEK

FINAL SUBMITTAL

Laguna Canyon Channel Facility Evaluation Report
From Beach Street to Ocean Outfall

Prepared for:

The City of Laguna Beach
505 Forest Avenue
Laguna Beach, California 92651
Contact: Christina Templeton, PE

Prepared by:

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27372 Calle Arroyo
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FEBRUARY 2017

Printed on 30% post-consumer recycled material.

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EXECUTIVE SUMMARY

The purpose of this project is to inspect and evaluate the Laguna Canyon channel culvert and identify feasible alternatives to increase the existing system capacity between Beach Street and the ocean outfall. This section of culvert has been identified as the main cause of flooding over the past few decades. The goal of this project is to evaluate and develop a structural flood mitigation facility that increases the system capacity to match that of the adjacent upstream reach, which is approximately 2,200 cubic feet per second (cfs). Currently, the facility from Beach Street to the ocean contains a flow capacity between 800 and 950 cfs.

The main drainage system restrictions in the existing system have been identified to be primarily associated with the Beach Street culvert (including the 50-foot transition just upstream), and the Caltrans "squash box" under the South Coast Highway. These areas not only restrict flows but have a history of clogging with large debris.

Headworks at Beach Street Culvert

Multiple studies have been prepared to identify possible flood mitigation measures for this section of Laguna Canyon channel. Some studies identified structural improvements to the culvert system, and others were focused on evaluating upstream detention to reduce flows tributary to the downtown area. To date, no feasible alternatives have been implemented to mitigate the flood issue.

The project drainage system is very complex, with multiple restrictions, surcharging storm drain laterals, tidal storm surge, and splitting flows on the surface and the subsurface. Traditional models used to evaluate this system in the past are incapable of accurately quantifying potential impacts of varying alternative mitigation measures.

Dudek evaluated the drainage system using a state-of-the art hydraulic modeling software. A software not used for this project in the past, is capable of evaluating the entire drainage system within downtown Laguna Beach based on real storm data. This project included the use of an advanced hydraulic model that utilizes a linked one-dimensional/two-dimensional analysis approach. XP Solution's XPSWMM software model was used to analyze the entire surface of the downtown area, the Laguna Canyon storm drain, and the connecting laterals between Beach Street and the ocean simultaneously. Variable tides, surcharge, surface storage, and storage in the pipes themselves can be evaluated in one comprehensive model utilizing computational equations far superior to those found in previous models used to evaluate this system.

The hydraulic analyses were performed based on the January 10, 1995 storm event. Recorded stream and rain gage data for this event closely resembled the target 2,200 cfs flowrate goal for the project reach. A stream gage at Woodland Drive, approximately 0.5 miles upstream from Forest Avenue had a maximum flow reading in this storm of 2,280 cfs. Detailed hydrology was performed for the areas below the stream gage (downstream of Woodland Drive) to account for the additional tributary to the culvert system. At Beach Street, the total flow in the channel was calculated to be 2,400 cfs for the 1995 storm. The benefit of using real rain and stream gage data is the model results can be validated to photos and videos from the flood event.

As part of this study, Dudek performed a comprehensive facility inspection of the culvert system from Beach Street to the downstream side of the Caltrans squash box. The inspection revealed several areas where structural improvements could be implemented to lengthen the lifespan of the existing facility. The recommendations in this report include utilizing the existing culvert system in addition to implementing new storm drain improvements.

Multiple alternatives were evaluated for this project resulting in several recommendations to improve the flood conveyance properties of the current system. Bypass structures are proposed to collect flows at Beach Street, where it is conveyed in a parallel system to the ocean via Ocean Avenue and/or Broadway Street. After several iterations of multiple options, four alternative solutions were identified:

Alternative 1

- Provides partial flood protection from the Beach Street Culvert, capacity approximately 1,200 cfs, or 250 cfs additional capacity.
- Assumes existing culvert, downstream of Beach Street is structurally improved per the recommendations of the Inspection Report.
- Reconstruction of the transition structure immediately upstream of Beach Street.
- Construction of a 3.5’ high parapet floodwall at the Beach Street culvert inlet
- Estimated Cost: $620,000.

Alternative 2 (2A & 2B)

- Proposed single bypass system. Consists of a single 11’w x 6’h RCB from Beach Street down Ocean Avenue. Alternative 2A proposes a new and separate ocean outfall, and

Alternative 2B proposes to outlet the flows next to the existing culvert outlet – sharing a common headwall.

- Provides flood protection from the Beach Street Culvert for 2,400 cfs, or 1,400 cfs additional capacity.
- Assumes existing culvert, downstream of Beach Street is structurally improved per the recommendations of the Inspection Report.
- Reconstruction of the Beach Street culvert and the transition structure immediately upstream.
- Construction of a 3.5’ high parapet floodwall at the Beach Street culvert inlet.
- Estimated Cost Alternative 2A: $4.3 million.
- Estimated Cost Alternative 2B: $4.0 million

Alternative 3

- Proposed double bypass system. Consists of two 8’w x 6’h single-celled reinforced concrete box (RCB) structures; one down Ocean Avenue; and one down Broadway. Both systems will be routed outlet next to the existing system ocean outfall.
- Provides flood protection from the Beach Street Culvert for 2,400 cfs, or 1,400 cfs additional capacity.
- Assumes existing culvert, downstream of Beach Street is structurally improved per the recommendations of the Inspection Report.
- Reconstruction of the Beach Street culvert and the transition structure immediately upstream.
- Construction of 3.5’ high parapet floodwall at the Beach Street culvert inlet.
- Estimated Cost: $6.0 million.

In 2002, the City, County, in conjunction with the U.S. ACOE proposed a similar project alignment that ran down Broadway Street. This facility, which was sized to pass the 2,200 cfs flowrate, was proposed to be a single 14’w x 9’h RCB. With respect to just the structural costs of the facility, Alternative 2 is 35-percent less expensive. The proposed structural facilities for Alternative 3 were similar to the 2002 project costs but the alignment down Broadway is substantially smaller, which would result in a less intrusive construction process through that street.

The selection process for the recommended facility included a decision matrix populated with a ranking system of several key project criteria, including hydraulic efficiency, flood protection, environmental impacts, construction impacts to the community, and construction costs. Bases on the preliminary scores, Alternative 2B was found to be the recommended alternative.

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1 INTRODUCTION

1.1 Introduction and Project Overview

The downtown area of the City of Laguna Beach has a long history of flooding issues due to the lack of conveyance capacity of the existing Laguna Canyon channel storm drain system. The existing facility conveys flows from approximately 9 square miles of tributary drainage area reaching beyond the SR-73, to the ocean. The current drainage system consists of a combination of natural channels in the upper reaches, to reinforced concrete channel along the western portion of the SR-133, until it reaches the downtown portion of Laguna Beach, where it is routed underground into variable sizes of reinforced concrete boxes. Most of this channel is owned and operated by Orange County Flood Control District. The County facility, referred to as I02, extends generally from the upstream side of Beach Street, east. The City operates and maintains the portion of culvert from Beach Street to the ocean outfall except for the Caltrans portion of culvert under South Coast Highway.

The culvert between Beach Street and the ocean was constructed in 1928. In the 70’s, Orange County improved a portion of the channel from Beach Street to Forest Avenue. The remaining section of Laguna Canyon Channel between Beach Street and the ocean currently consist of a combination of variable sizes and shapes of aging material comprised of a system with inadequate hydraulic capacity. Consequently, this portion of channel experiences floods approximately once every 5 to 7 years.

Beach Street Culvert, Jan. 10, 1995 Storm

Multiple studies have been prepared to identify possible flood mitigation measures. One of the more comprehensive studies was prepared in 1997 by the City, Orange County Flood Control District (OCFCD), in cooperation with the United States Army Corps of Engineers (USACE). The project analyzed the system and proposed a design of a new culvert under Broadway Street. Boyle Engineering also prepared a study identifying possible detention basins within the Laguna Canyon tributaries to partially mitigate flows (1995). More recent studies prepared by PBS&J identified alternatives for improving a section of the storm drain from Beach Street to the ocean outfall, which included removing the center pier from the double box culvert, and improving a portion of the County channel immediately upstream of the Beach Street culvert.

The portion of storm drain under the South Coast Highway includes a "squash box" that has created a blockage hazard over the years. Although not part of the alternative plans in this study, Caltrans has previously allocated $1.4 million dollars to the future improvements of this section. This study will however evaluate the hydraulic performances of proposed alternatives for both existing and improved Caltrans box conditions.

The purpose of this project is to complete a study to identify the most feasible alternatives to increase the existing drainage system capacity. The main constrictions in the existing system have been identified as the reinforced concrete box at Beach Street (including the 50-foot transition just upstream), and the Caltrans "squash box" under the South Coast Highway.

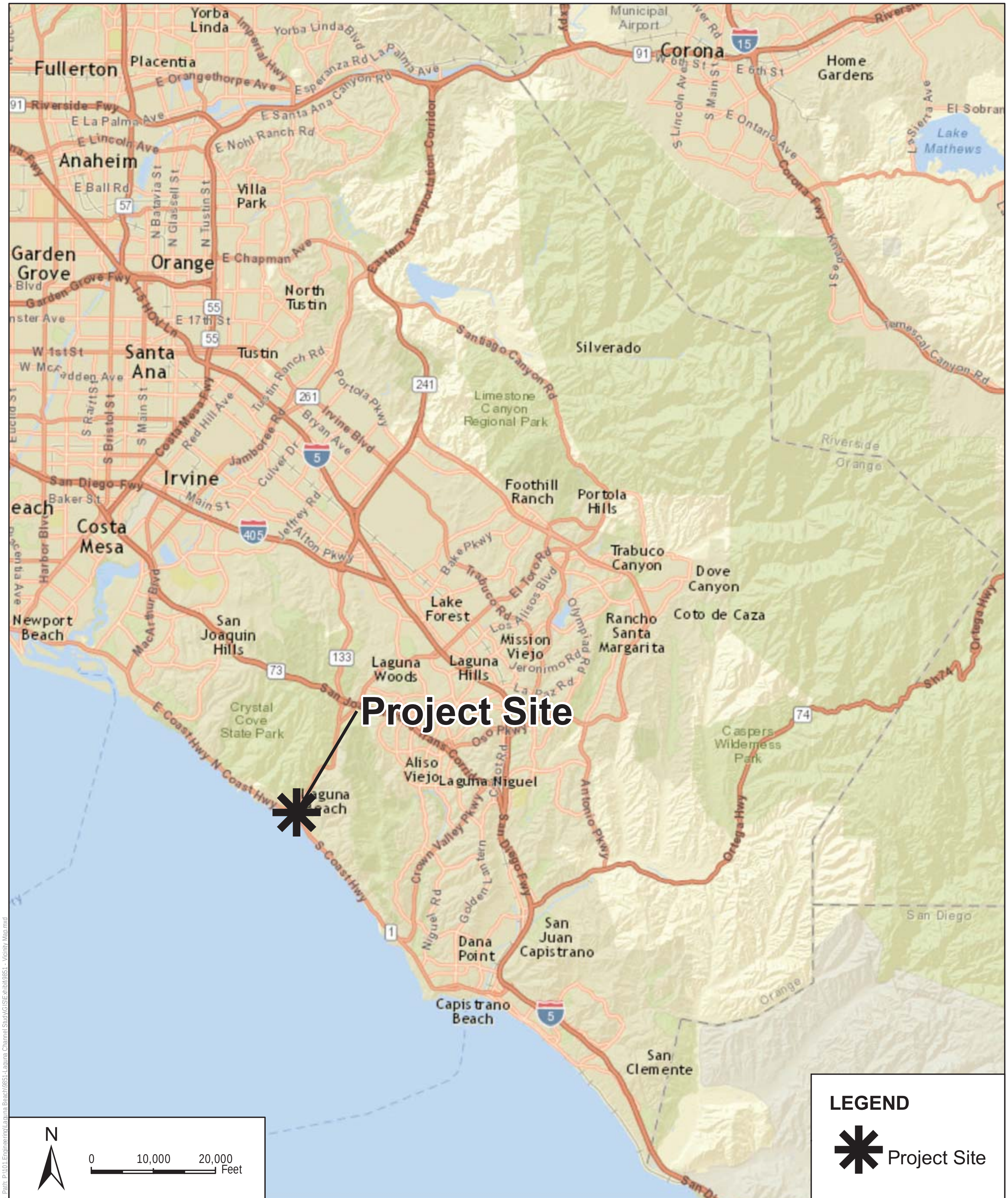
This project will include the use of an advanced hydraulic model that utilizes a linked one-dimensional/two-dimensional analysis approach. XP Solution's XPSWMM (1d/2d) will be used to model the entire surface of the downtown area, the Laguna Canyon storm drain, and the connecting laterals between Beach Street and the ocean simultaneously. Variable tides, surcharge, surface storage, and storage in the pipes themselves will be evaluated in one comprehensive model utilizing computational equations far superior to those found in previous models used to evaluate this system.

This study evaluates previously recommended alternatives and identifies potential new options and proposed drainage alignments that can reduce overall project costs, and the construction impacts to the City as well as South Coast Highway. The goal of this project will be to identify a solution that balances the amount of increased facility capacity with the associated construction costs, and their impacts to the community and the environment. Selected alternatives will be vetted by Coastal Planners, CEQA experts, and Regulatory specialists to ensure each potential drainage solution has been evaluated to identify any potential environmental implications.

As with many older, fully developed communities, proposing a complete ultimate (100-year) facility reconstruction may not be feasible. Even if a 100-year design could be achieved for this project reach, all of the reaches upstream would also need to be improved to convey those design flows to the project system. Yet, the selected project alternative should be implemented with the understanding that future improvements may be implemented to increase the system capacity to the standard 100-year design level.

1.2 Project Site Description and Location

The project focuses on a portion of the Laguna Canyon Channel, primarily between Beach Street and the ocean outfall. This facility is referred to by the County as Facility No. I02. Orange County owns and maintains most of the Laguna Canyon Channel, which consists of a combination of natural channel, improved channel and culvert sections. The channel/culvert extends from the Pacific Ocean up Laguna Canyon, where it runs parallel to Laguna Canyon Road. Figures 1 and 2 summarize the project location.



DUDEK

Laguna Canyon Channel Study

Vicinity Map

City of Laguna Beach

Figure 1

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DUDEK

Laguna Canyon Channel Study

Project Location Map

City of Laguna Beach

Figure 2

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1.3 Goals and Objectives

The objective of this study is to identify the most feasible alternative to increase the existing capacity of the reach of storm drain between Beach Street and the ocean outfall, while not adversely affecting the existing 100-year floodplain. Alternatives identified in this study may be used as a first phase of an ultimate future flood control solution.

The target flow for improved system capacity is based on the goals of previous studies and the existing capacity of channel segments immediately upstream, which has been identified as 2,200 cubic feet per second (cfs). Proposed improvements will be identified with the understanding that future additional improvements could be implemented to further increase the system's overall capacity.

Using more advanced hydraulic modeling software, this system was analyzed to identify if a smaller conduit size could be used in lieu of past proposed mitigation measures. A smaller conduit, or conduits, will reduce construction impacts and project costs. Traditional hydraulic modeling software programs will produce more conservative conduit sizes, since most of them typically use steady state, or constant peak flows.

Improving the system will reduce the downtown Laguna Beach flooding, by controlling the Laguna Canyon Channel overflows at Beach Street. Larger storm events (larger than 2,200 cfs) will overtop the system, but much less than currently. As a result, the current frequency of flooding in the downtown area will be reduced.

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2 PROJECT APPROACH AND DESIGN CRITERIA

2.1 Background

Multiple studies have been prepared to identify flood mitigation measures for the project reach. None more thorough than the study and design plans prepared by the City, County, and USACE titled "*Laguna Canyon Channel, Draft Detailed Project Report"*, in November 1997. Other relevant studies include the following:

- Laguna Canyon Channel Draft Detailed Project Report, USACE, Prepared by CH2MHILL (November 1997)
- An Investigation of Flood Control Alternatives in Laguna Canyon, California, OCFCD, August 1973
- Broadway/Coast Highway Flood Overflow Improvement Alternatives, John M. Tettemer, May 1998
- Interim Study, Laguna Canyon Channel Facility No. I02 from Pacific Ocean to San Juaquin Hills Transportation Corridor, OCEMA, June 1988
- Laguna Canyon Drainage System Possibilities/ Final Report: A Runoff Storage Concept Plan, Boyle Engineering, March 1995.
- Laguna Canyon Rd. Floodplain Hydraulics Analysis Main Report, RBF Consulting, July 1999.
- Project Report Laguna Canyon Channel Facility No. I02, San Joaquin Hills Transportation Corridor to Pacific Ocean, Fusco Williams Lindgren & Short
- Hydrology Report, Laguna Canyon Channel Facility I02 Entire Drainage System, OCEMA, 1987
- Supplemental Hydrology Report, Laguna Canyon Channel, Facility I02 Entire Drainage System, OCEMA, 1988

2.2 Design Criteria

The purpose of this project is to increase the current capacity of the Laguna Canyon Channel system between Beach Street and the Ocean outfall. The goal is to match the capacity of the channel reach upstream of Beach Street, between Beach Street and Forest Avenue. This section had been improved by OCFCD to convey approximately a flowrate of 2,200 cubic feet per second (cfs). This flowrate does not conform to a specific Orange County Design Storm, but is estimated to be approximately a 10-year event.

Since most of the flooding in downtown Laguna Beach, between Beach Street and South Coast Highway has been attributed to the Laguna Canyon Channel overflows at Beach Street, the target capacity identified for the system at Beach Street has been identified as at least 2,200 cfs, to match the capacity of the upstream reach. This flowrate closely resembles that recorded in the January 10th, 1995 storm event that flooded downtown Laguna Beach. The County has stream and precipitation gage information for this event, which will be used in this study. A peak flowrate of 2,280 cfs at Woodland Drive was measured during this event. Slightly larger than the design goal of 2,200 cfs, this data provides a unique opportunity to use real storm data to design the project channel reach.

For design purposes, the January 10, 1995 storm event will be used for the regional flows tributary to Woodland Avenue. Since the stream gage is located approximately 0.5 miles upstream from the project site, hydrology was prepared for the portion of the watershed downstream of the gage. This “local” hydrology was prepared using the January 10th storm precipitation at the rain gage located at the Fire Station, along Forest Avenue. The resulting flows calculated at Beach Street for this storm event, when adding the hydrology of the areas downstream of Woodland Drive was found to be approximately 2,400 cfs. This is the flowrate used to evaluate the alternatives for this project.

The program used for hydrology and hydraulic analyses was XPSWMM. This program calculates hydraulic performances based on time varied flows, or unsteady flows. Different from traditional models that use a single design storm peak flow, this model evaluates the drainage system using both peak flow and volume of a given rainstorm.

2.3 Data Research

Available data was compiled and reviewed pertaining to the project. Acquisition and review of material from the City and other agencies included flood plain hydraulics, regional watershed investigations, hydrologic data, as-built information and GIS data. Field verification was performed for the entire project culvert and some of the surface drainage facilities within the project site. Figure 3 shows the existing storm drain systems in the project area.

The project reach has been studied several times over the last few decades. Multiple studies and alternatives have been proposed to mitigate the flooding issues within downtown Laguna Beach.

As part of this project, Dudek performed a comprehensive field inspection of the project reach, from just upstream of Beach Street to the downstream end of the Caltrans culvert, under South Coast Highway. As part of the facility conditions inspection, Dudek verified the subsurface drainage facilities to the as-built plans. Facility verifications included lateral sizes, locations, culvert transitions, and grade breaks to ensure consistency with the as-built plans.

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Laguna Canyon Channel

City of Laguna Beach

Storm Drain Facilities

Figure 3

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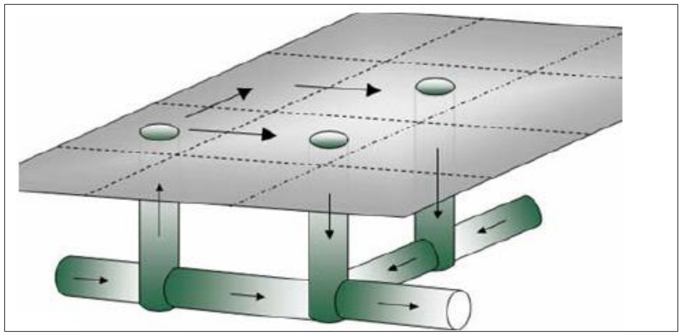
2.4 Technical Software Description



Linked Subsurface (1d) to Surface (2d) Analysis

A state-of-the-art hydrologic and hydraulic model was used due to the complexity of the project site characteristics. XP Software's XPSWMM model was used to model both the complex local hydrology and hydraulic simulations. XPSWMM solves the full St. Venant Equations. In other words, the program solves the highest level of computations available for shallow flooding storm drain modeling. The model utilizes full rainstorm patterns, not just peak flows, to calculate expected runoff and storm drain capture and conveyance efficiencies. Surface flows (above ground) are evaluated in two-dimensions (2D) based on a 3D surface or digital terrain model (DTM) and subsurface flows (conduit flows) are evaluated using a fully dynamic computation method. Linking the surface to the subsurface drainage system produces a comprehensive and realistic analysis of the entire watershed. The linkages allow the subsurface pipe networks to communicate with the surface flows in real time, within a single comprehensive model.

Evaluating the entire drainage system in one model provides a major benefit over the traditional models, where each drainage system (main channel, laterals, surface flows) are hydraulically modeled individually. Individual models require an iterative calculation process of back-and-forth until all systems produce desired results. Iterative processes within a complex drainage system does not lend itself to multiple alternative analyses.

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3 ALTERNATIVES DISCUSSION

The focus of this project is to evaluate the capacity of the Laguna Canyon Channel culvert system from Beach Street to the ocean outfall. During larger storm events, flood waters escape the channel at Beach Street and flow down to Broadway Street and Ocean Avenue towards South Coast Highway. The channel/culvert system between Beach Street and the system outfall contains multiple hydraulic restrictions. Built in 1928, the drainage structure was designed and constructed per different criteria than what is standard today. The existing facility experiences surface flooding approximately once every 7 years.

3.1 Culvert System Deficiencies

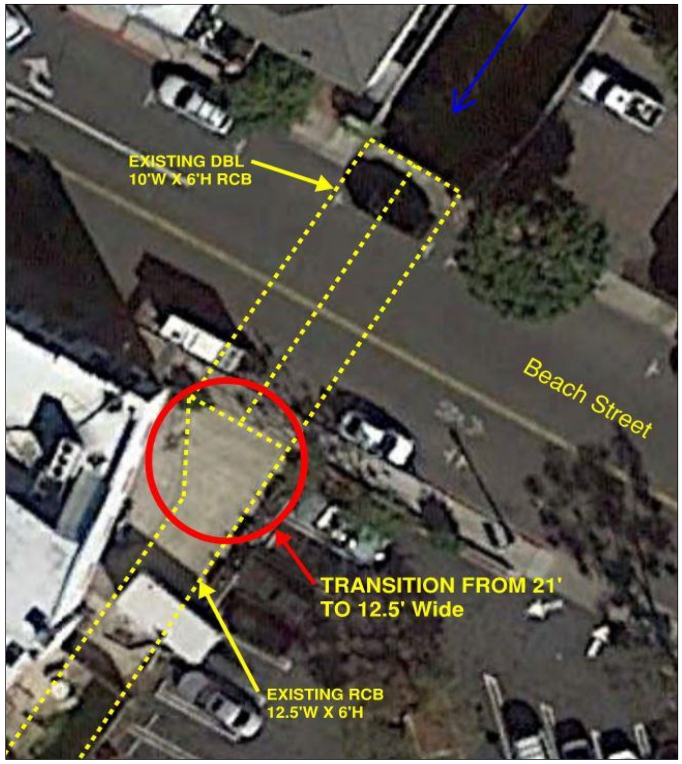
Issues contributing to a reduction in hydraulic capacity are as follows:

Beach Street Culvert Inlet. Flows enter a double 6-foot high, 10-foot wide reinforced concrete box (RCB) from an 8.5-foot high 14.5-foot wide rectangular concrete channel. A short double transition structure exists between the channel and culvert box. Multiple head losses occur in this portion of channel. Head losses can reduce the velocity of the flow, resulting in increased flow depths. Additional head losses occur at the double culvert's center pier wall. The height of the channel reduces from 8.5-feet at the open channel to about 7-feet at the culvert entrance. This culvert has a history of trapping large debris during storm events, resulting in further hydraulic losses.

Beach Street Culvert Entrance

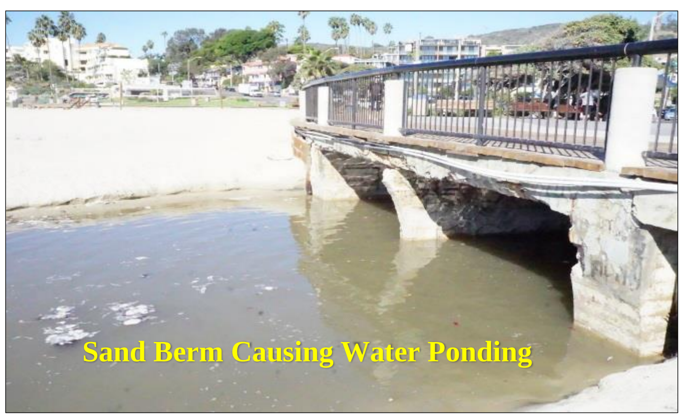
Culvert Transition under Beach Street from Double Culvert to Single Culvert. The most critical hydraulic restriction in the project reach was found to be the transition structure under Beach Street. The structure is approximately 20-feet long, transitioning from the double 6-foot by 10-foot culvert (21-foot wide section) to a single 6-foot high by 12-foot wide RCB. This abrupt restriction in culvert width causes the flows to back up to approximately 50-feet upstream of the Beach Street culvert entrance. The losses associated with this single structure have been found to be the primary clearwater, or non-debris flow, restriction that causes the flooding at Beach Street.

Multiple hydraulic evaluations were performed of the existing facility at this location. The results showed the major hydraulic control was at this restriction. Regardless of the improvements made to the inlet of the existing culvert or the upstream County transition structure, this section governed the increase in water surface elevation and was found to be responsible for most of the flooding at the Beach Street location.



Downstream Transition Structure at Beach St.

Caltrans Culvert under South Coast Highway. The culvert under South Coast Highway consists of a double 4.5-foot high by 11-foot wide RCB. The system transitions from a single 6'x12' RCB to the double RCB (23-foot wide section) under PCH. This type of structure is referred to as a "squash box", where a reduction in facility height occurs. Past issues have occurred where large debris has wedged itself into this facility, blocking flows and causing more flooding upstream. Loss rates associated with these types of structures are typically high, but due to the widening of the structure, from 12' to 21', the losses were found to not drastically affect the flooding at Beach Street. This facility, however, is a safety hazard and greatly increases the risk for debris blockage.



Laguna Canyon Culvert Outlet – During Summer

Sand Intrusion at Ocean Outlet. The system outlets at Main Beach, under the boardwalk on the ocean side. During the summer months, the City's Water Quality Program berms sand in front of the outlet to trap summer storm flows in the culvert, where its pumped to the sanitary sewer for treatment. Although depths of sand get as high as 4 feet in the outlet, it does not impact the capacity of the system during large storm events. Hydraulic model results suggest that the velocities in the outlet are well over 15 feet per second for storm events greater than a 3-year storm. As can be seen at the beginning of the rain season, the flows from the outlet blow through the sand creating a channel to the ocean. For small storm events, before the outlet is self-cleaned, the sand will reduce the system function, but not likely to the point of substantial surface flooding.

3.2 Proposed Solutions

Several potential solutions have been evaluated in past reports and studies. Some solutions consider improving the project reach to match the current capacity of the channel section upstream of Beach Street, or 2,200 cfs. Other proposed alternatives, proposed a phased approach with a future 100-year “ultimate” solution. This study focuses on a solution to improve the current flooding issues by increasing the reported system’s capacity to match the capacity of the upstream section between Beach Street and Forest Avenue (2,200 cfs). The difference between this study and previous studies is the use of a more advanced model capable of modeling multiple scenarios including 2-dimentional (2d) surface flows and subsurface culvert flows simultaneously. The models can also evaluate the entire storm drain network simultaneously, identifying if and when specific laterals and inlets become surcharged and even spill out onto the surface. The use of the 1d/2d model will also show the proposed conditions impacts to the 100-year floodplain. It is important to compare the proposed project conditions to the existing conditions to ensure not adverse impacts are created for extreme events (100-year).

Existing Culvert Improvements. As part of this project, Dudek performed a facility inspection for the culvert reach between Beach Street and the downstream end of the Caltrans RCB. Similar to inspections of past, much of the system is in critical need of improvement. A separate report was prepared that identifies the facility conditions, methods of improvement, and estimated costs. Dudek believes this system can be improved, even if it was constructed in 1928. The cost of structurally improving the facility will be substantially less expensive and intrusive to the community. The system is undersized with respect to current design standards, but it does provide some conveyance capacity. It is recommended that some sections be substantially structurally improved, which entails removal of unsound concrete and inclusion of reinforced concrete. Some of the reinforcement measure could slightly reduce the existing culvert capacity, but the benefit of utilizing the system’s existing capacity is considered economically feasible.

Acceptable Surface Flooding: By evaluating surface flows using XPSWMM, a detailed flood model can show if some flooding or “acceptable flooding” can be allowed to overtop the Beach Street culvert. This type of solution can reduce the proposed “bypass” pipe sizes, and consequently construction costs, and construction impacts to community.

Another benefit to a detailed analysis of surface flooding is to strategically locate and/or modify existing surface inlets to capture flows and route them back into the storm drain systems. Some of the causes of the flooding are also associated with the off-site runoff, or bypass flows from the watershed adjacent to the Laguna Canyon channel watershed.

Before a final alternative can be recommended, a 100-year analysis is prepared for the drainage system to ensure the existing 100-year floodplain is not adversely affected by the proposed recommendations. In some cases, removing flood potential in one particular area could increase flood potentials in other areas. An XPSWMM 1d/2d model will show the impacts of these larger events.

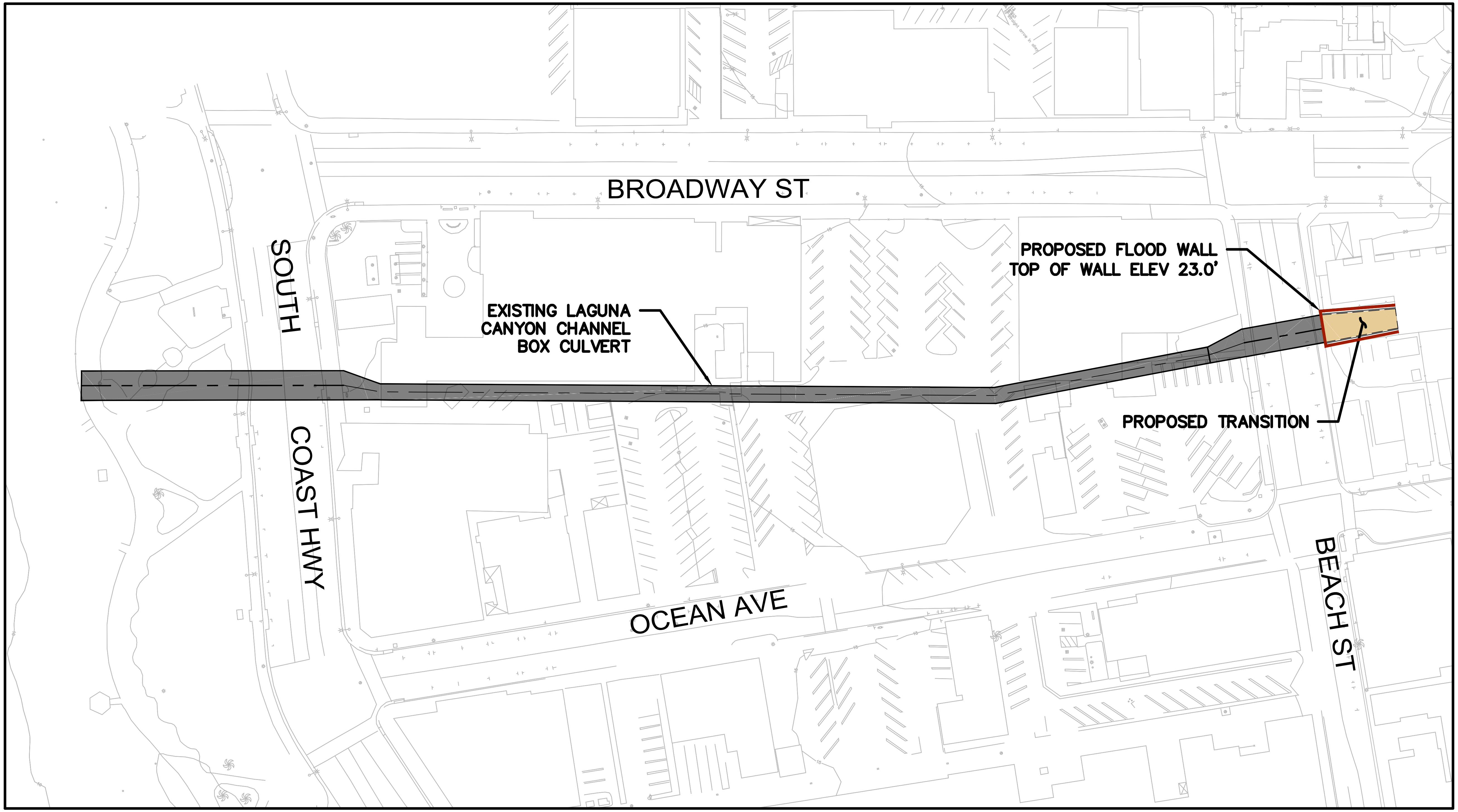
Proposed Alignments. Two main alternative alignments have been selected for analysis. These alignments are based on site constraints and generally consistent with past study evaluations. Site constraints include land-use or physical space to construct the proposed system and topographic relief, since storm drains are gravity systems.

The first alternative alignment begins at the Beach Street RCB and conveys flows north along Beach Street to Broadway Street. From Broadway Street, the alignment travels west to the ocean. The outfall can either be outlet directly to the ocean, or tie into the existing RCB headwall, which will be improved per a separate project. Figure 4 shows the different possible alternative alignments and bypasses evaluated for this project.

A second potential alignment begins at the Beach Street RCB and conveys flows south along Beach Street to Ocean Avenue. From Ocean Avenue, the alignment travels west to the ocean. Similar to the first alignment, the outfall can be directly into the ocean, via a separate outfall, or can be tied into the existing RCB headwall, which will be improved per a separate project.

Another outlet option for both alignments would be to tie directly into the existing double RCB, or future proposed RCB. This alternative has environmental and socio-economic advantages as it reduces he number of storm drain outlets onto Main Beach. Although, hydraulically, tying the two outlets into the existing outlet greatly increases the tailwater, or depth of water at the system outlet, resulting in larger required culverts to pass similar flows as in separating the outlets (even if they are next to each other).

Beach Street Culvert Improvements. Extensive evaluations were conducted for the hydraulic conditions at the Beach Street section of channel/culvert, since both proposed alignments require diverting flows from this location. These diversions, either one or both alignments, consist of large junctions located inside the RCB, under the street section. The laterals would remove flows from the existing box where it would be routed (bypassed) down their respective alignments.



PLAN

GRAPHIC SCALE

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SCALE: 1" = 80'

DUDEK
27372 Calle Arroyo
San Juan Capistrano, CA 92675

LAGUNA CANYON CHANNEL STUDY

ALTERNATIVE 1

FIGURE 4a

FOR CITY OF LAGUNA BEACH

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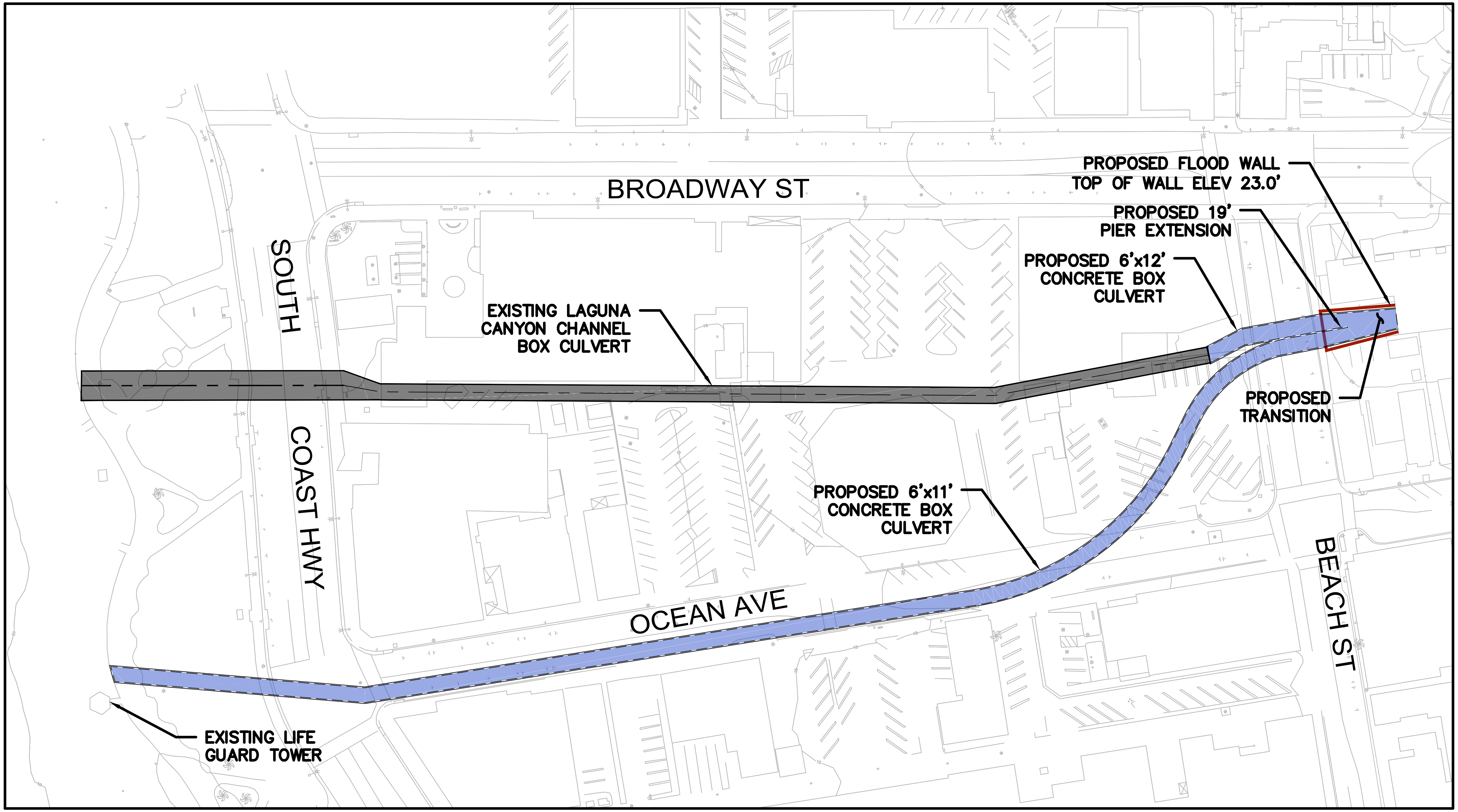

PLAN

GRAPHIC SCALE

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SCALE: 1" = 80'

DUDEK
27372 Calle Arroyo
San Juan Capistrano, CA 92675

LAGUNA CANYON CHANNEL STUDY

ALTERNATIVE 2A

FIGURE 4b

FOR CITY OF LAGUNA BEACH

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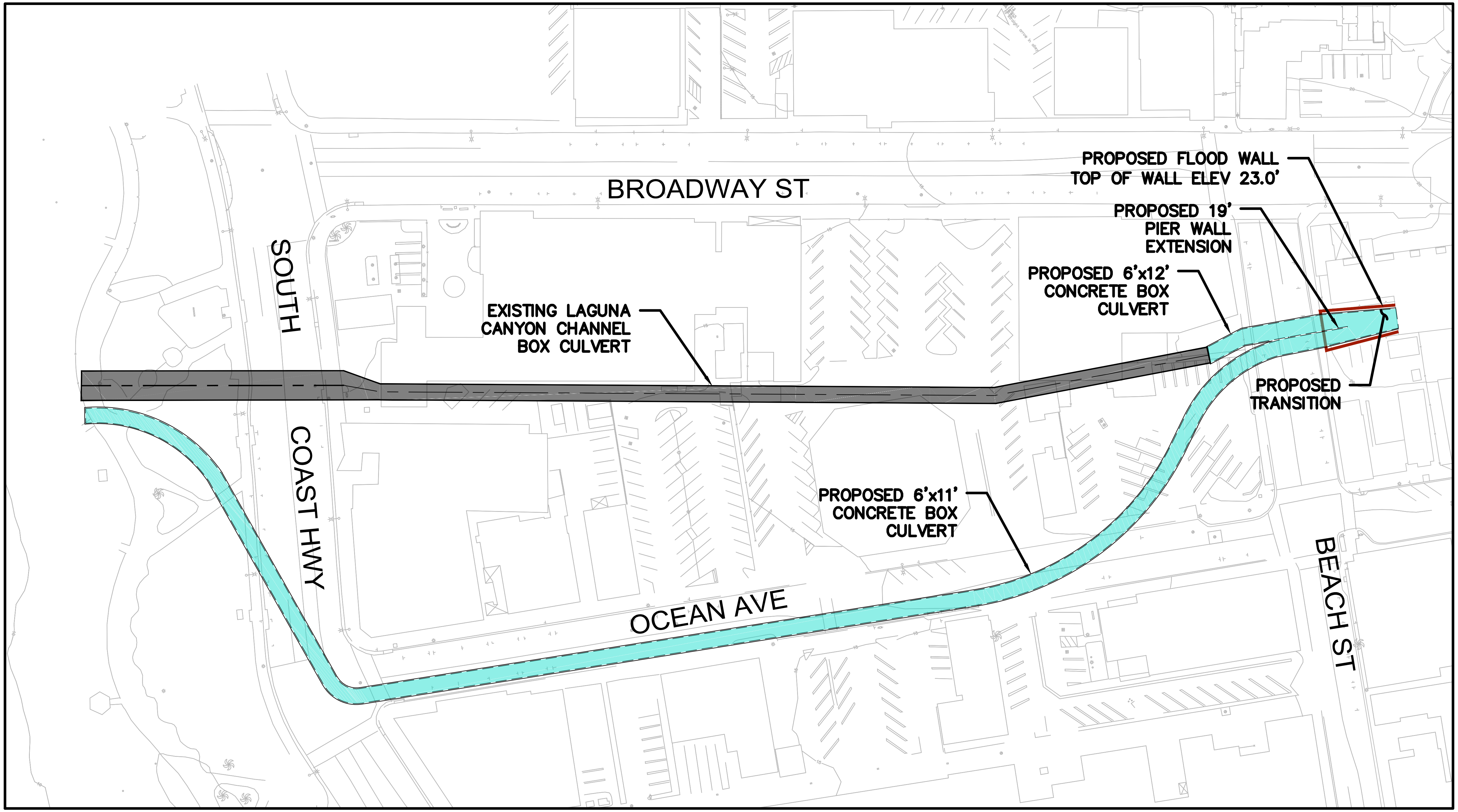

PLAN

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DUDEK 27372 Calle Arroyo San Juan Capistrano, CA 92675	LAGUNA CANYON CHANNEL STUDY ALTERNATIVE 2B	FIGURE 4c
	FOR CITY OF LAGUNA BEACH	9851

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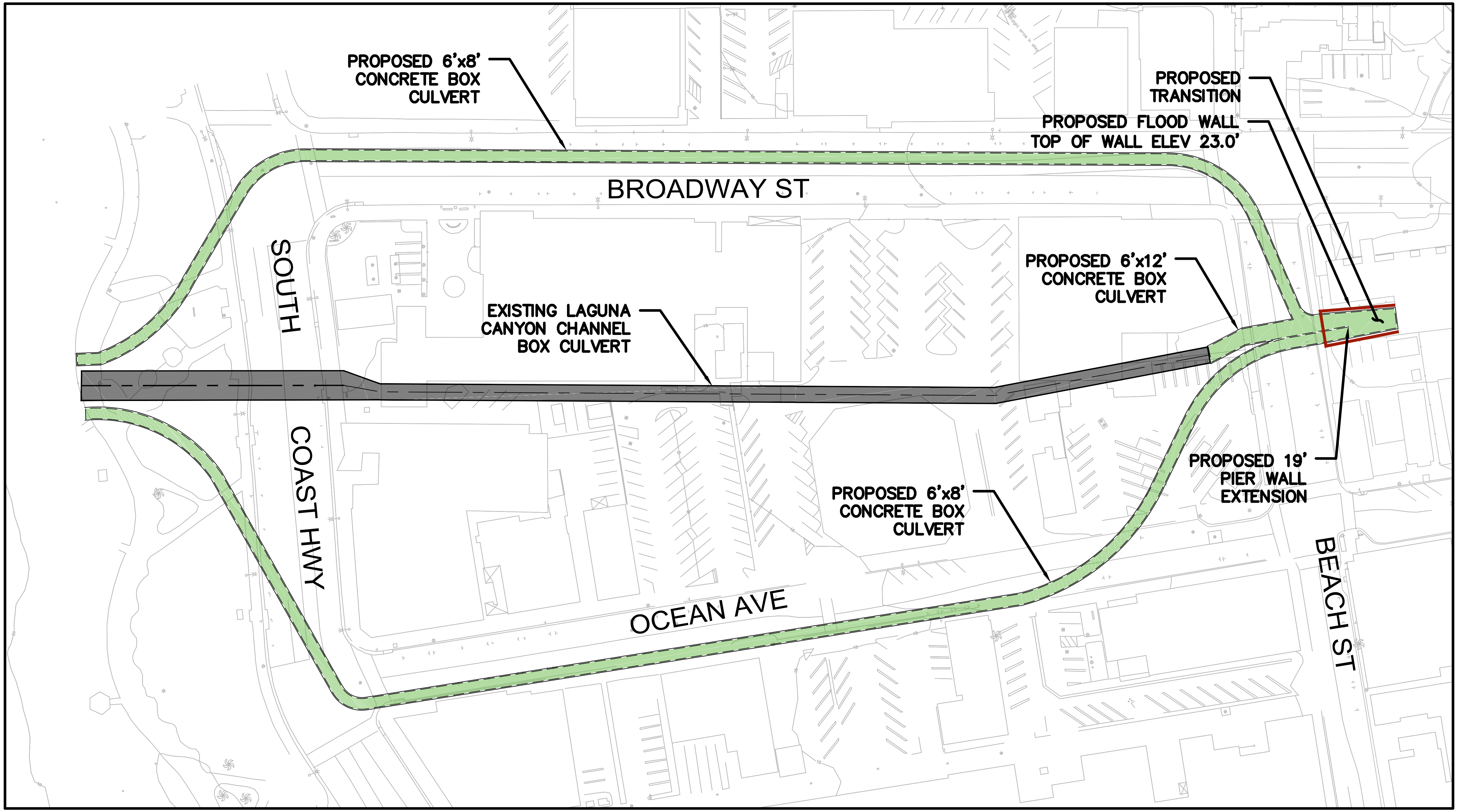

PLAN

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DUDEK
27372 Calle Arroyo
San Juan Capistrano, CA 92675

LAGUNA CANYON CHANNEL STUDY

ALTERNATIVE 3

FOR CITY OF LAGUNA BEACH

FIGURE 4d

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Since the main constriction in the existing storm drain system is at the transition structure just south, or downstream of Beach Street, most of the channel downstream of this junction has available capacity for carrying additional flows. Models show at approximately between 800-900 cfs, flows at the upstream face of the Beach Street culvert begin to overtop the road, yet 80 feet downstream in the RCB, flow depths are approximately only three (3) to four (4) feet deep.

The existing culvert entrance at Beach coincides with a low-point in the street. Local stormwater runoff in the street flows to this point where it discharges into the channel. The height of the face of the RCB at Beach Street is 7.16 feet. That is, flows above 7.16 feet in the channel will begin to overtop and run into the street. The open channel section just upstream from the Beach Street culvert is approximately 8.5 feet high. It is recommended to add a floodwall (parapet) wall across the top of the Beach Street culvert to reduce the amount of flows overtopping. Weep holes or a notched drainage inlet can be placed in the wall invert to allow local street flows to drain into the channel.

It is proposed to reconstruct the culvert under Beach Street in both alternatives. It is most probable that the culvert will need to be slightly widened to accommodate the proposed flows. Since the downstream culvert is a single 12'w x 6'h RCB, it would be hydraulically beneficial to match this dimension with one of the cells of the Beach Street double box culvert. The existing cells are both 10-feet wide with a 9-inch interior wall for a total width of 20.75 feet. It is proposed to increase the culvert to at least by 3 feet.

Linking Subsurface Infrastructure. Calculations reveal the main restriction that causes the most flooding at Beach Street is the transition structure under Beach Street. Under Beach Street, the double RCB (20.75' wide section) transitions to a single RCB (12' wide section). The length of this transition is 20 feet, which in hydraulic terms is very short for such hydraulic transition. The restriction causes a hydraulic jump immediately upstream. A hydraulic jump is defined as a location where flows change from supercritical to subcritical. The result is higher flow depths with slower velocities upstream of the transition and lower flow depths and higher velocities downstream. As a result, the channel downstream of the transition contains more available capacity than upstream.

The existing transition structure is located just downstream of Beach Street, adjacent to the Verizon building, near the Whole Foods building. Calculations revealed that lengthening this transition did not provide any substantial hydraulic benefit. Even if lengthening was found beneficial, constructing it would not be economically feasible due to the proximity of the buildings above.

Given the available capacity in the existing channel downstream of the transition, alternatives will be analyzed to see if it is desirable to tie the alternative storm drain(s) into the existing facility. With either proposed alternative alignments, connector pipes can be linked to the existing facility downstream of the transition. This would allow the systems to communicate hydraulically. When one system gets overburdened, it can bleed off to an adjacent system. The result of this can reduce the proposed alternative conduit sizes and costs.

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4 HYDROLOGY

Similar to previous recommendations, the design goal for this system is to pass a minimum of 2,200 cfs without flooding any of the dwellings, or businesses within the community. This flowrate was selected since it matches the capacity of the section of Laguna Canyon Channel constructed by Orange County upstream of Beach Street.

This flowrate closely correlates to the 1995 January 10th storm event. A stream gage located at Woodland Drive, approximately half of a mile upstream from Forest Avenue, in conjunction with two precipitation gages (Gage 1120 and 1130) in the area, provided a rainfall-runoff relationship for the Laguna Canyon Watershed. The peak flow at this stream gage was recorded at 2,280 cfs, which correlates to approximately 2,400 cfs at Beach Street. Although this gage is upstream from the project site, it provides a very close peak flowrate to the project design goals.

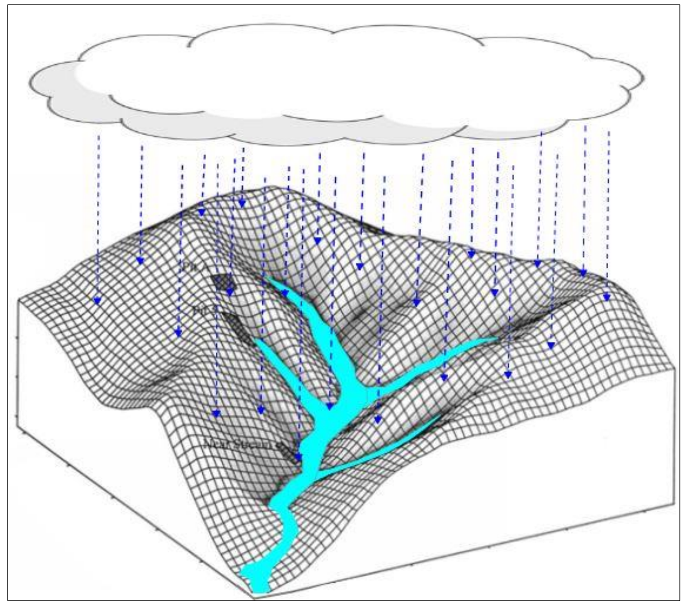
For the project design purposes, Dudek utilized the gaged data for the regional hydrology tributary to the Woodland Drive station. The remaining portions of the watershed tributary to the project site, "local" hydrology was prepared based on the rainfall from precipitation gage 1120 to supplement the regional hydrology.

Dudek also evaluated the project conditions alternatives using the 100-year, 24-hour high confidence (HC) storm event provided by others which utilized the methods outlined in the Orange County Hydrology Manual. This analysis was performed to ensure the project alternatives would not adversely impact the 100-year floodplain. The Orange County 100-Year storm is different than the typical FEMA 100-Year storm event. FEMA uses the Expected Value (EV), or 50-percent confidence storm, where Orange County uses the 85-percent (High Confidence) storm. The difference is quite substantial, as the Expected Value 100-year event is approximately equal to the 25-year High Confidence event.

4.1 Methodology

Local hydrology was prepared in XPSWMM for two scenarios: 1) the January 10, 1995 storm event; and 2) the 100-year (HC) Design Storm (Orange County Hydrology).

The local hydrology, downstream of the Woodland stream gage was prepared in XPSWMM using the Distributed Rainfall Method (DRM). The DRM process allows the user to add a precipitation pattern directly to a topographic surface, or digital terrain model. This process allows runoff to flow freely, seeking paths of least resistance, until captured by the storm drain system or surface channels. Based on the rating curve or capture efficiency of the storm drain inlet, flows can enter the system or bypass via surface flows to the next inlet. Large storm events, similar to the 1995 January event, may overrun most of the local inlets, where surface flows continue in the streets ultimately reaching the primary low point in the drainage catchment. In the case of downtown Laguna Beach, this surface low point is located at South Coast Highway between Beach Street and Broadway.



Distributed Rainfall - Rain on Grid

A major benefit to using this approach is the identification of impacts to surrounding areas by way of bifurcation, or increasing flooding elsewhere as a result of improving a particular location. In other words, XPSWMM can identify sources of flooding other than the Laguna Canyon Channel. For example, if local drainage areas overburden their respective catch basin inlets, the additional flows will be conveyed toward the low point in South Coast Highway.

4.1.1 Loss Rate Calculations

Loss rates were calculated for the local watersheds using the Natural Resource Conservation Services (NRCS) methodology. Using the gross mass rainfall data from gage No. 1120 for the 1995 January storm event, the effective rainfall depths were calculated assuming Antecedent Moisture Conditions (AMC) 3. Even though this rainfall event was classified as a 10- to 25-year event, AMC 3 was used because a similar sized rain event occurred on January 4th, six days prior, leaving the ground saturated resulting in a higher effective runoff rate in the watershed. Higher AMC will produce higher runoff for a given storm event.

Calculated loss rates were deducted from the gross rain gage data to yield and effective precipitation. Effective precipitation is defined by the depth of rainfall that will produce direct runoff. In the beginning of a particular storm event, rainfall does not immediately runoff into the streams, but rather infiltrates, evapotranspirates, or simply gets caught in natural ponds or low points in a given area. Effective rainfall is the theoretical calculation of the actual amount of rainfall that produces runoff, or the net rainfall after losses.

The equation used for Effective Rainfall, or depth of direct runoff is based on the NRCS (formerly Soil Conservation Services) runoff Curve Number Method, which is consistent with the Orange County Hydrology Manual:

$$\mathbf{P_{eff} = \frac{(P - Ia)^2}{(P - Ia) + S}}$$

Where:

P_{eff} = Effective Runoff (inches)
P = Precipitation (inches)
Ia = Initial Abstraction: **Ia = 0.2*S**
S = Potential Maximum Retention: **S = (1000/CN) – 10**
CN = Curve Number

The Curve Number is a value ranging between 0 and 100 that corresponds to a loss rate dependent on land use, cover type, percent of impervious area, and soil type of a given area. The higher the number, the more runoff a particular rainfall yields. Curve Numbers were selected based on the values identified in the Orange County Hydrology Manual.

Precipitation

The project precipitation was acquired from the Orange County Flood Control District for the Precipitation Gage #1120 located near the Laguna Beach Fire Station on Forest Avenue. The January 10th, 1995 storm event provided the following rainfall amounts:

Table 4.1
Gross Precipitation at Gage No. 1120 during January 10, 1995 Storm Event

Time	Duration	Sum Rainfall (inches)	Incremental Rainfall (inches)
10am	0-hour	0.10	0.1
11am	1-hour	0.30	0.2
12am	2-hour	0.68	0.38
1pm	3-hour	0.92	0.24
2pm	4-hour	1.21	0.29
3pm	5-hour	1.73	0.52
4pm	6-hour	2.25	1.04
5pm	7-hour	2.61	0.36
6pm	8-hour	2.78	0.17
7pm	9-hour	2.82	0.04

These values are gross totals based on 9 hours of recorded data. The Effective Rainfall for each sub-watershed was calculated and can be seen in Appendix D.

Land Use

Effective rainfall calculations take into consideration the type of land uses within the watershed. Heavily urbanized areas, with large impervious areas will produce greater rainfall runoff, as losses are less than a natural or rural condition. Dudek used recent aerial photographs to identify land uses. These photographs were correlated with a 1994 aerial photograph to ensure appropriate land uses were used for the 1995 Storm model. For the loss rate calculations, the following land uses were identified. Land use types are shown in Figure 5.

Soil Types

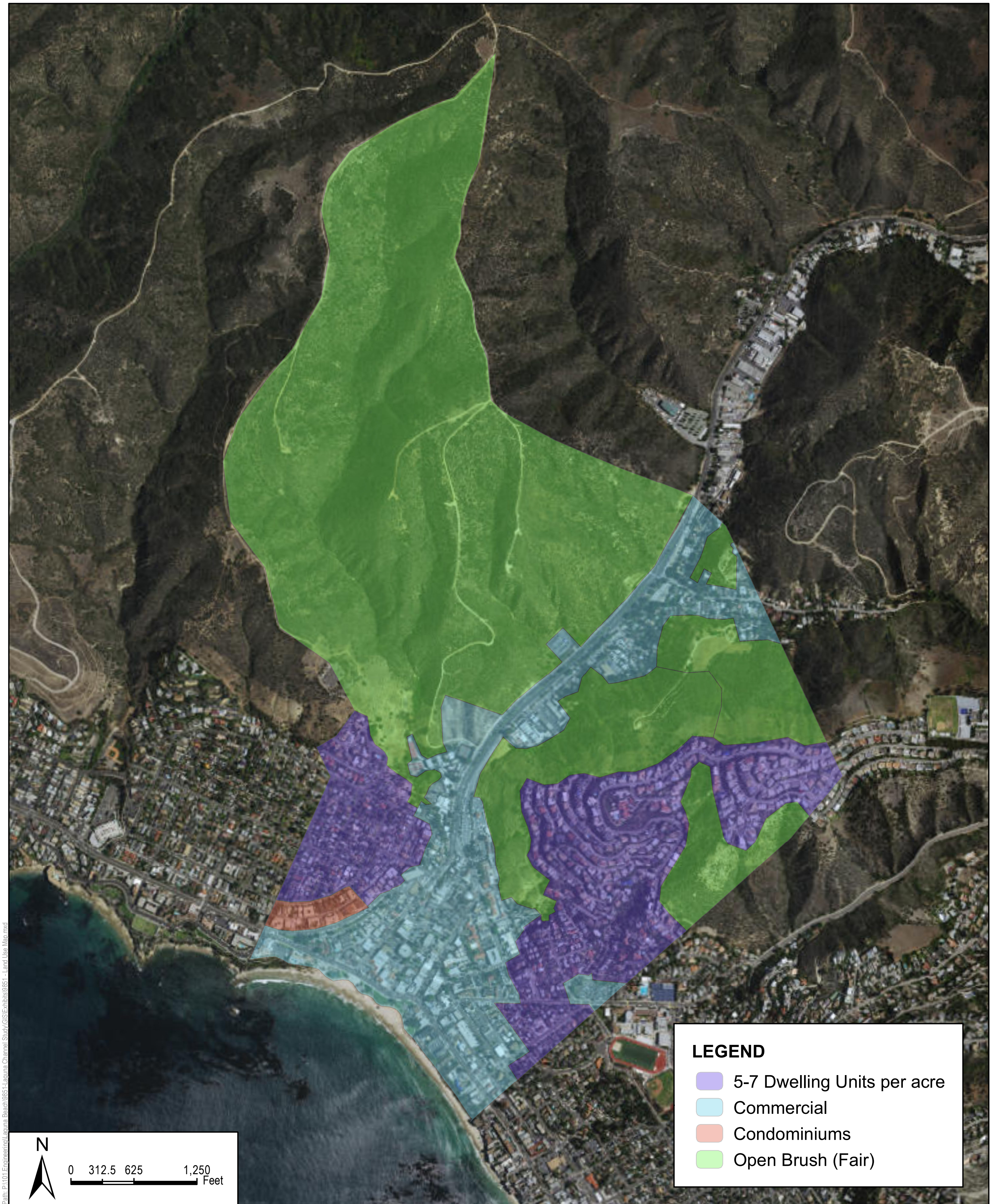
Soil types for the watershed downstream of the Woodland stream gage were identified per the Orange County Hydrology Manual (GIS database). Hydrologic soil types are divided into four categories; A, B, C, and D based on their infiltration potential. Type "A" produces the least runoff, where Type "D" produces the most runoff.

Watershed Descriptions

Hydrology was performed for all areas downstream of the Woodland Avenue stream gage, and tributary to the Laguna Canyon Channel (culvert) outlet at Main Beach. The watershed consists of rural hillside adjacent to Laguna Canyon Road, hillside residential, and relatively flat residential and commercial areas in the main downtown. Figure 6 shows the location of the "local watershed" versus the regional watershed (tributary to Woodland Drive).

4.1.2 Distributed Rainfall Application

The watershed in the project area is comprised of mainly older storm drain systems that were most likely designed to standards less than current standards. Many of the drainage inlets are located on hillsides or areas with steep slopes. These types of facilities make it difficult to "delineate" drainage areas for specific storm drain systems. Typically, watersheds are identified based on those areas tributary to their respective storm drain systems. In older Cities, especially where the urban areas are built in hilly areas, this process is not only difficult but the process can often lead to miscalculations. One of the features of XPSWMM is the ability to prepare a "rain on grid" or a Distributed Rainfall approach. Distributed Rainfall is applied in the XPSWMM model by adding a *time-versus-precipitation* pattern to the 2-dimensional surface grid. This method allows the surface's physical characteristics (i.e., topography, land use) to dictate the flow patterns, resulting in a more realistic rainfall-runoff modeling approach. Surface inlets and catch basins are added to the surface model to capture flows to convey to the subsurface storm drain system. These surface facilities are identified in the model based on standard catch basin hydraulics. This "link" between the surface flows and subsurface drainage system models the inlet's ability to capture flows from the surface, and deliver flows to the surface in the case of surcharged storm drains.



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Laguna Canyon Channel Study

Land Use Map

City of Laguna Beach

Figure 5

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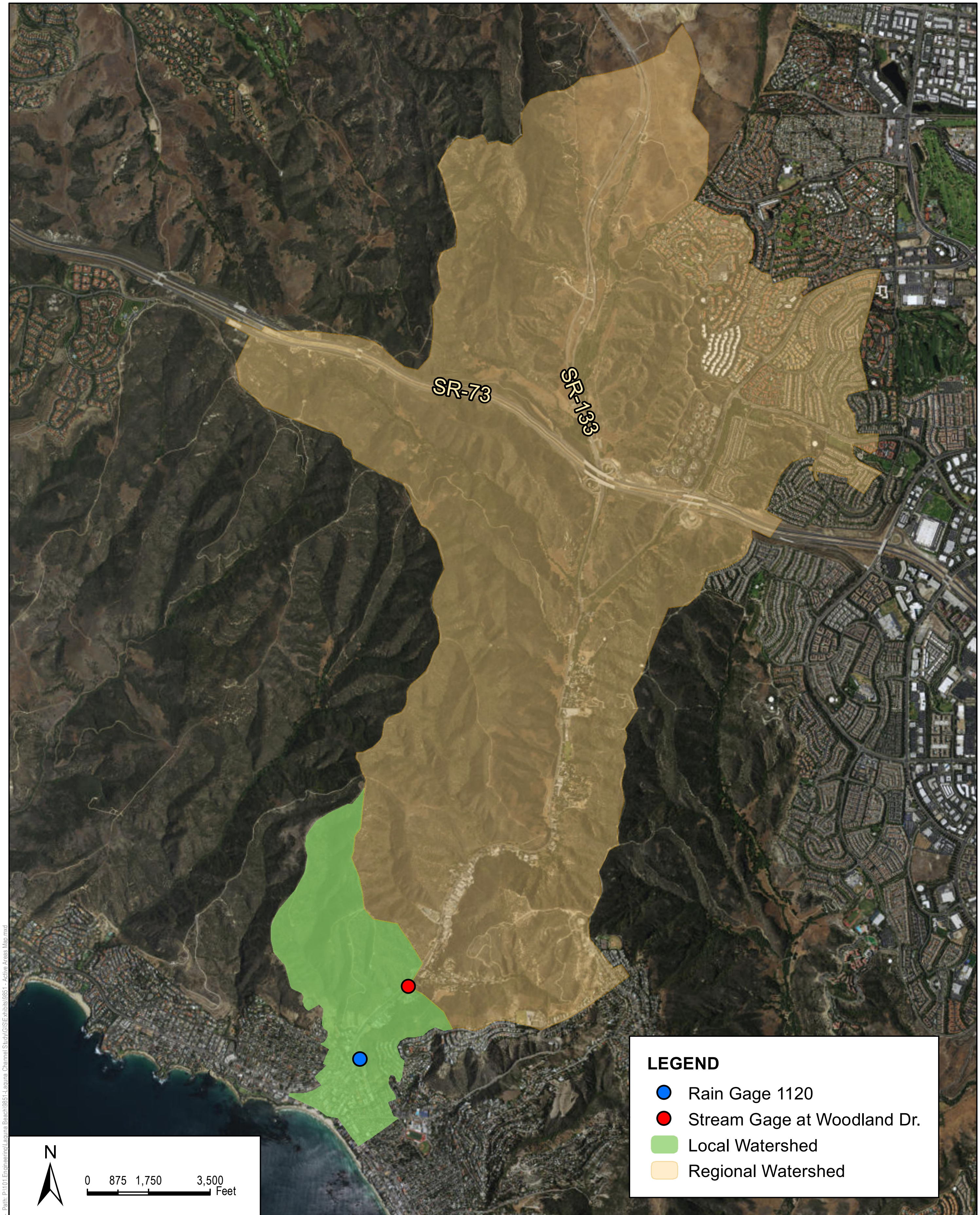

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Laguna Canyon Channel Study

City of Laguna Beach

Watershed Map

Figure 6

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The Distributed Rainfall Method will not yield the same design peak flow rates from methods such as Rational Method or Small Area Unit Hydrograph (SMUH). This is a result of the response of the runoff on the 2D surface. Theoretically, the peak flows produced by the SAUH or Rational Method are calculated based on time-of-concentration, which assumes all flows are concentrated and conveyed from one concentration point to the next, which has the tendency to reduce the travel time and consequently increase the peak flowrate. A rain-on-grid method, or DRM, will match the volume of effective runoff but typically has lower peak flow rates. Since the design of this project is based on an actual storm event, DRM was used in the model as it will provide a more realistic result.

100-Year Storm

For the 100-year evaluation, the full regional hydrograph was placed at a location in the channel approximately 1,000 linear feet upstream from Forest Avenue. This evaluation is performed as a check to verify the recommended alternative does not adversely impact the existing 100-year floodplain.

The regional hydrology was from "*Hydrology Report, Laguna Canyon Channel Facility No. I02, Entire Drainage System*", prepared by Orange County Environmental Management Agency, in December 1987. In particular, the values from Node 1.22 were used in this study, with a peak 100-Year flowrate of 7,940 cfs. Although this concentration point was at Main Beach, it was used since it incorporated the entire watershed. The placement of this hydrology within our models was only to compare the downtown maximum depths for existing versus alternative conditions.

4.1.3 Surface Model Depressions

In 2-dimentional modeling, low points or "pits' will exist on the digital terrain model surface that won't drain during a given storm event. This is typically a result of locations serviced by area drains such as residential backyards, small parking lots, or local depressions. As a results, these "pits" must be filled prior to running analyses, or some of the runoff volume will get caught in the low points, and can significantly reduce the storm model runoff. One way to deal with these areas is to fill them by running a "pre-storm" prior to the actual storm event. In the model, an initial amount of precipitation is allowed to fall on the model surface to fill the minor voids prior to running the actual model. Low points, such as backyards will show a minor amount of ponded water. This initial storm will be allowed to completely drain prior to the actual modeled events. The result is most of the low points and "pits" are filled, allowing the model to calculate runoff more appropriately.

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5 HYDRAULIC ANALYSIS

5.1 Methodology and Model Setup

The study area was modeled using XP Software's XPSWMM, which is an improved version of the U.S. EPA's Storm Water Management Model (SWMM). XPSWMM is a dynamic wave model that solves the full St. Venant Equations. Dynamic modeling allows the effects of storage and backwater in conduits and floodplains and the timing of the hydrographs to yield a true representation of the hydraulic conditions. XPSWMM can model the surface in 2-dimensions, while linking to the subsurface infrastructure, or storm drain system. The result is a comprehensive model that can communicate between the surface and subsurface facilities throughout the modeled design storm duration.

Due to the variable topographic terrain and complexity of the drainage system, this project study required an advanced surface model to identify flow quantity and direction as it moves through the urban area. Traditional hydraulic modeling techniques can not accurately predict the existing flooding potential or the impacts of proposed improvements for these areas. Using these advanced modeling techniques, hydraulic analyses were completed for both existing and proposed conditions using a linked 2-dimensional surface model, and 1-dimensional subsurface model (1D/2D) in XPSWMM. The existing City storm drains were added to a 3-dimensional surface terrain model to understand the level of flooding and to help identify what potential solutions could be implemented.

Topography

Two sources of topographic data were used in the development of the models. Aerial survey was flown for a majority of the study area and was supplemented by Coastal Lidar data acquired from USGS website database.

Vertical Datum

The project uses the North American Vertical Datum of 1988 (NAVD88).

1-Dimensional Model Geometry Data

The geometry for existing storm drain systems were modeled as 1-D elements within XPSWMM and linked to the 2-D surface via interface grid. The geometries were obtained from as-built drawings and supplemented with field inspections. All pipes systems 18-inches or larger that were tributary to Laguna Canyon culvert were incorporated in the model.

Manning's "n" Values

A varying manning's value was used for the surface model. The manning's designations were as follows:

- 0.035 – Open Space
- 0.015 – Residential
- 0.013 – Commercial
- 5.000 – Buildings/obstructions

For buildings, typically instead of blocking out the flow entirely, a high manning's values is given since under extreme flooding events (i.e., 100-year), water does get into the buildings.

2-D Model Grid Size

In 2-D modeling with XPSWMM, calculations are performed over the surface using a grid pattern. Similar to a fishnet draped over the ground, each square in the net resembles a point of calculation in the model. Each grid cell will perform eight (8) calculations per time-step for the entire storm event. For the majority of our project, the duration is 24-hours, and the time step is 1 seconds. As a result, there are 86,400 time steps in a single run, and 8 calculations per time step for a total of 691,200 calculations *per grid cell* in every run.

The grid cell resolution is an important consideration in two-dimensional modeling. Small grid cell sizes can increase accuracy, but require additional computation times; while larger grid sizes may compromise accuracy but decrease computation time. The determination of grid size requires a trade-off to ensure a workable model without compromising satisfactory accuracy.

Multiple cell sizes can be specified within one model, allowing a larger grid size to be used in areas were high detail is not required and a smaller grid size to be used in primary areas of interest. For this project, a constant cell size of 6 feet (or 6'x 6') was used. The total number of grids in the model are roughly 250,000.

Computational Time Step

The computational time step is very important for 2-D modeling. At each time increment, the software computes a flow depth at each cell as well as each cell boundary, and assigns flow accordingly, resulting in a new computation at the subsequent time step therefore increasing the simulation time. Grid size is directly proportional to the computational time step. A time-step of 1 second was used for the 6-foot grid cell size.

5.2 Existing Condition Models

The existing condition flood routing analysis was performed to identify existing street and surface conveyance and storm drain capacities and to acquire a benchmark for our proposed analyses. The January 10, 1995 storm data was used to correlate the hydrology and hydraulic model results to existing photos and videos from that event (See Exhibit 2). Once the existing condition model results were correlated to the storm photos, it provided a level of confidence that the rainfall-runoff relationship of the model was performing adequately.

Corner of Broadway & Beach (1995 Storm)

The downstream water surface control for this project was the Pacific Ocean. For the purposes of this model, the maximum high tide plus 100-year storm surge was used for the 100-year analysis, while record tidal gage data was used for the 1995 January 10th storm event. Since no tidal gages are located near Laguna Beach, the two nearest gages that had data for the design storm were located in Long Beach (L.A. Harbor) and San Diego (La Jolla). These two gages were compared and it was found that the storm surge was about the same. The peak tide elevation during the storm event, from 10am to 7pm (January 10th) was approximately Elevation 3.2. Instead of using a variable tide, this maximum value was used with respect to the duration of the storm event.

For the 100-year analysis, a single maximum value of 9.6 Elevation was used. This value corresponds to the maximum high tide plus 100-year storm surge. No wave run-up or sea level rise value was used for this analysis.

5.2.1 Model Verification Process

In addition to the comparison of the existing model run to the 1995 storm photos, Dudek evaluated the drainage system using multiple additional hydraulic modeling software programs. The main culvert system was analyzed using WSPGW to check the values in the XPSWMM model. Prior to running a full 1D/2D model, Dudek prepared a 1-D only model in XPSWMM. Even in 1-D, XPSWMM calculates the storm drain using a fully dynamic analysis. This advanced method allows the pipes to surcharge, and allows the volume of the conduits to be considered in the calculations. Corresponding peak flows were analyzed in WSPGW to check the behavior of the existing culvert and channel system for varying flowrates. In WSPGW, a capacity of approximately 900 cfs was identified before flows began to spill out at the Beach Street culvert. Both program results were compared for the entire reach to ensure data input was correct and the results were defendable.

A second step in the validation process was to run HEC-RAS 5.0.3 for the remaining surface flows. HEC-RAS 5.0.3 is a new 2-D model developed by the USACE. This advanced software is not typically used in urban areas, as you cannot link storm drain system networks to the surface model. Using the same hydrograph given in the Woodland Drive stream gage for the 1995 storm event, the capacity of the culvert (900 cfs) was subtracted out of the hydrograph. The remaining portion of the hydrograph was routed in the surface only. The goal was to correlate the depths and the spread of the floodplain over the urban surface.

5.2.2 Existing Condition Results

Model results suggest the existing flooding conditions experienced at Beach Street are primarily due to the transition structure inside the Beach Street culvert. The facility consists of an abrupt transition from the double box culvert under Beach, to a single box culvert downstream. The structure transitions from a 20.75-foot wide section to a 12-foot wide section over a distance of 20 feet. Although not the only restriction in the culvert, it was found to be the most severe.

Photo-Los Angeles Times, Allen J. Schaben (2010)

Preliminary model results suggested larger than expected depths in South Coast Highway. Further evaluation of video and photo footage of the storm, it was found that much of the flow within South Coast Highway escaped via an eroded channel near the west side of the intersection of Broadway and South Coast Highway. Flows higher than the back of sidewalk begin to erode the sand, cutting a channel to the ocean, by way of under the boardwalk. The adjacent photo from the Los Angeles Times was from the 2010 December 22 storm shows the scour that occurs at this location from the flows overtopping South Coast Highway as they made their way to the ocean. Once this information was included in the 2-D model, results began to resemble me like the actual storm flood footage archives from the January 10th, 1995 event.

A well-known video was taken during the 1995 storm event, which was used to correlate relative flow depths to the model. The exact time of the footage is not known but estimations from some scenes containing a date stamp suggest the video was taken between 3:00pm and 3:30pm. The peak flow recorded at Woodland Drive was about 3:50 pm, suggesting the peak volume of flow at South Coast Highway would occur about 4 pm. Although the video may not have captured the peak flood, the results in the XPSWMM model can be evaluated at 3:00 to 3:30pm, since the model was run in real time (i.e., input data was actual dates and times based on gage data).

Existing Culvert Capacity

Several studies have been performed on the hydraulic capacity of the existing culvert facility from Beach Street to the ocean outfall. Many suggest the capacity is approximately 800 cfs. This value most likely refers to the maximum carrying capacity of the facility before it overtops. Dudek evaluated this facility using XPSWMM and WSPGW. According to WSPGW, the facility had an approximate capacity (before overtopping Beach Street) of 900 cfs, which corresponded to a flow depth of 7.2-feet, the elevation that included the culvert opening and the thickness of the soffit. XPSWMM and EPA's SWMM5 were evaluated separately to identify a capacity of approximately 950 cfs, at the same depth. The difference in capacity is most likely due to the difference in calculation methodologies between the SWMM models and WSPGW. XPSWMM and SWMM5 utilize a fully dynamic modeling scenario, taking into account local flow acceleration and impact equations.

When the XPSWMM 1-D/2-D analysis was performed for the January 10, 1995 event, the existing flow within the culvert (under Beach Street) was found to be over 1,400 cfs. This was a result of a flow depth of approximately 10.5 feet at the face of the culvert. This flow overtopped the culvert by over three (3) feet, but also increased the hydraulic head at the inlet, pushing more flow through the culvert.

5.3 Proposed Condition Models

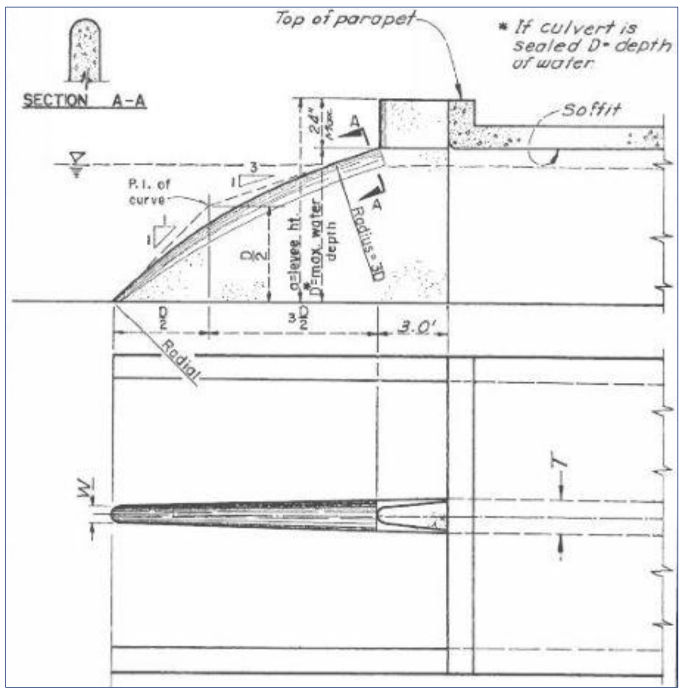
Multiple alternatives were evaluated based on two bypass alignments; the Ocean Avenue alignment; and the Broadway Street alignment. All alternatives included using a structurally improved existing culvert facility based on the findings of the Facility Inspection. Given the construction constraints, it is recommended to utilize as much of the existing facility capacity as possible. In addition to using the existing facility, all alternatives include the following improvements:

- Replacing the existing transition structure upstream of the Beach Street culvert;
- The addition of an extended pier-nose in front of Beach Street culvert;
- Reconstruction of Beach Street culvert, including the addition of a 2' to 4' foot parapet wall that ties into the connecting transition structure; and
- Reconstruction of the existing culvert outfall downstream of Caltrans RoW.

The procedure for evaluating potential alternative solutions involved modeling the entire storm drain system in 1-D first. This was done to identify how and when the model would overtop. Alternative 1 was modeled to allow flows to overtop Beach Street for 2,400 cfs, where Alternatives 2 and 3 were evaluated assuming no flow overtopping Beach Street for the 2,400 cfs flowrate.

After multiple iterations, three alternatives are proposed. The first alternative (Alternative 1) proposes only modifications to the transition structure upstream of Beach Street, including the addition of a parapet wall at the existing Beach Street culvert. The second set of alternatives (Alternatives 2A and 2B) propose an additional single RCB facility down Ocean Avenue. The third alternative (Alternative 3) proposes two smaller single RCB conduits split, one running down Ocean Avenue and one down Broadway Street.

5.3.1 Alternative 1 (Rehabilitation of Existing)



Typical Pier Extension (OCFCD)

Alternative 1 includes rehabilitating the existing RCB from Beach Street to the ocean outfall. The proposed improvements are based on the findings of the Laguna Canyon Channel Facility Inspection Report, prepared by Dudek (December 2016). Additionally, modifications to the Beach Street headworks includes replacing the existing double transition structure with a single transition structure. A pier extension and parapet wall are also proposed at the culvert entrance as part of this alternative. The pier extension is a reinforced concrete tapered extension that extends up the open channel section from the existing culvert pier wall. This facility is designed to improve the hydraulic performance of the inlet, as well as, reduce the potential for large debris to block the entrance of the culvert.

As with the other options, this alternative includes the reconstruction of the existing double culvert outfall between the ocean and Caltrans RoW.

This alternative was evaluated with the understanding that flows will overtop during the target storm event. By raising the wall height around the transition and at the culvert entrance, and improving the hydraulics within the upstream transition, the existing capacity of the system is slightly increased at a fraction of the construction cost of the other proposed alternatives.

5.3.1.1 January 10, 1995 Storm

Alternative 1 was evaluated in XPSWMM 1D/2D to identify the hydraulic performance of the system. The model included the distributed rainfall of the local areas and laterals tributary to the Laguna Canyon channel system to ensure a more accurate evaluation of the system was performed. A proposed parapet wall elevation was selected (top of wall Elevation 23) to ensure modeled flows did not adversely impact the upstream channel hydraulics. For the 1D/2D model, peak flows at Beach Street were approximately 2,400 cfs with the addition of the local hillsides, downstream from the stream gage at Woodland Drive.

The results at Beach Street showed an increase in capacity compared to the existing facility as a result of the modifications, generally below Beach Street. The peak flow in the existing culvert (just downstream of the entrance at Beach Street) was identified as approximately 1,450 cfs, with 940 cfs overtopping Beach Street. The total modeled peak flowrate for this alternative was 2,390 cfs. Although, due to the proposed parapet wall along the Beach Street Culvert and the transition structure, the water surface elevation within the channel upstream of Beach Street increased slightly, causing flows to overtop the channel walls approximately 200 feet upstream. Not a substantial amount, but enough to cause local ponding in the area.

An exhibit was created to show the difference in depths for the Alternative 1 verses the Existing conditions for the 1995 storm event. Generally, the flooded depths were reduced due to the Alternative 1 improvements. (See Exhibit 3and 4).

5.3.2 Alternative 2 (Single Diversion + Rehabilitation of Existing)

Alternative 2 includes the addition of a single 11’w x 6’h box culvert from Beach Street down Ocean Avenue. Two different ocean outfall locations were evaluated: a new single outfall (Alternative 2A); and routing the outfall adjacent to the existing culvert outfall (Alternative 2B). The Beach Street culvert would be reconstructed to a double box culvert with the eastern cell 11’w x 6’h and the western cell 12’w x 6’h. This would ultimately increase the overall culvert width by three (3) feet. The goal of this is to have the western cell match the dimensions of the existing 12’w x 6’h box downstream and neutralize the current transition losses.

The eastern box would split off down Ocean Avenue in an 11’w x 6’h single RCB. An existing 45-inch RCP storm drain, located along Beach Street will need be routed to tie into the Ocean Avenue culvert. Other laterals crossing Ocean Avenue between Beach Street and South Coast Highway will be tied into the new culvert along Ocean Avenue.

The ocean outfall flowlines for both outfall location options (2A and 2B) of the new box will be 1-foot lower than that of the existing double RCB. This is necessary due to the minimal available cover at South Coast Highway.

5.3.2.1 January 10, 1995 Storm

Alternative 2 (A & B) was evaluated first in XPSWMM 1-D to identify approximate size of the bypass system down Ocean Avenue. Once identified, the model was set up to run 1D/2D, which included the distributed rainfall of the local areas and laterals tributary to the Laguna Canyon channel system to make sure they the system did not flood at Beach Street or any other locations within the project system. The 1D/2D model results were consistent with the 1D results showing no overtopping of the culvert. To get the desired function, a parapet wall (top of wall Elevation 23) was proposed on top of the new culvert to ensure modeled flows did not escape at Beach. For the 1D/2D model, peak flows at Beach Street were approximately 2,400 cfs with the addition of the local hillsides, downstream from the stream gage at Woodland Drive.

Partially flooded streets identified in the model were a result of the local hydrology and approximately 10 cfs that overtopped the southern corner of the transition structure upstream of Beach Street. Since the peak was well above the 2,200 cfs target, this overtopped amount was considered within reason. The associated flood depths from this slight breach were less than 2-inches in the low points of the street.

South Coast Highway shows the largest depth of flooding (approximately 12-inchs) but can be seen having at least one dry lane in each direction (Exhibits 5 and 6). The catch basin inlets on the corner of Ocean Avenue and South Coast Highway experience some surcharged flooding during the peak of the 1995 storm event. It may be recommended in the future that this lateral be flap gated if local flooding becomes an issue.

The results at Beach Street showed a good increase in capacity compared to the existing facility, as a result of modifying the culvert and transition structures both upstream and downstream. The peak flow in the 12’w x 6’h existing culvert (downstream of Beach Street) was identified as 1,140 cfs. The peak flow in the proposed 11’w x 6’h Ocean Avenue culvert was 1,250 cfs. The total modeled peak flowrate for this alternative was 2,390 cfs.

An exhibit was created to show the difference in depths for the Alternative 2b verses the Existing conditions for the 1995 storm event. Both Alternative 2a and 2b produced very similar maximum flooded depth results. The flooded depth reductions can be seen in this exhibit due to the Alternative 2b improvements. (See Exhibit 7).

5.3.2.2 100-Year Storm

Once the size of the new proposed culvert was modeled and functioning for the target flowrate, the system was evaluated for the 100-year, high confidence, storm event. This was completed to ensure no adverse impacts would be incurred to the adjacent areas as a result of the proposed alternative. The maximum depths were compared to the existing conditions 100-year (HC) maximum flooded elevation to identify if adverse impacts were found. The results of this analysis showed no adverse impacts to the existing floodplain (See Exhibits 10 and 11).

5.3.3 Alternative 3 (Double Diversion+ Existing Culvert Rehabilitation)

Alternative 3 includes the addition of two single 8’w x 6’h box culverts, one down Ocean Avenue and one down Broadway Street. The Beach Street culvert would be reconstructed to a double box culvert with the eastern cell 8’w x 6’h and the western cell 12’w x 6’h. This overall width would match that of the existing culvert. The goal of this is to have the western cell match the dimensions of the existing 12’w x 6’h box downstream and neutralize the transition losses. Within the western box, a junction will occur splitting flows off towards Broadway Street in a 8’w x 6’h single RCB.

The eastern box would split off down Ocean Avenue in an 8’w x 6’h single RCB. An existing 45-inch RCP storm drain, located along Beach Street will be tied into the Ocean Avenue culvert. Other laterals crossing Ocean Avenue between Beach Street and South Coast Highway will be tied into the new culvert along Ocean Avenue.

The outfall for both of these new single box culverts will tie into the existing culvert headwall at Main Beach. The flow lines of the two new boxes will be 1-foot lower than that of the existing double RCB. This is necessary due to the minimal available cover at South Coast Highway.

5.3.3.1 January 10, 1995 Storm

Alternative 3 was evaluated first in XPSWMM 1-D to identify approximate sizes of the bypass systems. Once identified, the model was set up to run 1D/2D, which included the distributed rainfall of the local areas and laterals tributary to the Laguna Canyon channel system to make sure they the system did not flood at Beach Street or any other locations within the project system. The 1D/2D model results were consistent with the 1D results showing no overtopping of the culvert. Partially flooded streets identified in the model were a result of the local hydrology. For the 1D/2D model, peak flows at Beach Street were approximately 2,400 cfs with the addition of the local hillsides, downstream from the stream gage at Woodland Drive.

South Coast Highway shows the largest depth of flooding (approximately 12-inchs) but can be seen having at least one dry lane in each direction. Both Alternative 2 and Alternative 3 showed similar flood inundation results. The catch basin inlets on the corner of Ocean Avenue and South Coast Highway experience some surcharged flooding during the peak of the January 1995 storm event. It may be recommended that this lateral be flap gated.

The results at Beach Street showed an increase in capacity of the existing facility, as a result of modifying the culvert and both upstream and downstream transition structures. The peak flow in the existing facility was increased to 990 cfs, just downstream of the Beach Street culvert inlet. The peak flow in the proposed 8’w x 6’h Ocean Avenue culvert was 775 cfs, and 650 cfs in the 8’x6’ Broadway culvert. The total modeled peak flowrate at this location was 2,415 cfs.

An exhibit was created to show the maximum flooded depths for Alternative 3 (Exhibit 8). The maximum depths were very similar to those found for Alternative 2. Consequently, the 100-year evaluation also showed similar results as that of Alternative 2.

6 GEOTECHNICAL EVALUATIONS

Geofirm, a Dudek team member, prepared a geotechnical conditions summary based on having conducted previous subsurface investigations at the beach in 2 separate locations and then near the mouth of Laguna Canyon near the Village Entrance east of the intersection of Forest Avenue and Laguna Canyon Road. These investigations consisted of Cone Penetration Test (CPT) combined with drilling and soil sampling. The subsurface conditions at these locations were used as a preliminary representation of conditions expected along the alignments from Beach Street to South Coast Highway for both Broadway and Ocean Avenue alignments.

Based on aerial photographs, in-house geotechnical reports, and the results of Geofirms's previous on-site subsurface explorations, it should be anticipated that the site is generally underlain by a thick accumulation of interfingered, or undifferentiated beach deposits, alluvium, and at depth by Topanga Formation bedrock of Miocene Age. All earth materials on site are considered acceptable for use as compacted fill provided there is no debris or concentrations of organic material in the excavated materials. A preliminary Geotechnical Report will be provided in the report Appendix C.

6.1 Site Investigations

No site investigations were performed as part of this study. Geofirm conducted a study based on previous investigations as they pertain to this project. The results include suggested project recommendations for the construction of the two alternative alignments. During the final design process, a full geotechnical evaluation will be required for the recommended alternative.

6.2 Special Recommendations

Geotechnical recommendations are summarized below and detailed in the Geotechnical Report, located in the Appendix. Following are our preliminary considerations:

- Construction vibrations will potentially create settlement of the existing site soils and impact the improvements adjacent to the trenching operations.
- In general, slope stability is not a design consideration as the site is relatively level, however, local stability of the alluvial soils aligning the channel will need to be evaluated.
- As groundwater will be encountered during construction of the improvements, dewatering should be anticipated. A dewatering contractor should be consulted to design and construct an appropriate system based on the excavation depth required, transmissivity of the soil, shoring system used, and other construction factors.

- Due to the liquefaction potential and the variability of soil types and settlement potentials it may be necessary to design a pile supported channel. Until further investigations are performed, it is suggested that pile supports be implemented from the ocean outfall to just north of the Pacific Coast Highway.
- The gradient of the channel improvements is confined by outfall at the beach and the flow line of the existing structures above Beach Street. However, provided the gradient of the channel would not be disrupted by differential settlement of up to a foot it may be possible to design the structure with adequate gradient and flexibility to mitigate the effects of both liquefaction and differential settlement.
- On-site materials should excavate with conventional earthmoving equipment. Caving conditions are highly likely. Casing of drilled excavations should be anticipated.
- Due to the potential of caving of the trench sidewalls, loss of ground adjacent to the trenching operation will potentially result in settlement that could impact existing structures. Therefore, it should be anticipated that shoring will be required from a safety perspective and to reduce damage to adjacent properties.

It is recommended that future CPT testing be performed along the proposed alternative alignment. This data will provide details for the preliminary topics discussed herein. In particular, the layout of the CPT testing will allow the evaluation of total depth to bedrock differences between the Broadway Street and/or Ocean Avenue alignments. This could influence the overall cost of the preferred alignment depending upon the character of the varying soil types.

7 ENVIRONMENTAL CONSIDERATIONS

Dudek prepared an environmental constraints analysis of the proposed project alternatives (see Appendix B). Based on very preliminary findings of the proposed project, the existing project area, and the potential environmental impacts that could result from implementation of the proposed project, it is estimated that a preparation of a (Mitigated) Negative will be required to evaluate and disclose possible environmental effects. It is always recommended that the City prepare a CEQA Initial Study and all supporting technical studies prior to determining the most appropriate CEQA document and approach moving forward. Technical studies needed may include, but not necessarily limited to the following: construction air quality and greenhouse gas emissions assessment; biological resources assessment; cultural resources evaluation; hazardous materials assessment, hydrology study, and construction noise impact assessment. Additionally, early coordination with all relevant resource agencies, including the CCC, ACOE, CDFW and RWQCB, as well as with the City's land use counsel and environmental consultant, should occur to outline the forthcoming CEQA and permitting process.

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8 UTILITIES

Dudek performed a preliminary utility research based on as-built plans, topographic data, and previous design reports. Older cities, such as downtown Laguna Beach typically contain multiple utilities within the street right-of-ways. Horizontal alignments were estimated based on the available data. Vertical alignments were not investigated, as most as-builts do not show this information. Prior to preparation of Final Design Plans for the proposed drainage facility, a more comprehensive utility investigation will be required. This type of investigation will require pot-holing. The concept plans for this project includes the resultant horizontal alignment of the known utilities.

In general, South Coast Highway and Broadway Street contain the most potential conflicts. Ocean Avenue has more storm drain connector pipes that will need to be tied into the proposed alternative alignment. It is recommended that the pipe be connected to the new alignment, but also allowed to continue to the existing RCB. This will allow the connector pipes to drain to either system.

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9 OPERATION AND MAINTENANCE

The operation and maintenance of the recommended facilities will be the responsibility of the City. Procedures required include, but may not be limited to, debris removal, periodic facility inspections, structural repairs. This facility contains a water quality diversion pump station, located near the outlet on the west side of South Coast Highway. Currently, the City "berms" sand in front of the outlet during summer months to capture runoff from the summer storm events, where they can be pumped and conveyed to the local sewer treatment plant. The guidelines in this report do not include the water quality operation and maintenance requirements.

9.1 Jurisdiction and Responsible Parties

The City owns and operates the portion of channel between upstream side of the Beach Street culvert, to culvert outfall at main beach, accept for the 4.5'high x 11'wide double box culvert under South Coast Highway. The portion upstream of the Beach Street culvert is operated and maintained by Orange County Flood Control District. The portion culvert under South Coast Highway is owned by the California Department of Transportation (Caltrans).

All adjoining storm drain laterals within the City right-of-way are owned and operated by the City, accept for the storm drain laterals within the Caltrans right-of-way.

9.2 Procedures and Associated Costs

Procedures for maintenance of drainage facilities can be difficult to quantify outside of the standard routine facility inspections and cleaning. Some of the more beneficial maintenance activities occur on private properties, such as good housekeeping measures. Debris such as fallen leaves can create havoc on catch basin inlets. Especially in early winter storm events, leaves alone can be the lead cause of surface inlet clogging. Street sweeping and public area cleanup will help but private residents should be notified to keep their property free of debris and foliage. Cost estimates for maintenance activities are included in the Cost Estimate section.

Inlets

Storm drain inlets include street catch basins and main drainage inlets where surface flows are directed to a structure that covey flows to the subsurface drainage system. Street inlets are designed to capture local flows within the street sections. These inlets typically drain residential and commercial land uses. If these systems are clogged, local ponding can lead to sever surface flooding if the storms are large enough. Clogging occurs when debris blocks the inlet. If excessive amount of debris is in the streets, these loose impediments will end up at the inlet face. Early in the rain season, trash, leaves, and other debris becomes a major problem for blockage. Routine street sweeping and periodic inlet debris removal can greatly increase the operational functionality of these inlets. It is recommended that inlet grates be checked/cleaned before the beginning of the rainy season (i.e., October). Additionally, after a storm event, these inlets should be inspected and cleaned. Special consideration should be given to any inlets that contain water quality screens. These screens, are designed to trap sediment and debris, so the accumulation of debris will occur faster, reducing the inlets flood control capacity.

Channels/Culverts

Larger storm drain facilities are designed to carry debris to the outfall. During high flow events, velocities increase and carry debris and sediment to the outfall. During small events, lower flows will exhibit less velocity, which can deposit debris and sediment along the invert. Typically, velocities over 6 feet per second (fps) will tend to move sediment, where less than 6 fps will deposit non floating debris and sediment. Even if some sediment accumulates in the invert, large storm events will blast it downstream. Annual inspection should be performed to ensure no large debris has accumulated in these systems. The structural integrity of these system should be evaluated once every five years.

Multiple celled culvert entrances will need to be evaluated after every storm event. Large debris can hang up on the pier, causing a reduction in flow area, and ultimately flooding. This can be an issue at the Beach Street culvert and the culvert under South Coast Highway, where the system transitions from a single conduit to a double culvert.

Subsurface Drain System

Underground storm drain systems can also accumulate debris and sediment. Many of the collector pipes within downtown are flat, containing slopes of less than one percent. Usually, large storm events can push the debris and sediment through the system, but if the downstream system is surcharged, velocities could be restricted. Subsurface facilities can be inspected using a closed-circuit television camera (CCTV). A robotic camera can be placed in these facilities to reveal any blockages and/or structural issues. CCTV inspections are not routine and typically are implemented when there is a suspicion of blockage and/or structural issues with a storm drain.

Older storm drain systems (older than 30 years) are good candidates for CCTV inspection. Root intrusion, pipe separation, chemical erosion and spalling are typical deficiencies found in old storm drains that can greatly reduce the capacity of the pipe. Structural integrity of the conduit is another major concern with older storm drains. If a pipe fails structurally (i.e. collapse), it not only eliminates the hydraulic capacity, but directly impacts the facilities above it.

It is recommended that subsurface drain inspection be performed after 25 years. In most cases, specific sections of conduit will require attention, not the entire system. Depending on the findings, more frequent investigations may need to be performed to document deteriorating conditions, and or to document improved section status. In some cases, where a system is known to be constructed well below capacity, the City may bypass inspection in lieu of replacement and improvement.

Water Quality Diversion

The City's Water Quality Department operates a water quality diversion near the outlet of the existing Laguna Canyon Culvert outlet. As part of this operation, summer flows are blocked, inducing ponding within the culvert where it is pumped to the local sewer treatment facility. The O&M procedures associated with this facility are not part of this report.

Emergency Maintenance

During large storm events unforeseen maintenance issues can occur. Historically, large debris, and in a couple cases cars, have been swept into the main channel and ultimately lodged in the culvert. Dislodging such items needs to be performed as soon as conditions allow. If not, severe flooding will result as the capacity gets restricted. Although there is no routine measure that can be performed to mitigate these events, special design structures can be helpful. An example would be the debris nose proposed at the upstream end of the Beach Street Culvert. This structure extends from the face of the culvert upstream approximately 15 feet. A gradual elevation increase from three feet to the top of culvert allows debris to "roll" up the structure instead of getting hung up on the face.

Large flow events that exceed the design capacity of the channel will flow onto the streets and down towards South Coast Highway. These flows will deposit mud and sediment within the streets that will require temporary closures and clean up. With the design of the proposed improvements, the expected capacity increase suggest the facility can contain approximately the 10-year flood event (or 10-percent annual exceedance). The increased capacity of the facility will, however, reduce the amount of flow and sediment deposited.

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10 CONSTRUCTABILITY REVIEW

Constructability refers to the potential issues associated with the implementation of a particular project improvement. Two storm drain alignments have been evaluated as part of this study. Alternative 3 includes a split alignment down both Broadway Street and Ocean Avenue, with modifications to the existing culvert system. Alternative 2 includes a single bypass alignment down Ocean Avenue, with modifications to the existing culvert system. In both cases, major improvements are proposed for the Beach Street double box culvert. Other improvements to the existing structure include the improvement of several locations throughout the culvert from Beach Street to the system outfall. These improvements are outlined and discussed in detail in the Facility Inspection Report (Appendix E).

Implementation of these projects will be subject to environmental regulations, traffic and retail disruptions, utility conflicts, and site characteristic challenges. Environmental regulations for each project will be similar and entail acquiring permits through California Coastal Commission, California Regional Water Quality Control Board, U.S. Fish & Wildlife, and U.S. Army Corps of Engineers. The CEQA process during the final design phase will identify the specific permits and applications processes necessary to implement the project.

The Broadway Street alignment has been proposed in the past, and the constructability hurdles have been well documented. In particular, were the expected impacts to the local community during construction of the facility. In 2002, a joint effort to construct a flood control mitigation project, including the City and Orange County, was met with resistance from the local business community which ultimately resulted in the City Council stopping the project. The proposed alignment diverted flows from Beach Street down Broadway Street to the ocean.

Broadway Street is one of the main thoroughfares to and from downtown Laguna Beach. Any alternative in this street will need to show reduced construction impacts than the last project. Due to the result of the past project, no alternative was evaluated to route all flows down Broadway Street in this study. It is expected that even with a reduced construction footprint (Alternative 1), the portion of the alignment that runs down Broadway Street will be met with resistance.

10.1 Special Provisions

Several aspects of the construction of this project will require special consideration, including traffic control during construction, utility conflict relocations, and non-standard structures.

Traffic Control

Traffic control will be a major concern as not only is Broadway Street and South Coast Highway main thoroughfares for passing commuters, but also gateways to the downtown area. Past proposed projects were shelved due to this single issue. Business owners and residents will potentially be greatly impacted if traffic control measures are not planned and implemented well. Extensive coordination with the City, community, and Caltrans will be necessary to ensure appropriate measures are taken. It is likely that a formal Traffic Management Plan (TMP) will be required for the Final Design phase of the project.

Utility Conflicts

Given the age of downtown Laguna Beach and its facilities, utility conflicts will require and relocation. Extensive potholing will need to be performed during the Final Design phase. Preliminary research suggests several utilities will be impacted by the proposed alignment(s). Researched utilities are shown on the Concept Plans, but no utility relocation plans are provided as part of this project. Alternative project storm drain alignments have been selected, or located within street sections, that have the minimum impacts with respect to utility conflicts. These alignments and utility locations were based on researched data and as-builts. These alignments may change during Final Design based on more comprehensive utility location measures.

Non-standard Structures

This project will contain several non-standard structures. The main facilities that will require special provisions is the Beach Street culvert reconstruction, the outlet structure, and the structural support for the proposed RCB facility between the ocean outfall and the north side of Caltrans RoW.

Beach Street Culvert

This culvert includes the removal and replacement of the upstream transition structures. The existing 50-foot double transition will be replaced with a single 50-foot reinforced concrete transition. At the head works of the culvert, it is proposed to construct a pier extension upstream of the culvert face. The culvert itself is proposed to be a flow splitting structure (Alternatives 2 and 3). For Alternative 2, the structure will begin as a double RCB (at the upstream end) and actually split into two separate culverts; one down the Ocean Avenue alignment, and one that will tie into the existing 12’w x 6’h RCB.

Alternative 3 also consists of a junction from the north side of the double box culvert (under Beach Street) that splits flows down the Broadway Street alignment. This junction would be in addition to the Alternative 1 proposed improvements.

Outlet Structure

Both alternatives recommend discharging the bypass culverts near the existing outlet. Since this outlet is currently scheduled to be reconstructed, it is proposed to utilize a single headwall facility. The outlet headwall will be widened to accommodate the new alternative culverts. Improvements will need to be constructed to the existing cutoff wall. This facility will need to be widened and connected to the proposed extensions.

RCB Foundation Supports

The existing facility contains a pile system from the ocean to Beach Street, most likely to support and protect the facility from potential liquefaction and settlement due to the geotechnical conditions of the area. During the original design and construction of this facility, it was most likely understood that buildings would be constructed on top of the facility, resulting in the need for additional structural support. Whereas the proposed alternative structures in this project will be completely within the street right-of-way. Settlement of the proposed facilities is highly unlikely. It is more likely that the proposed facility will rise, rather than settle during a large seismic event, due to the fact that the structure's weight is less than the weight of earth displaced to construct. Details of potential pile system requirements will be identified in the Final Design based on the findings of a detailed Geotechnical investigation.

10.2 Phasing Recommendations

Construction phasing will be necessary to mitigate the impacts to the community. The structural improvements to the existing facility should be implemented first. This phase will pose the least impacts of the project.

Construction of the recommended alignment should begin at the downstream end (outfall) and work upstream to the Beach Street culvert. Extensive coordination with Caltrans and the City will be required to work in South Coast Highway. Sections of alignment can be constructed separately to work with the Traffic Management Plan. The final construction phase will include the modifications to the Beach Street culvert.

10.3 Scheduling (Estimated Construction Durations)

The duration of the constructed project will depend greatly on the coordination efforts between agencies. The expected construction durations may change based on the findings of the Final Design phase. Preliminary estimates for the construction of this project can be broken down into the following:

1. **Environmental Permitting:** 6 – 12 months.
2. **Final Design:** 6 months
3. **Construction:** 8 months
    a. ***Survey:*** 2 week

b. ***Staging:*** 1 week
c. ***Demolition:*** 2 weeks
d. ***Traffic Control:*** 3 months
e. ***Existing Facility Improvements:*** 8 weeks
f. ***Beach Street Improvements:*** 4 weeks
g. ***Improvements within Caltrans RoW (Optional):*** 3 weeks
h. ***Proposed Culvert Alignment Improvements (Ocean Avenue):*** 4 months
i. ***Pavement/Landscaping Replacement:*** 4 weeks

Many of these items will be performed concurrently. With phasing the project, some of these items will be implemented in stages. These estimates are assuming minimal construction restrictions, which may be optimistic. These durations are just estimates and will be refined during Final Design and again during initial construction phase. It is estimated that once construction has started, it would take approximately eight (8) months.

11 COST ESTIMATES

Cost estimates were created for each alternative. The unit prices were developed based on current market values, associated with similar type projects within Southern California and Orange County. The calculated system costs estimates include costs for engineering, construction, SWPPP, surveying, construction management, and contingencies. Any new storm drain construction within the City most likely will require utility relocation. This can be very costly, especially considering the age of the downtown area. The quantity and complexity of utility relocation is unknown and will require detailed site specific subsurface investigations.

Pipe and box culvert costs are per linear foot and included costs for excavation, shorting, bedding, backfill, compaction, removal of excess material, and trench resurfacing. A unit price of $8 per inch of diameter was used for pipe sizes up to 36-inches in diameter. Reinforced concrete box culvert facilities costs were based on a unit price of concrete at $900 per cubic yard. Based on individual size of RCB, a volume of concrete was calculated in cubic yards per linear foot of culvert, and converted into a cost per foot.

11.1 Financial Responsibilities

Construction and associated costs for improving the section of Laguna Channel from Beach Street to the ocean is primarily the responsibility of the City of Laguna Beach. The portion of double culvert owned by Caltrans (under South Coast Highway) will be either fully or partially funded by Caltrans. Any portion of proposed alignment that crosses Caltrans right-of-way will be the responsibility of the City of Laguna Beach unless an agreement with Caltrans can be reached prior to construction. For the purposes of this report, it is assumed to be City responsibility. All storm drain lateral and local catch basin improvements within the City downtown will be the responsibility of the City. Exhibit 14 shows a graphical representation of the project reach.

The section of open channel upstream of Beach Street is owned and maintained by OCFCD. As part of this evaluation, it is proposed to improve this section, which includes two transition structures. Replacing the existing 50-foot double transition with a single transition will be the responsibility of the City. Coordination with the County will be required regarding improvements to this facility.

11.2 Preliminary Construction Cost Estimates

Preliminary construction cost estimates were prepared for each of the alternatives. Alternative 3 provided the highest cost estimate and poses the most potential socio and environmental hurdles. Alternative 1 provides the lowest cost alternative but included the lease flood protection. The detailed cost estimates are included in Tables Nos. 11.1 through 11.5. The cost estimates do not include the reconstruction of the existing culvert from Caltrans to the ocean.

Table 11.1

Existing Channel Improvements Cost Estimate – Beach Street to South Coast Highway

Item No.	Item Description	Project Total			
		Unit of Measure	*Estimated Quantities*	*Unit Price*	*Item Total*
1	Inject Crack (Epoxy)	LF	480	$85	$40,800.00
2	Remove Unsound Concrete	SF	264	$100	$26,400.00
3	Portland Cement Concrete Patch	SF	192	$125	$24,000.00
4	Structural Reinforced Concrete (Box Culvert)	CF	70	$150	$10,500.00
5	Fiber-Reinforced Polymer Composite Surface Treatment	SF	600	$80	$48,000.00
6	Removal of Abandoned Utility /Sleeves	LS	1	$1,000	$1,000.00
7	Form Removal/Site Preparation (8%)	LS	1	$12,056	$12,056.00
8	Mobilization/Bonding/Traffic Control (10%)	LS	1	$16,276	$15,000.00
			Subtotal (Construction)	*$177,756*	
9	Administration (5%)	LS	1	$8,888	$8,887.80
10	Engineering (10%)	LS	1	$17,776	$17,775.60
11	Inspection (9%)	LS	1	$15,998	$15,998.04
			Subtotal (Engineering And Construction Administration)		***$42,661***
			Subtotal Cost		*$220,417*
			Contingency	*30%*	*$44,083*
			TOTAL PROJECT	**$264,501**	

Table 11.2
Alternative 1 Cost Estimate

Item No.	Item Description	Project Total			
		Unit of Measure	*Estimated Quantities*	*Unit Price*	*Item Total*
1	3.5' U/S Channel Wall Improvements	FT	30	$210	$6,300
2	Beach Street Pier Extension	EA	1	$25,000	$25,000
3	Remove and Replace U/S Transition Structure	EA	1	$75,000	$75,000
4	Dewatering	EA	1	$10,000	$10,000
5	Mobilization/Bonding/Traffic Control	LS	1	$20,000	$20,000
6	Existing Channel Improvements	LS	1	$264,501	$264,501
			Subtotal (Construction)	*$400,801*	
12	Administration (5%)	LS	1	$20,040	$20,040.05
13	Engineering (10%)	LS	1	$60,120	$60,120.14
14	Inspection (9%)	LS	1	$36,072	$36,072.08
			Subtotal (Engineering And Construction Administration)		***$116,232***
			Subtotal Cost		*$517,033*
			Contingency	*30%*	*$103,407*
			TOTAL PROJECT	**$620,440**	

Table 11.3
Alternative 2a Cost Estimate

Item No.	Item Description	Project Total			
		Unit of Measure	*Estimated Quantities*	*Unit Price*	*Item Total*
1	Install 11'x6' RCB Below (Not including Beach Street)	CY	898	$1,200	$1,077,600
2	Beach Street DBLI Box RCP	CY	130	$1,200	$156,000
3	Install RCB Outlet Structure	EA	1	$15,000	$15,000
4	Install Outlet Cutoff Wall	EA	1	$30,000	$30,000
5	Foundation Pile Support System	EA	50	$7,500	$375,000
6	Catch Basins	EA	1	$5,000	$5,000
7	Junction Structures	EA	4	$7,000	$28,000
8	Flap Gates (laterals)	EA	1	$5,000	$5,000
9	SD Lateral Modifications	EA	4	$20,000	$80,000
10	Prepare Storm Water Pollution Prevention Plan	LS	1	$7,000	$7,000
11	Street Improvements	SF	18,000	$5	$90,000
12	3.5' U/S Channel Wall Improvements	FT	30	$210	$6,300
13	Beach Street Pier Extension	EA	1	$10,000	$10,000
14	Remove & Replace U/S Transition Structure	EA	1	$60,000	$60,000
15	Dewatering	EA	1	$50,000	$50,000
16	Mobilization/Bonding/Traffic Control	LS	1	$70,000	$70,000
17	Existing Channel Improvements	LS	1	$264,501	$264,501
			Subtotal (Construction)		*$2,329,401*
18	Administration (5%)	LS	1	$116,470	$116,470
19	Engineering (15%)	LS	1	$349,410	$349,410
20	Inspection (9%)	LS	1	$209,646	$209,646
21	Relocate Utilities (20%)	LS	1	$465,880	$465,880
			Subtotal (Engineering And Construction Administration)		***$1,141,406***
			Subtotal Cost		*$3,470,807*
			Contingency	*30%*	*$867,702*
			TOTAL PROJECT	**$4,338,509**	

Table 11.4
Alternative 2b Cost Estimate

Item No.	Item Description	Project Total			
		Unit of Measure	*Estimated Quantities*	*Unit Price*	*Item Total*
1	Install 11'x6' RCB Below (Not including Beach Street)	CY	992	$1,200	$1,190,400
2	Beach Street Dbl Box RCP	CY	130	$1,200	$156,000
3	Install RCB Outlet Structure	EA	1	$15,000	$15,000
4	Install Outlet Cutoff Wall	EA	1	$25,000	$25,000
5	Foundation Pile Support System	EA	50	$7,500	$375,000
6	Catch Basins	EA	1	$5,000	$5,000
7	Junction Structures	EA	4	$7,000	$28,000
8	Flap Gates (laterals)	EA	1	$5,000	$5,000
9	SD Lateral Modifications	EA	4	$20,000	$80,000
10	Prepare Storm Water Pollution Prevention Plan	LS	1	$7,000	$7,000
11	Street Improvements	SF	18,000	$5	$90,000
12	3.5' U/S Channel Wall Improvements	FT	30	$210	$6,300
13	Beach Street Pier Extension	EA	1	$10,000	$10,000
14	Remove & Replace U/S Transition Structure	EA	1	$60,000	$50,000
15	Dewatering	EA	1	$50,000	$50,000
16	Mobilization/Bonding/Traffic Control	LS	1	$80,000	$80,000
			Subtotal (Construction)		*$2,172,700*
17	Administration (5%)	LS	1	$108,635	$108,635
18	Engineering (15%)	LS	1	$325,905	$325,905
19	Inspection (9%)	LS	1	$195,543	$195,543
20	Relocate Utilities (20%)	LS	1	$434,540	$434,540
			Subtotal (Engineering And Construction Administration)		***$1,064,623***
			Subtotal Cost		*$3,237,323*
			Contingency	*30%*	*$809,331*
			TOTAL PROJECT	**$4,046,654**	

Table 11.5
Alternative 3 Cost Estimate

Item No.	Item Description	Project Total			
		Unit Of Measure	*Estimated Quantities*	*Unit Price*	*Item Total*
1	Install 8'x6' RCB Below (Not including Beach Street)	CY	1452	$1,200	$1,742,400
2	Beach Street Dbl Box RCP	CY	120	$1,200	$144,000
3	RC Transition Structure (Beach St.)	EA	1	$60,000	$60,000
4	Install RCB Outlet Structure	EA	2	$18,000	$36,000
5	Foundation Pile Support System	EA	100	$7,500	$750,000
6	Install Outlet Cutoff Wall	EA	2	$25,000	$50,000
7	Catch Basins	EA	1	$5,000	$5,000
8	Junction Structures	EA	4	$7,000	$28,000
9	Flap Gates (laterals)	EA	1	$5,000	$5,000
10	SD Lateral Modifications	EA	4	$20,000	$80,000
11	Prepare Storm Water Pollution Prevention Plan	LS	1	$10,000	$10,000
12	Street Improvements	SF	35,000	$5	$175,000
13	3.5' U/S Channel Wall Improvements	FT	30	$210	$6,300
14	Beach Street Pier Extension	EA	1	$10,000	$10,000
15	Dewatering	EA	1	$40,000	$40,000
16	Mobilization/Bonding/Traffic Control	LS	1	$100,000	$100,000
			Subtotal (Construction)		*$3,241,700*
17	Administration (5%)	LS	1	$162,085	$162,085
18	Engineering (15%)	LS	1	$486,255	$486,255
19	Inspection (9%)	LS	1	$291,753	$291,753
20	Relocate Utilities (20%)	LS	1	$648,340	$648,340
			Subtotal (Engineering And Construction Administration)		***$1,588,433***
			Subtotal Cost		*$4,830,133*
			Contingency	*30%*	*$1,207,533*
			TOTAL PROJECT	**$6,037,666**	

12 CONCLUSIONS AND RECOMMENDATIONS

Several alternatives were evaluated with respect to the project hydraulic goals. Beyond the hydraulic performance, the proposed alternative will need to be economically, socio-economically, and environmentally feasible. To better understand this, a decision matrix was created to identify and quantify impacts for several design and construction related issues.

12.1 Decision Matrix Evaluation

Dudek prepared a decision matrix to identify the potential impacts of each proposed alternatives. The matrix was divided into four alternatives; 1) Alternative 1, 2) Alternative 2a; 3) Alternative 2b, and 4) Alternative 3

Decision factors were separated by Project Objectives, Environmental Constraints, Project Feasibility, and Design Performance. Each of the factors is divided further into sub-factors. A weighting has been allocated to each sub-factor and given a score of 0-10, depending on the alternative's impact. Weights for each category were derived from discussions with the City, previous project concerns, and site constraints. Refer to Exhibit 1 for a detailed evaluation and discussion of each item.

Project Objectives

Project objectives consists of Flood Damage Reduction, Flood Protection, and the ability to match the capacity of the upstream reach (2,200 cfs). Flood Damage Reduction identifies the proposed alternative's ability to take structures out of the design flow flood plain. Flood Protection describes the ability of an alternative to protect against larger storm events (i.e., 100-year flood).

Environmental Constraints

Each alternative was evaluated with respect to the anticipated level of effort for CEQA documentation and environmental permitting requirements. Varying levels of environmental compliance range from 0-10 based on the expected level of effort to acquire environmental approval.

Project Feasibility

Project feasibility encompasses the constructability, costs, socio-economic impacts, and level of maintenance anticipated for each alternative.

Design Performance

The Design Performance category includes the alternative's potential to function properly during multiple storm events and its impact to recreational areas, such as Main Beach. The

Risk of Failure includes the alternative's susceptibility to blockages of major debris. Surface Flooding includes a hazard potential to safety and traffic interruptions.

Exhibit 12 shows the detailed Alternative Decision Matrix. Based on the Alternative Decision Matrix evaluation, the flowing the recommended alternative is 2b.

Table 12.1
Summary of Alternative Decision Matrix

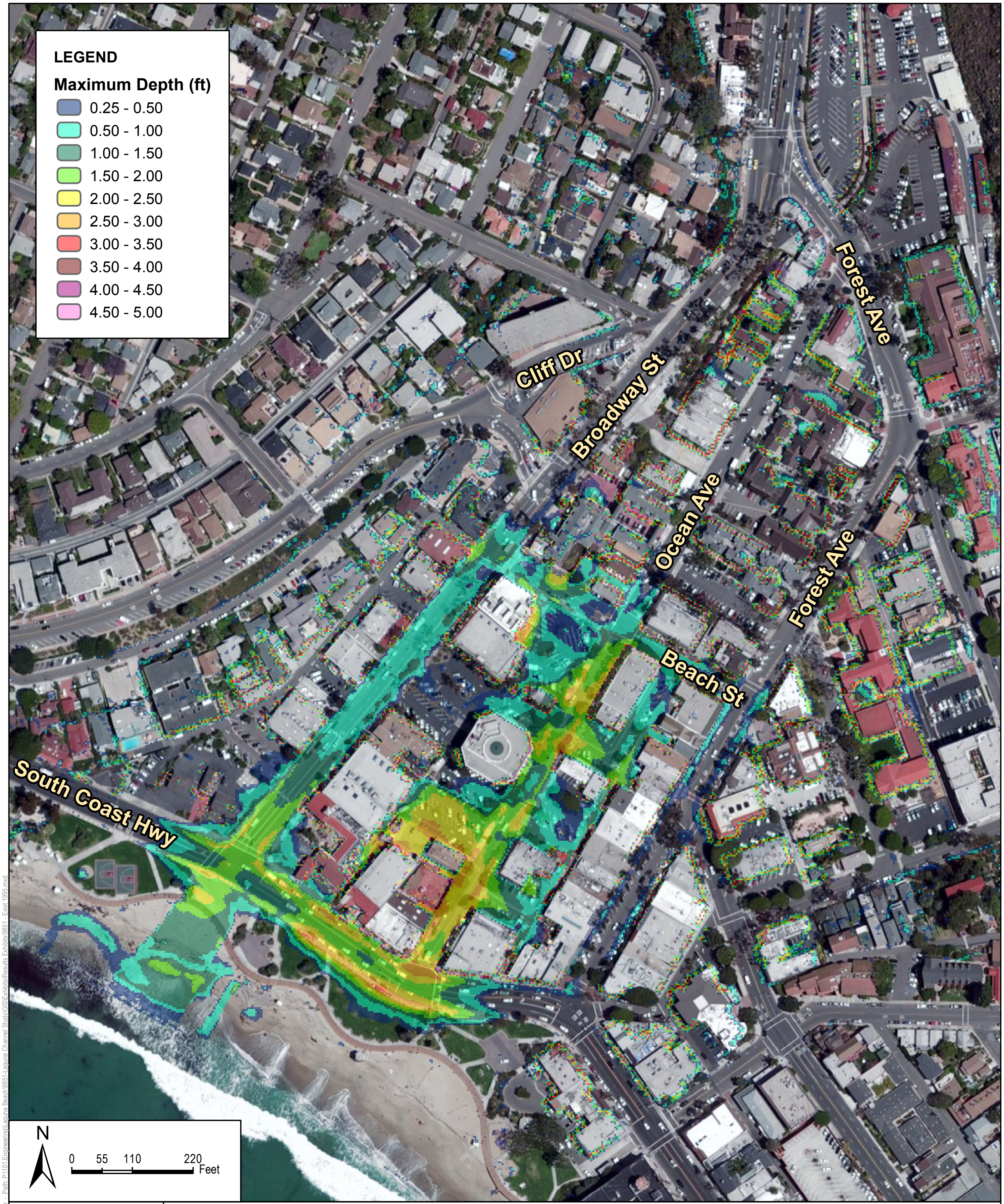
Alternative	Total Score
Alternative 1	513
Alternative 2a	665
Alternative 2b	738
Alternative 3	614

12.2 Recommended Alternative Preliminary Design Plans (Plan/Profile/Typical Sections)

Alternative 2b consists of a single RCB down Ocean Avenue that would produce less impact than the Alternative 3 double box alignment. Alternative 1 is the least expensive but does not provide adequate flood protection. Compared to the previous study alternative prepared in 2002, which proposed a 14'w x 9'h RCB down Broadway Street, this recommended alternative conduit would require 35-percent less reinforced concrete to construct. The previous project recommended alternative was also voted down by the City Council. As a result, a larger single box RCB down Broadway Street was ruled out in this study early in the decision process. Even with a split structure (Alternative 3), where a smaller structure is proposed down Broadway Street, its acceptance by the Council was suspect after previous rulings.

Preliminary design plans were completed for the recomended alternative alignment. Using recently flown topographic data in conjunction with Coastal Lidar data, base maps were prepared. The plans include a preliminary Plan, Profile, and Typical Sections for the alternative. Plans can be seen in Appendix A. Horizontal alignments of researched utilities were place on the plans. Vertical data for these utilities will need to be identified during the Final Design process.

Exhibits



DUDEK

Laguna Canyon Channel Study

January 10, 1995 Existing Maximum Flood Depths

City of Laguna Beach

Exhibit 1

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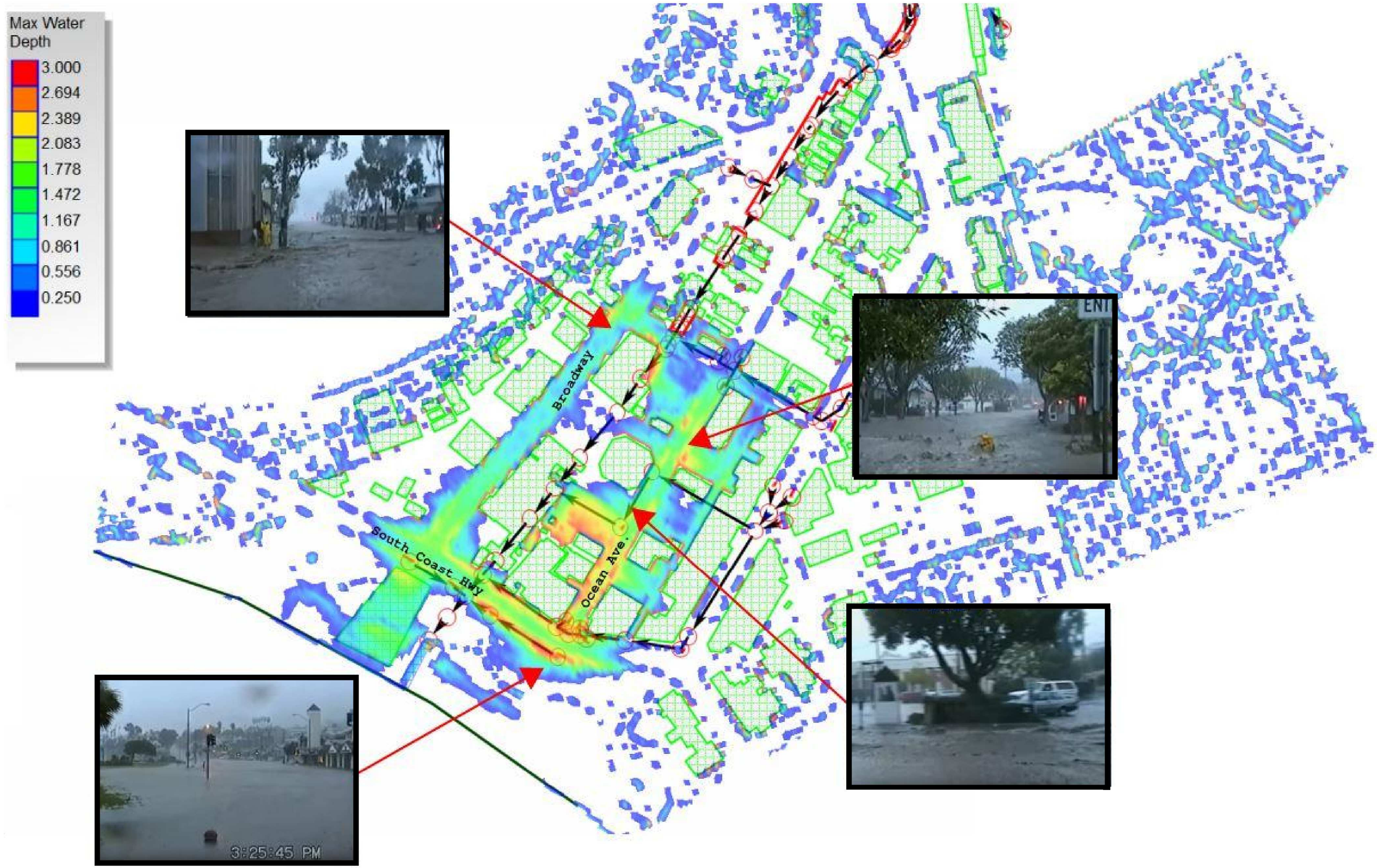

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LAGUNA CANYON CHANNEL STUDY

JANUARY 10, 1995 STORM
EXISTING CONDITIONS
VALIDATION

FOR CITY OF LAGUNA BEACH

EXHIBIT

2

9851

DUDEK

Laguna Canyon Channel Study

January 10, 1995 Alternative 1 Maximum Flood Depths

City of Laguna Beach

Exhibit 3

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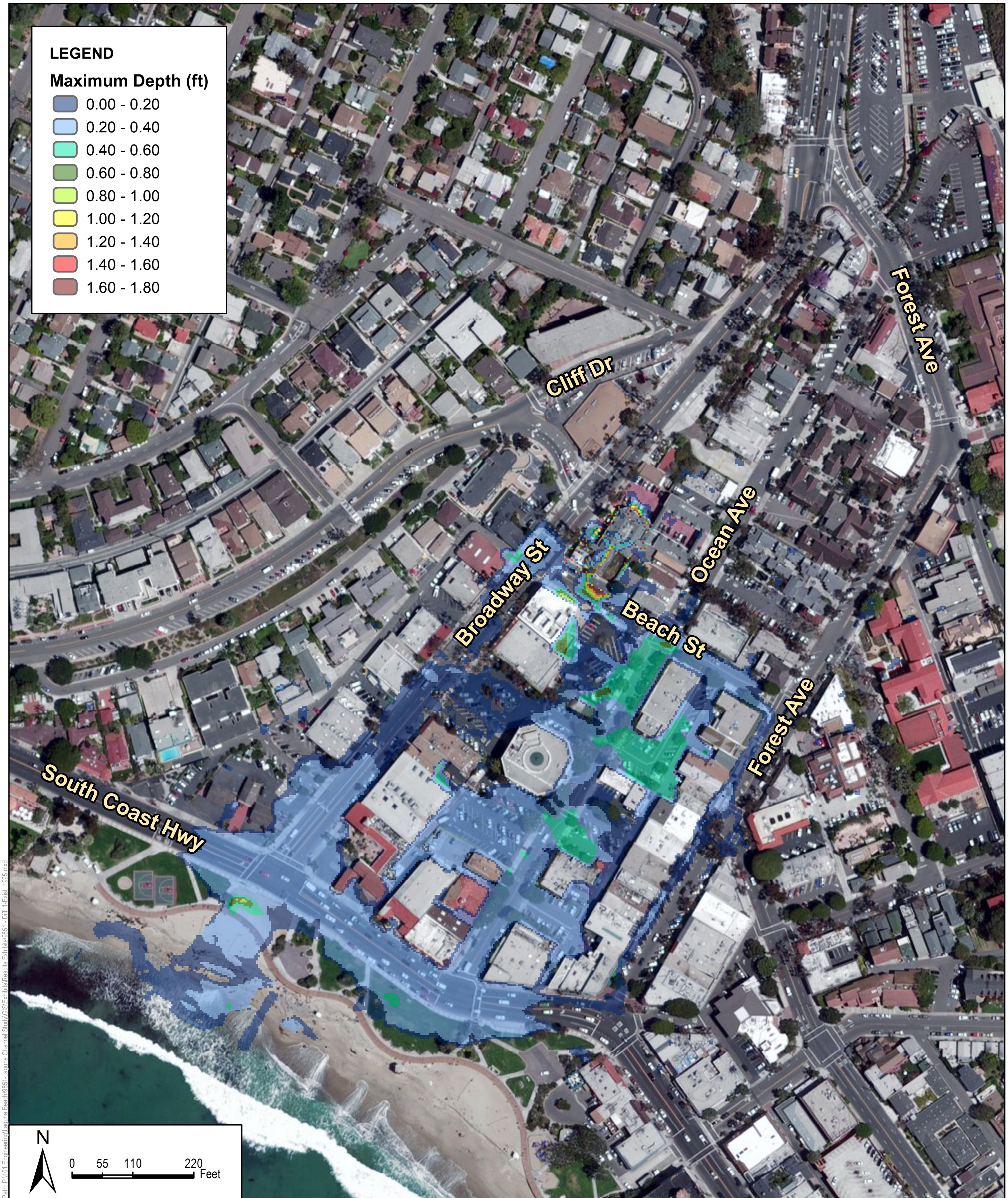


DUDEK

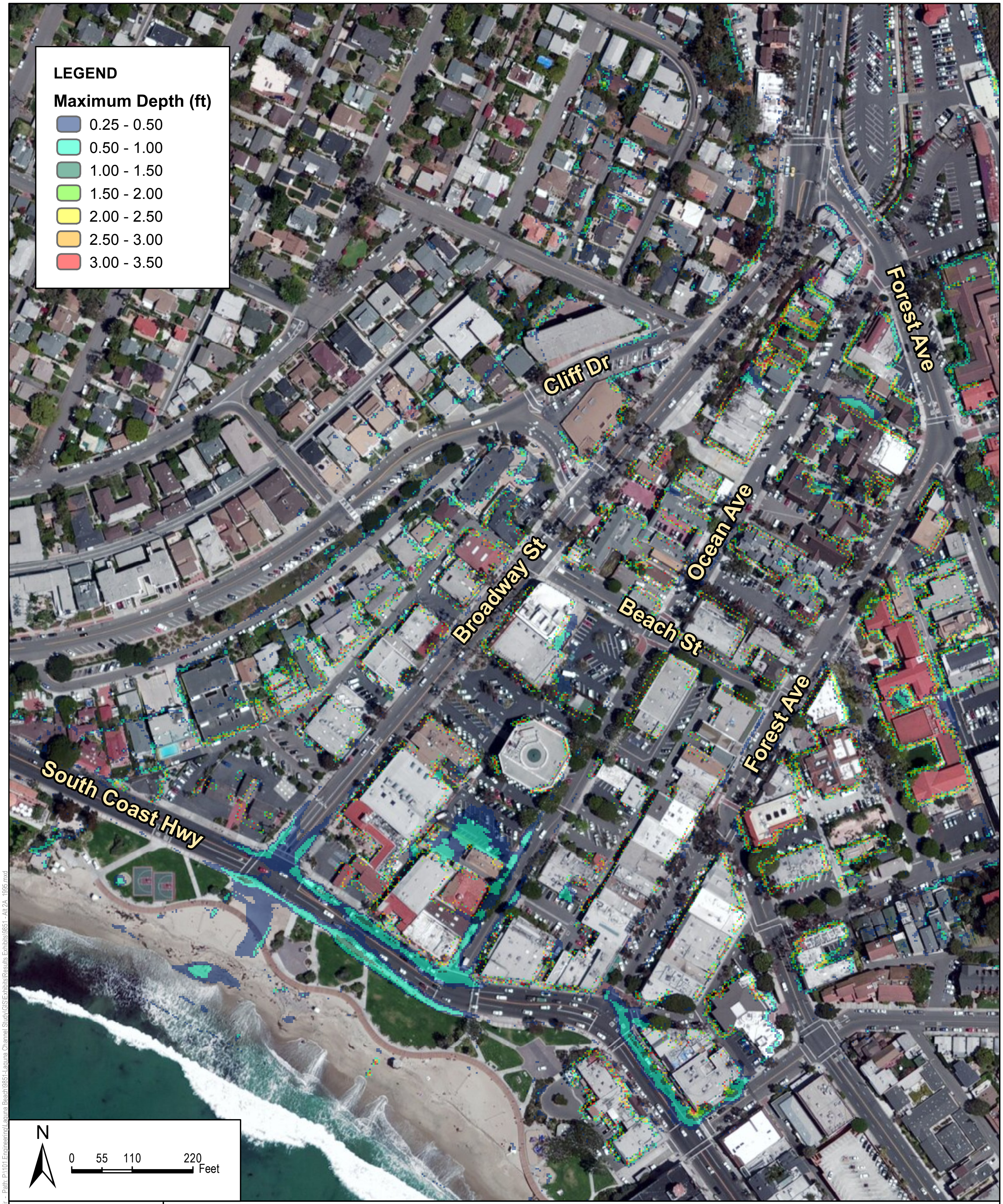
*Note: Colors indicate depth of reduction from existing conditions.

Laguna Canyon Channel Study

January 10, 1995 Difference in Maximum Depths (Existing Condition - Proposed Alternative 1)

City of Laguna Beach

Exhibit 4



DUDEK

Laguna Canyon Channel Study

January 10, 1995 Alternative 2A Maximum Flood Depths

City of Laguna Beach

Exhibit 5

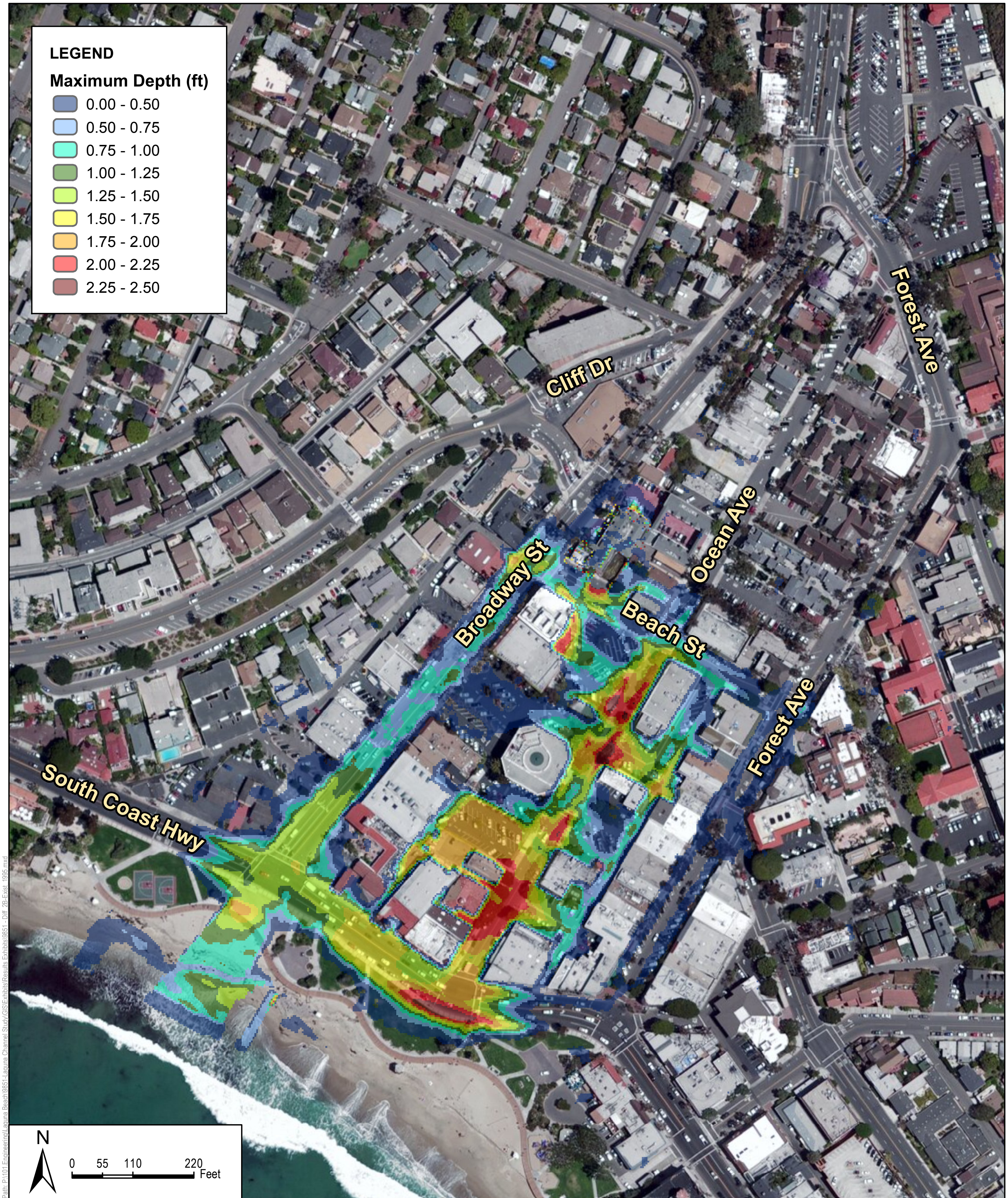
DUDEK

Laguna Canyon Channel Study

January 10, 1995 Alternative 2B Maximum Flood Depths

City of Laguna Beach

Exhibit 6



DUDEK

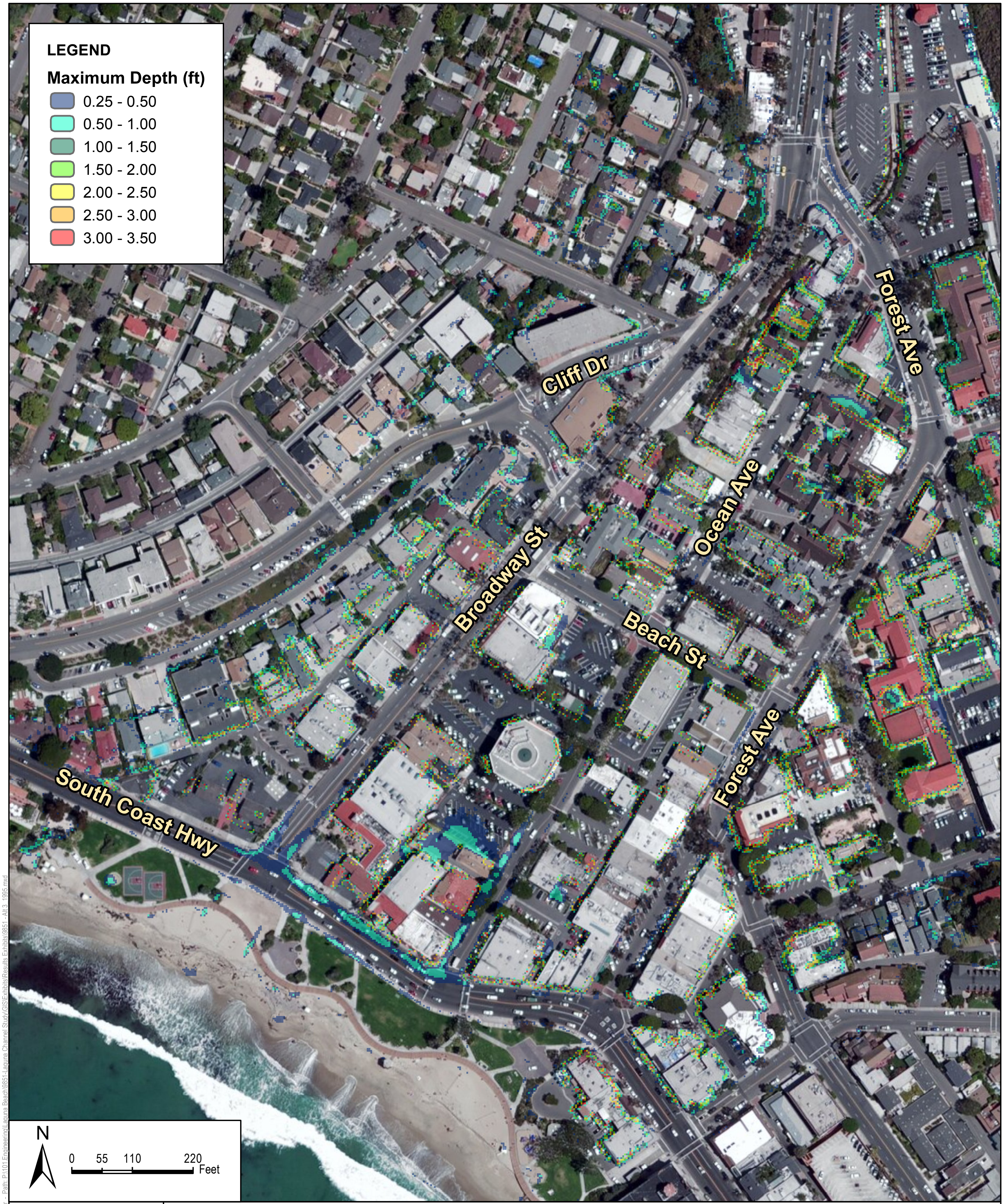
*Note: Colors indicate depth of reduction from existing conditions.

Laguna Canyon Channel Study

January 10, 1995 Difference in Maximum Depths (Existing Condition - Proposed Alternative 2B)

City of Laguna Beach

Exhibit 7



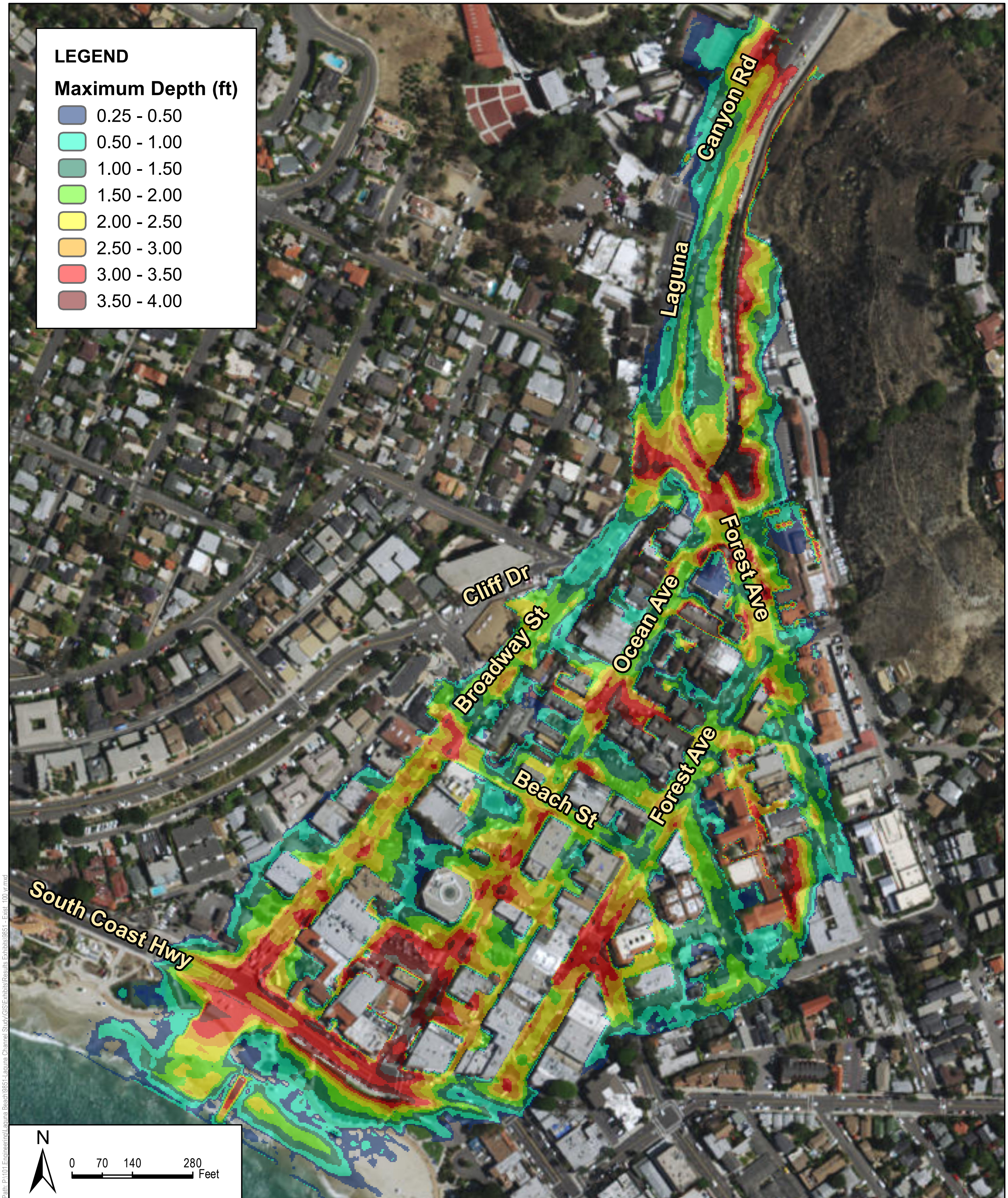
DUDEK

Laguna Canyon Channel Study

January 10, 1995 Alternative 3 Maximum Flood Depths

City of Laguna Beach

Exhibit 8



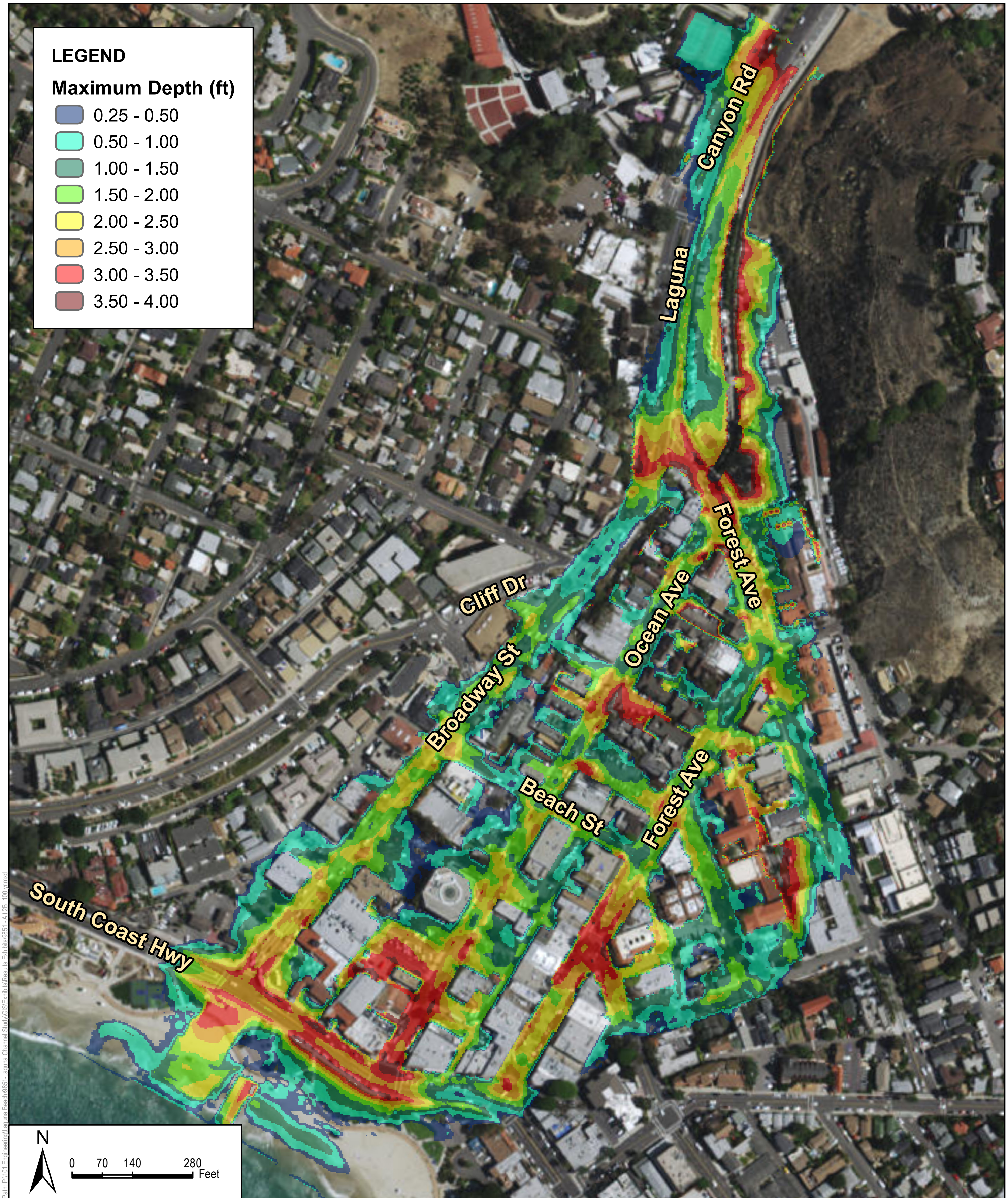
DUDEK

Laguna Canyon Channel Study

100-Year HC Existing Maximum Flood Depths

City of Laguna Beach

Exhibit 9



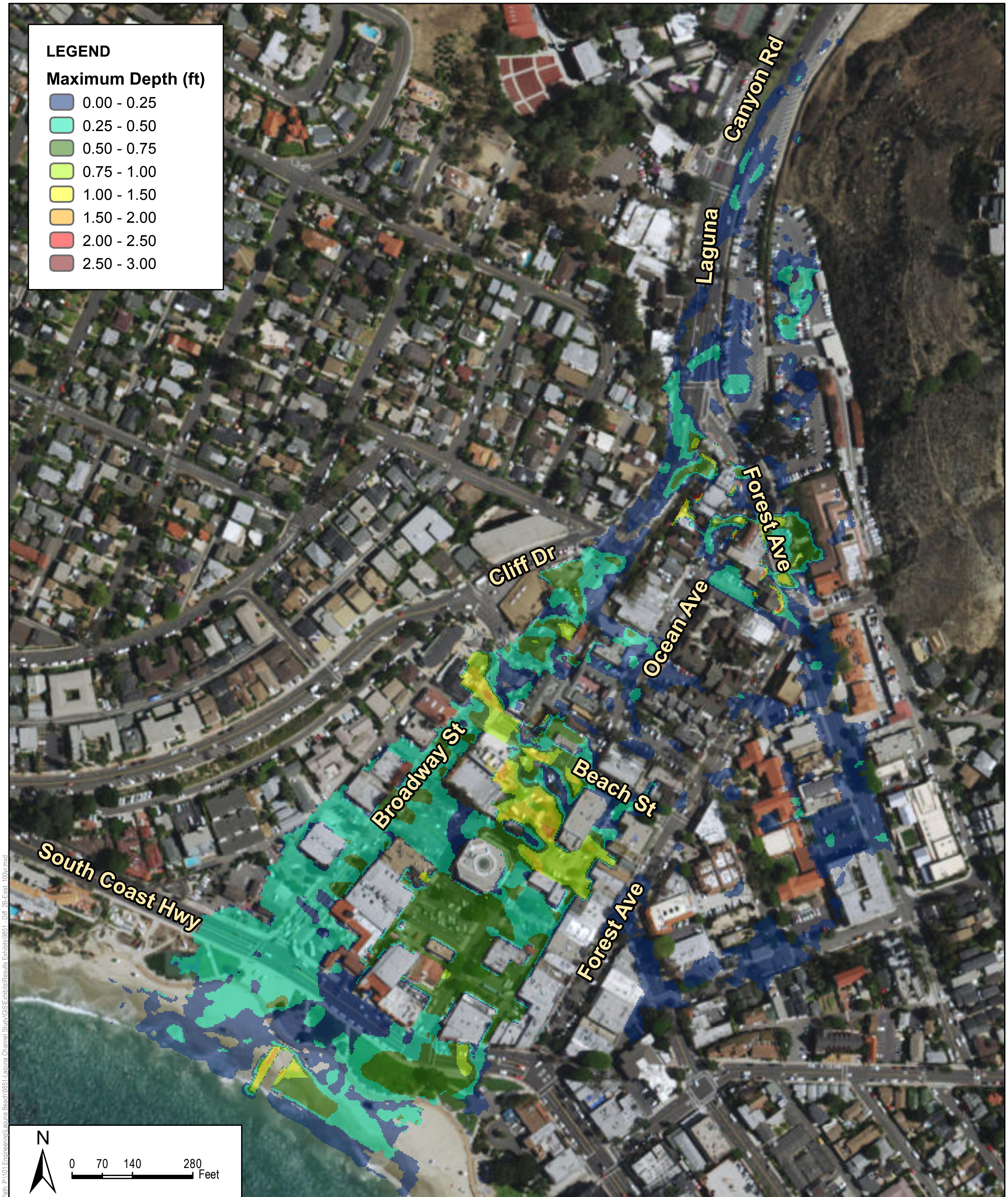
DUDEK

Laguna Canyon Channel Study

100-Year HC Alternate 2B Maximum Flood Depths

City of Laguna Beach

Exhibit 10



DUDEK

*Note: Colors indicate depth of reduction from existing conditions.

Laguna Canyon Channel Study

100-Year HC Difference in Maximum Depths (Existing Condition - Proposed Alternative 2B)

City of Laguna Beach

Exhibit 11

EXHIBIT 12 - ALTERNATIVE DECISION MATRIX

NUMERICAL RANKING OF ALTERNATIVES BY CRITERIA															
	PROJECT OBJECTIVES			ENVIRONMENTAL CONSTRAINTS	FEASIBILITY							DESIGN PERFORMANCE			EVALUATION
Alt. No	Flood Damage Reduction	Flood Protection	Match Capacity of U/S System	Environmental Permitting and CEQA Docs	Construction Duration	Socio-Econ Impacts	Stakeholder Acceptance	Sustainability	Construction Costs	Level of Maintenance Effort	Property Acquisition	Impacts to Main Beach Recreation	Risk of Failure / Reliability	Regional Surface/ Street Flooding	Total Score
Weight	10	10	8	5	7	10	7	7	10	6	7	5	10	10	
1	2	2	2	9	9	9	2	1	10	3	10	10	0	0	513
2A[1]	4	4	10	4	8	6	6	5	6	8	7	3	6	6	665
2B	4	4	10	5	8	6	7	5	8	9	7	10	6	6	738
3	4	4	10	5	4	3	4	5	4	7	8	10	6	6	614

PROJECT OBJECTIVES:

Expected Flood Damage: Each alternative was evaluated in terms of the expected flood damage as compared to the 1995 and 2010 storms. Flood damage is measured in terms of depth of flooding adjacent to or within habitable structures: (residential / commercial / office / professional / industrial / institutional / governmental), outdoor commerce areas, and mixed use structures. Flooding of street right-of-way, travel-way of alleys, surface parking lots, or dedicated parking structures is also evaluated. No Expected Damage – 10 pts (No regional flood conveyance within streets / surfaces, local storm runoff conveyed below top of curb); Minor Damage Expected – (5-9) pts (some regional street/surface flood conveyance up to public right-of-way). Significant Damage Expected – (0-4) pts (surface flooding above the public right-of-way)

Flood Protection: Each alternative was evaluated in terms of the total flood conveyance capacity of the system including subsurface and surface conveyance (floodplain conveyance) in order to provide an increased level of flood protection to adjacent parcels relative to the existing condition. Scoring is as follows; 0-2 pts (less than or equal 5yr storm), 3-7 pts (10 - 25yr storm), 8-9 pts (greater than 25 - 100yr), and 10 pts (100yr or greater).

Match Channel Capacity of Upstream System at Beach: Each alternative was evaluated in terms of the conveyance capacity of subsurface channel system downstream (south) of Beach Street relative to the channel system conveyance capacity upstream (north) of Beach. Scoring is as follows; capacity greater than upstream channel (9-10 pts), capacity equal to upstream channel (5-8 pts), capacity less than upstream channel (0-4 pts)

ENVIRONMENTAL CONSTRAINTS:

Environmental Permitting and CEQA Documentation: Each alternative was evaluated with respect to the anticipated level of effort for CEQA documentation and environmental permitting as follows: 0-3 pts if project will require a complicated, rigorous, and lengthy environmental review process and/or substantial mitigation costs (CEQA, NEPA, Water Quality & Wetland permits, Coastal Dev Permits, etc.), 4-7 pts- The project will require moderate environmental review and permitting and minimal mitigation costs and 8-10 pts if the project is either exempt from additional CEQA documentation and regulatory permits or is covered by an existing CEQA document or set of permits.

FEASIBILITY:

Construction Duration: The anticipated duration of construction for the proposed project improvements was evaluated to assess the duration of impacts that each alternative could have on commerce and quality of life in the area. The scoring for construction duration is as follows, construction duration greater than 1-yr (0-2 pts), construction duration 9 - 11 months (3-6 pts), construction duration 6-8 months (7-9 pts), construction duration less than 6 months(10pts).

Socio-Economic Impacts: Each alternative was evaluated to assess the anticipated Socio-Economic Impacts in terms of the level of disruption to commerce and quality of life within the project area as measured by: decreased commercial visibility (decreased business frontage and signage visibility), decreased business accessibility (decreased pedestrian access, disruption of traffic patterns, construction traffic congestion, roadway closures, decreased parking), and interruption of commerce (utility interruption, street closure). The scoring for the measure of the level of disruption is as follows: complete disruption of commerce and life (street closure, no pedestrian access, extensive signage/frontage visibility blockage, utility interruption) 0 pts, moderate disruption of commerce and life (partial street closure, pedestrian access, limited parking, some frontage/signage visibility blocked) 1-5 pts, minor disruption to commerce and life (minimum access disruption during traditional commerce hours, staged construction activities, access maintained, limited parking disruption, minimal signage/frontage blockage) 6-9 pts, no disruption of commerce and life alternative construction hours, alternative construction techniques, access maintained, parking maintained, traffic flow maintained, visibility maintained) 10 pts.

Stakeholder Acceptance: Each alternative was evaluated to estimate the level of stakeholder acceptance. The project stakeholders are defined in no particular order as: Business Owners, Residents, City of Laguna Beach, County of Orange, State of California (Caltrans, State Parks), Environmental Resource Agencies (CCC, SWRCB, RWQCB, USACOE, CDFW), Environmental Activist Groups, and Utility Agencies. Many of the Stakeholders may have conflicting interests so, level of acceptance or resistance is measured in terms of anticipated likelihood to agree/accept project with or without negotiated terms. The scoring to assess the stakeholder acceptance or resistance of the project is as follows: Majority stakeholder resistance (0-3 pts), moderate stakeholder resistance/acceptance (4-6 pts), wide stakeholder acceptance (7-9 pts), and complete stakeholder acceptance (10 pts).

Sustainability: Each alternative was evaluated to assess the Sustainability of the project components in terms of service life. Scoring of the service life is as follows: project service life is less than 50 yrs (0 pts), project service life is greater than 50 yrs (5 pts), and project service life is greater than 75 yrs (10 pts).

Construction Costs: The anticipated construction costs of each project alternative was evaluated to rank the budgetary impact of each alternative. Scoring of construction costs is as follows: least cost (10 pts), second lowest cost (8 pts), median cost (6 pts), second highest cost (4 pts), highest cost (2 pts).

Level of Maintenance Effort: The anticipated level of maintenance effort was estimated for each project alternative to reflect long term maintenance costs without actually applying a dollar cost to maintenance activities. Category scoring for the level of maintenance was ranked as follows: frequent/intensive maintenance (0-3 pts), moderate maintenance (4-6 pts), infrequent/light maintenance (7-10 pts)

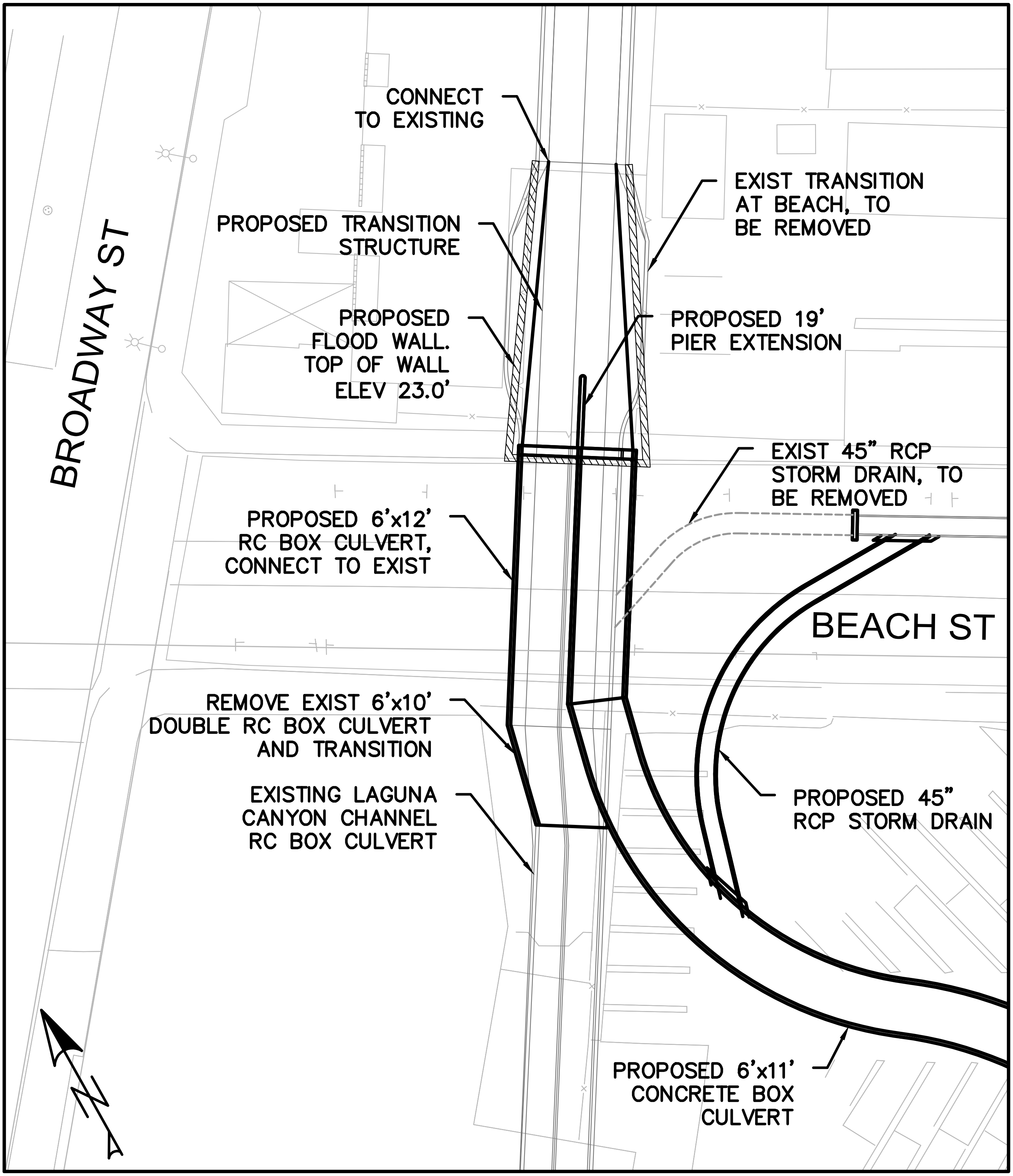
Property Acquisition: Permanent private land acquisition may be required for some of the project alternatives. Land acquisition can make up a significant portion of the overall project cost. Each alternative was scored to assess the impact of land acquisition for the project without evaluating the actual dollar cost of said land. Category scoring for each alternative was ranked as follows: no land acquisition required (10 pts), greater than 0 acres but less than 0.33 acres (7 – 9 pts), greater than 0.33 acres but less than 0.67 acres (3-6 pts), greater than 0.67 acres but less than 1 acre (1-2 pts), greater than 1 acre (0 pts).

Impacts to Main Beach Recreation: Recreational impacts to Laguna Beach Main Beach were evaluated for each project alternative in terms of temporary impacts, permanent impacts, utility impacts, and visual impacts. The scoring of Main Beach recreational impacts is as follows: permanent utility impacts (0-2 pts), permanent visual impacts (3-5 pts), temporary visual impacts (6-8 pts), temporary visual impacts (9-10 pts).

DESIGN PERFORMANCE:

Risk of Failure / Reliability: The potential for flood damage to still occur after the project is implemented was evaluated in terms of perceived likelihood. The scoring of reliability is as follows: extremely unlikely (10 pts), very unlikely (7-9 pts), plausible (4-6 pts), likely (1-3 pts), very likely (0 pts).

Surface/Street Flooding: Surface flooding can be extremely dangerous and damaging and can have a lasting psychological effect on observers and victims. Roadways and streets that become unpassable flooded rivers are not as desirable as roadways and streets that can be utilized by traffic during storms. The level of roadway flooding was scored for each alternative using the following criteria: no flooding - runoff contained below top of curb (10 pts), flooding of roadway below public right-of-way (5-9 pts), flooding of roadway exceeds public right-of-way (0-4 pts).



PLAN

0 30' 60'

SCALE: 1" = 30'

DUDEK

27372 Calle Arroyo
San Juan Capistrano, CA 92675

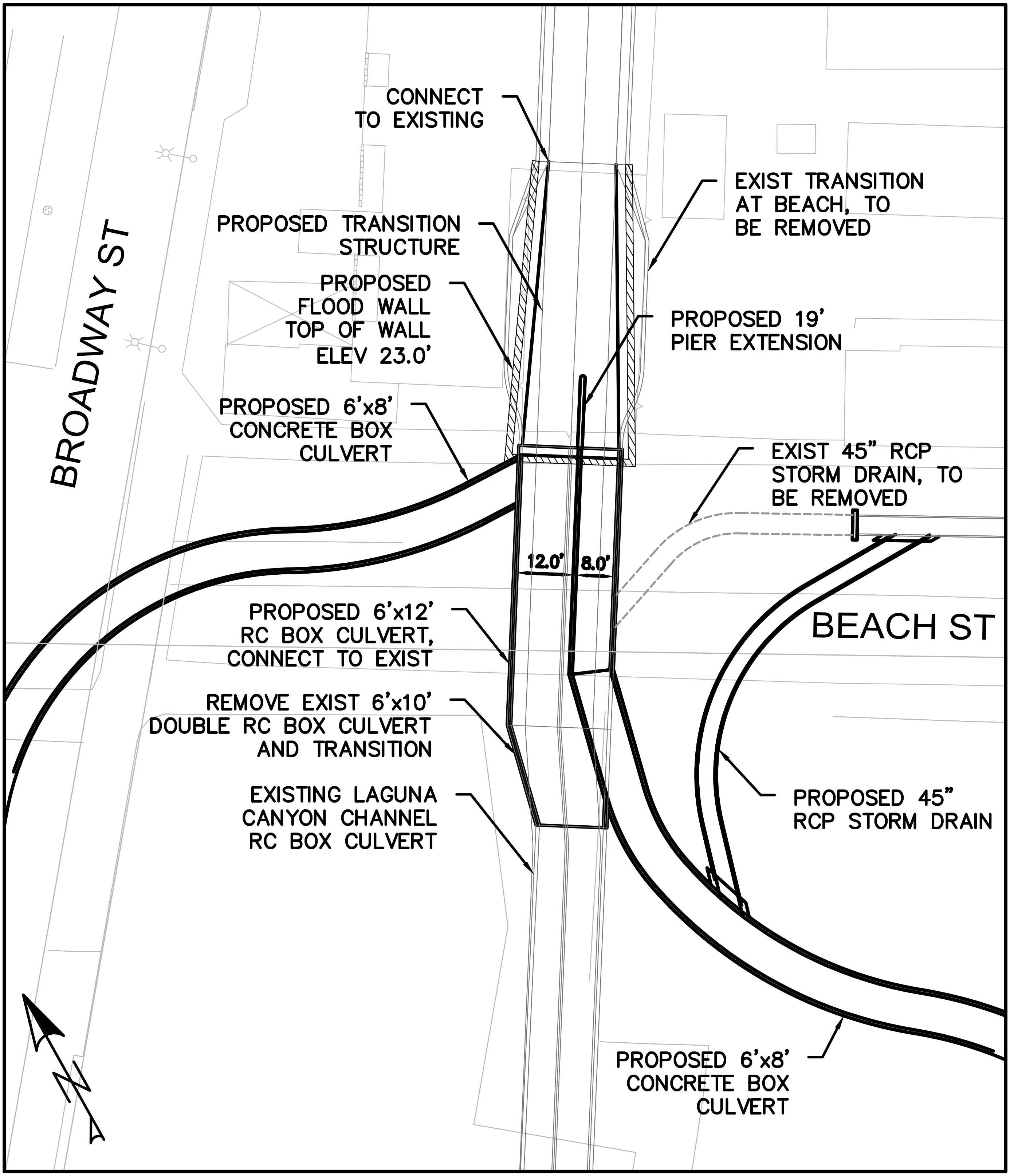
LAGUNA CANYON CHANNEL
ALTERNATIVES
2A & 2B

FOR
CITY OF LAGUNA

EXHIBIT
13a

9851

P:\01Engineering\Laguna Beach\9851-Laguna Channel Study\CAD\Exhibits\9851 Exhibit 9 - Transition at Beach PLOTTED: 1/31/2017 10:53:21 PM



PLAN

0 30' 60'

SCALE: 1" = 30'

DUDEK
27372 Calle Arroyo
San Juan Capistrano, CA 92675

LAGUNA CANYON CHANNEL

ALTERNATIVE 3

FOR CITY OF LAGUNA

EXHIBIT 13b

9851

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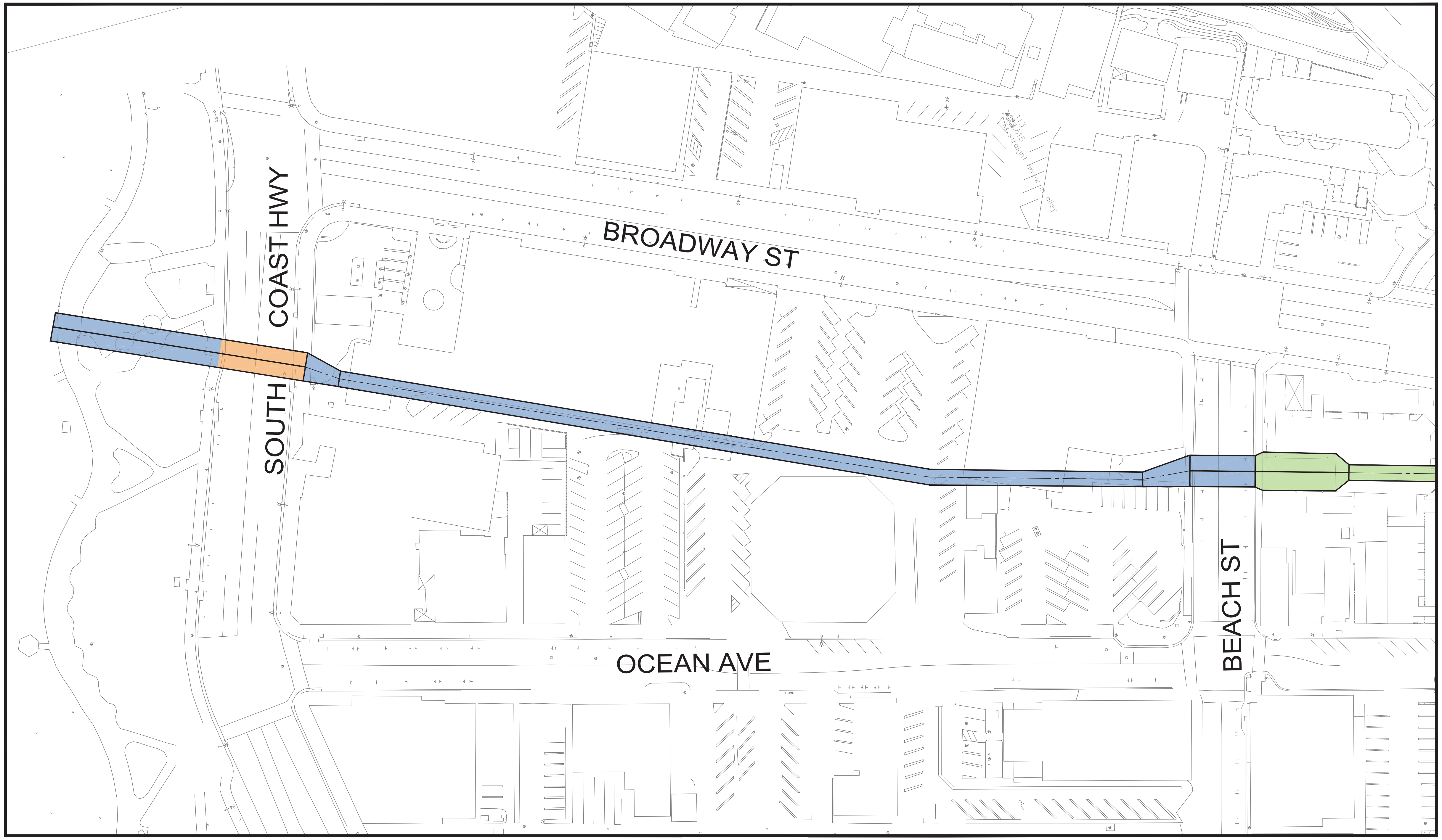


LEGEND

- CITY OF LAGUNA BEACH
- CALTRANS
- OCFCD

GRAPHIC SCALE
0 40' 80'
SCALE: 1" = 40'

DUDEK
31878 CAMINO CAPISTRANO #200
SAN JUAN CAPISTRANO, CA 92675
949.450.2525

LAGUNA CANYON CHANNEL STUDY

FACILITY OWNERSHIP MAP

EXHIBIT 14

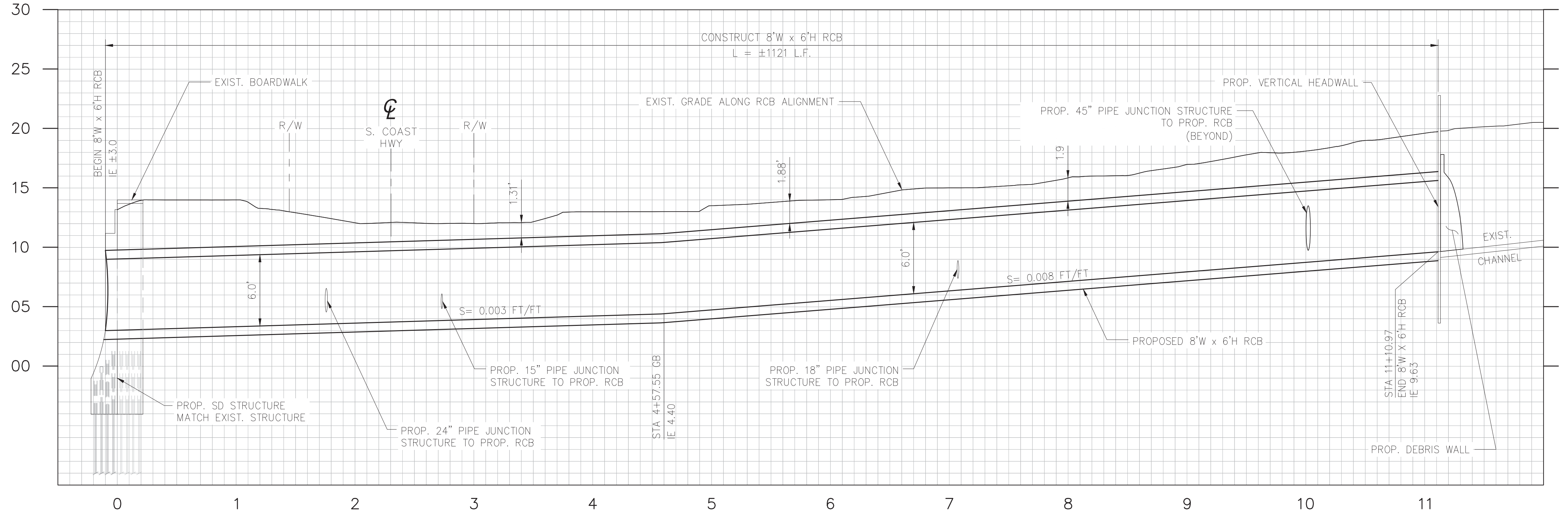
FOR CITY OF LAGUNA BEACH

9851

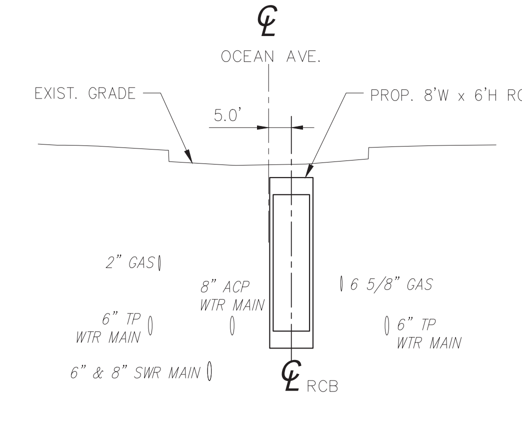
P:\101.Engineering\Laguna Beach\9851-Laguna Channel Study\CAD\Exhibits\9851 Exhibit 8 – Ownership Map PLOTTED: 12/14/2016 9:53:36 AM

APPENDIX A

Preliminary Design Plans (Alternative2B)

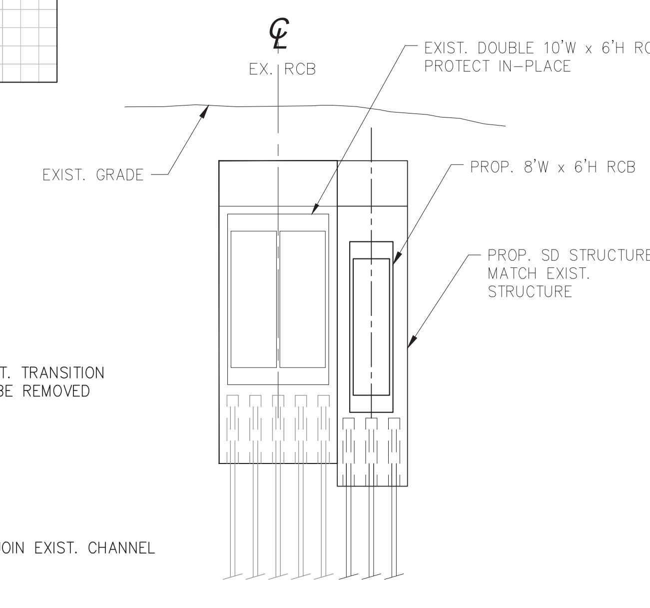


PROFILE
SCALE: 1"=50' HORIZ
1"= 5' VERT

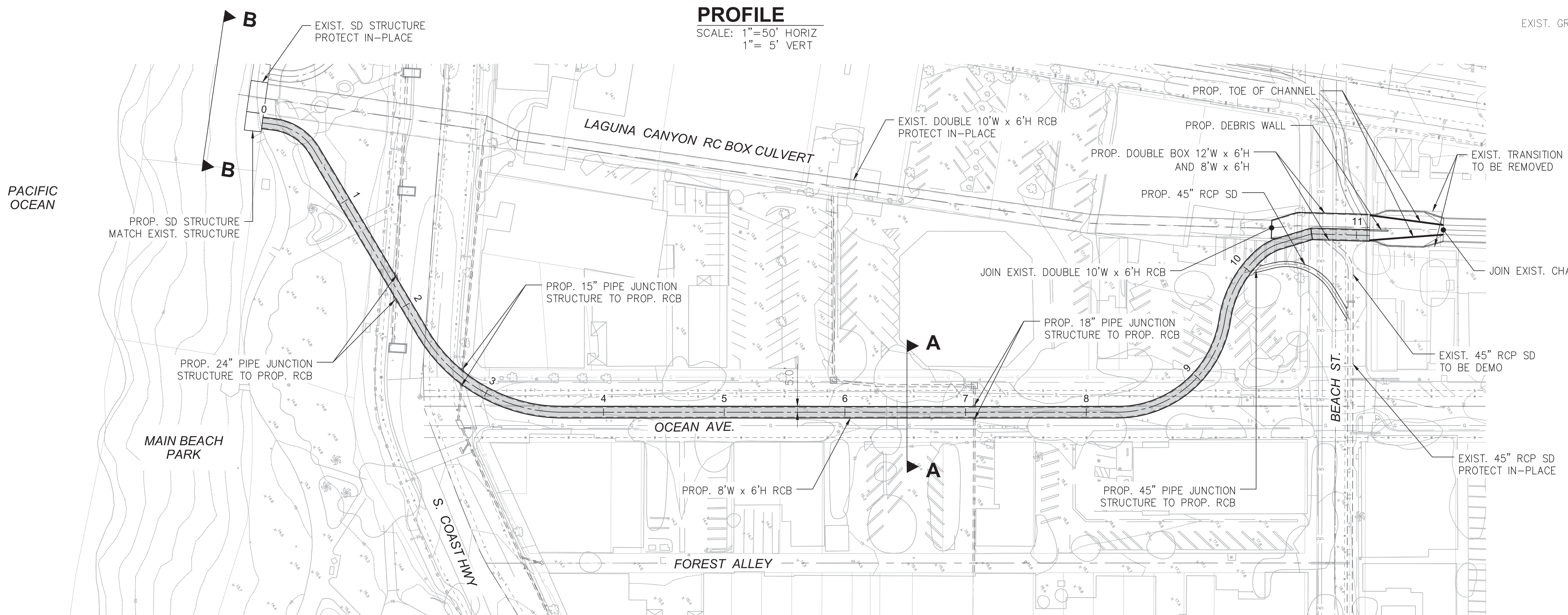


SECTION A-A
NOT TO SCALE

NOTE: LOCATION OF UTILITIES SHOWN ON SECTION A-A TO BE FIELD VERIFIED.



SECTION VIEW B-B
NOT TO SCALE



PLAN
SCALE: 1"=50'

GRAPHIC SCALE
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SCALE: 1" = 50'

P:\101.Engineering\Laguna Beach\9851-Laguna Channel Study\CAD\Conceptual Plans\9851 FIGs_Alts1&2B_RCBs

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DUDEK
Dudek & Associates, Inc.
605 Third Street Encinitas, CA 92024
760.942.5147 Fax 760.632.0164

ENGINEER OF WORK

ENGINEER: THOMAS J. RYAN
RCE: #### EXP. DATE: ####
XX-XX-XX
DATE

DESIGN : TF
DRAWN : LT
CHECKED : TJR

CITY OF LAGUNA BEACH CALIFORNIA

LAGUNA CANYON CHANNEL FACILITY EVALUATION PROJECT

ALT 2B - OCEAN AVENUE ALIGNMENT

FIGURE
1

DATE 1/20/17
CAD FILE 9851 FIGs_Alts1&2B_RCBs

APPENDIX B

Environmental Constraints Analysis

DUDEK

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T 949.450.2525 F 949.450.2626

MEMORANDUM

To:	Lisa M. Penna, PE, Consulting Project Manager
From:	Collin Ramsey, Project Manager, Dudek
Subject:	Environmental Constraints Analysis for Laguna Canyon Channel Storm Drain Improvement Project (Beach Street to Ocean Outlet)
Date:	December 16, 2016
cc:	Tom J. Ryan, Senior Project Manger
Attachment(s):	Exhibit 1: Alternative Storm Drain Alignments

The following environmental constraints analysis has been prepared to provide information concerning the potential environmental constraints associated with construction and operation of the Laguna Canyon Channel Storm Drain Improvement Project (proposed project) located generally between Beach Street and the existing Main Beach ocean outlet in the City of Laguna Beach, California (City).

As conceptually designed at this time, up to two parallel storm drain alignments are being considered for the proposed project (see attached Exhibit: Alternative Storm Drain Alignments). Although the conceptual design is still subject to change and will be refined throughout the currently ongoing design process, the following provides a basic summary of these alignments1:

- Broadway Street Alignment: This alignment traverses Broadway Street from Beach Street to North Coast Highway in a southwesterly direction. At North Coast Highway, this alignment would either (1) make a 45-degree turn to the south and intersect with the existing Laguna Canyon Channel storm drain outlet structure located at Main Beach[2]; or (2) continue to a new outlet structure to be constructed northwest of the existing Laguna Canyon Channel storm drain outlet structure. This alignment is shown in green on the attached Exhibit 1.
- Ocean Avenue Alignment: This alignment traverses Ocean Avenue from Beach Street to North Coast Highway in a southwesterly direction. At North Coast Highway, this alignment

[1] It should be noted that one or more of these alignments may ultimately be required, depending on the results of ongoing hydrological modeling and design efforts.

[2] It is also important to note that the existing outfall structure located at Main Beach is proposed to be rehabilitated in the near future as part of this proposed project.

would either (1) make a 45-degree turn to the west and intersect with the existing Laguna Canyon Channel storm drain outlet structure located at Main Beach; or (2) continue to a new outlet structure to be constructed northwest of the existing Laguna Canyon Channel storm drain outlet structure. This alignment is shown in blue on the attached Exhibit 1.

The following constraints analysis provides information for the environmental issue areas most likely to be directly and/or indirectly impacted by construction and/or operation of the proposed project: land use/local coastal program consistency, aesthetics, biological resources, cultural resources, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, public services, transportation and traffic, and energy. The purpose of this environmental constraints analysis is to proactively inform the City of Laguna Beach of important environmental considerations that may affect future engineering, design, environmental, permitting, and construction efforts, and should assist the City in selecting the preferred alignment alternative(s).

For the purposes of the following constraints analysis, it is conservatively assumed that both the Broadway Street and Ocean Avenue Alignments will be required, and that both storm drain alignments would necessitate new ocean outlets at Main Beach. From a purely environmental perspective, the construction and operation of both of these alternatives would likely represent a conservative scenario.

POTENTIIAL ENVIRONMENTAL CONSTRAINTS

Land Use/Local Coastal Program Consistency

Like all coastal communities in California, the City of Laguna Beach must observe the provisions of the California Coastal Act of 1976. The Coastal Act requires that land use decisions within a local jurisdiction's coastal zone be regulated by a Local Coastal Program (LCP)[3]. Because the LCP covers so much of the City, the Laguna Beach General Plan Land Use Map is virtually identical geographically to the Coastal Plan Map.

Given the interrelationship between the City's General Plan and LCP, the LCP has been physically integrated into both the General Plan's Land Use and Open Space/Conservation Elements. These General Plan Elements contain policies and development standards related to the LCP and are intended to implement the provisions of the Coastal Act[4].

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3 http://lagunabeachcity.net/civicax/filebank/blobdload.aspx?BlobID=14750
4 http://lagunabeachcity.net/civicax/filebank/blobdload.aspx?BlobID=8066

Local Coastal Programs (LCPs) are basic planning tools used by local governments to guide development in the coastal zone, in partnership with the California Coastal Commission (CCC). LCPs contain the ground rules for future development and protection of coastal resources within a particular local jurisdiction, typically a city or county. The LCPs specify appropriate location, type, and scale of new or changed uses of land and water. Each LCP includes a land use plan and measures to implement the plan (such as zoning ordinances). Prepared by local government, these programs govern decisions that determine the short- and long-term conservation and use of coastal resources.

Project Area Jurisdiction

It is recommended that coordination with the CCC Long Beach office occur to verify the proposed project's jurisdictional boundaries. As lands below the mean high tide line (MHTL) are considered to be state tidelands within CCC original permit jurisdiction, all or portions of the new ocean outlets may be within CCC's direct permitting jurisdiction. In many cases, the CCC will assert jurisdiction over all present day "wet sand" areas of a beach. If the new ocean outlets are located within CCC's jurisdiction, but the remainder of the project components are located outside of the CCC's jurisdiction, a consolidated coastal development permit (CDP) may be appropriate. The City of Laguna Beach can refer to the "Post LCP Certification Permit and Appeal Jurisdiction, City of Laguna Beach Map" approved by the CCC to determine jurisdiction; however, it is recommended that the City also receive formal verification of the official jurisdictional boundaries with CCC staff and/or the CCC's mapping division.

CDP Exemption Determination

The CCC will generally not consider the redevelopment (over 50% reconstruction) of a structure located on a beach or within 20 feet of coastal waters to be exempt from CDP processing requirements. The Laguna Beach Municipal Code Section 25.076.008 (Exemptions) mirrors Section 13252 of the CCC regulations and states that development involving the placement (temporary or permanent) of any materials on a beach, the presence of any mechanized equipment on any sand area or within 20 feet of coastal waters, or the replacement of 20% or more of the materials of an existing structure with materials of a different kind is not considered exempt from CDP requirements. If the proposed project involves any of these characteristics, the CCC may not determine that the new ocean outfalls would be exempt from CDP processing requirements. It is recommend the City coordinate with CCC staff to determine whether or not the new ocean outlets, and all other applicable project components, are exempt from CDP requirements.

Application of the CCC's Repair, Maintenance and Utility Hook-Up Exclusions

Coastal Act Section 30610(d) generally exempts from Coastal Act permitting requirements the repair and maintenance of structures that do not result in an addition to, or enlargement or expansion of the structure being repaired or maintained. However, the CCC does not generally apply these exclusions to projects that involve the replacement of 50% or more of an existing structure or that involve development/construction activities on a beach or adjacent to coastal waters. The repair and maintenance exclusions document states that it is only applicable to exclusions established in subsections (c) and (e) of Coastal Act Section 30610. Subsection section 30610(c) only exempts projects from permit requirements if they are repair and maintenance activities that do not result in an addition to, or enlargement or expansion of, an existing structure that do not involve a risk of substantial adverse environmental impact and are not considered to be extraordinary methods of repair and maintenance. Subsection 30610(d) of the Coastal Act also provides that:

> Notwithstanding any other provision of this division, no Coastal Permit shall be required pursuant to this chapter for the following types of development and in the following areas. . .
>
> (d) Repair or maintenance activities that do not result in an addition to, or enlargement or expansion of, the object of those repair or maintenance activities; provided, however, that if the commission determines that certain extraordinary methods of repair and maintenance involve a risk of substantial adverse environmental impact, it shall, by regulation, require that a permit be obtained pursuant to this chapter.

Section 13252 of the CCC regulations clarifies what extraordinary methods of repair and maintenance are and provides, in relevant part:

> (a) For purposes of Public Resources Code section 30610(d), the following extraordinary methods of repair and maintenance shall require a Coastal Permit because they involve a risk of substantial adverse environmental impact:
>
> > (1) Any method of repair or maintenance of a seawall revetment, bluff retaining wall, breakwater, groin, culvert, outfall, or similar shoreline work that involves:
> >
> > > (A) Repair or maintenance involving substantial alteration of the foundation of the protective work including pilings and other surface or subsurface structures;

> > (B) The placement, whether temporary or permanent, of rip-rap, artificial berms of sand or other beach materials, or any other forms of solid materials, on a beach or in coastal waters, streams, wetlands, estuaries and lakes or on a shoreline protective work except for agricultural dikes within enclosed bays or estuaries;
> >
> > . . .
> >
> > (D) The presence, whether temporary or permanent, of mechanized construction equipment or construction materials on any sand area, bluff, or environmentally sensitive habitat area, or within 20 feet of coastal waters or streams.
>
> (3) Any repair or maintenance to facilities or structures or work located in an environmentally sensitive habitat area, any sand area, within 50 feet of the edge of a coastal bluff or environmentally sensitive habitat area, or within 20 feet of coastal waters or streams that include:
>
> > (A) The placement or removal, whether temporary or permanent, of rip-rap, rocks, sand or other beach materials or any other forms of solid materials;
> >
> > (B) The presence, whether temporary or permanent, of mechanized equipment or construction materials.
>
> All repair and maintenance activities governed by the above provisions shall be subject to the permit regulations promulgated pursuant to the Coastal Act, including but not limited to the regulations governing administrative and emergency permits. The provisions of this section shall not be applicable to methods of repair and maintenance undertaken by the ports listed in Public Resources Code Section 30700 unless so provided elsewhere in these regulations. The provisions of this section shall not be applicable to those activities specifically described in the document entitled Repair, Maintenance and Utility Hookups, adopted by the Commission on September 5, 1978 unless a proposed activity will have a risk of substantial adverse impact on public access, environmentally sensitive habitat area, wetlands, or public views to the ocean.

(b) Unless destroyed by natural disaster, the replacement of 50 percent or more of a single family residence, seawall, revetment, bluff retaining wall, breakwater, groin or any other structure is not repair and maintenance under section 30610(d) but instead constitutes a replacement structure requiring a coastal development permit.

Based on Dudek's previous experience with the precedent for CCC's interpretation of the repair and maintenance provisions (and other applicable Public Resource Codes and relevant state policies), there is a possibility that CCC staff may not agree that the new ocean outlets are a repair and maintenance activity that can be considered excluded from permit requirements. We recommend early coordination with CCC staff to not only receive formal determination of the jurisdictional boundaries of the project area, but also to receive their feedback for the method of CDP processing they think would be most appropriate for the proposed project. Given that a portion of the proposed project may be either within the CCC's appealable CDP jurisdiction or within CCC's area of original jurisdiction, figuring out these unknowns early during the planning process will help streamline the project timeline and avoid permitting complications.

Aesthetics

The majority of the proposed project would be located underground and outside of public and private viewsheds. In addition, the new ocean outlets would be located underneath the existing meandering pedestrian boardwalk that traverses Main Beach. Only a portion of the new ocean outlets would be visible from viewers on Main Beach, and likely only if those receptors are sitting or standing with their back to the ocean and facing downtown Laguna Beach.

Notwithstanding, the upcoming CEQA document should include a visual impact analysis, possibly supported by color visual simulations, that focuses on potential impacts to views from public vantage points, including Main Beach. Impact significance should be determined as a function of the visual sensitivity of the location, as well as the degree of visual change created by the proposed project from public spaces.

Further, temporary construction activities would involve the use of construction equipment and building materials that would be stored when not being used. As such, to minimize the visual impacts that could result from stockpiling construction equipment and materials in a haphazard manner, feasible measures should be implemented to ensure that a designated construction staging area is provided in the project area to house equipment and materials in a centralized location. To the extent feasible, the staging area should be screened or otherwise outside of the public viewshed, as well as the private viewshed from nearby residential and retail/restaurant land uses.

Biological Resources

General Biological Resources Assessment

Due to the highly developed nature of the project area along Broadway Street and Ocean Avenue, construction activities along these portions of the alignments are highly unlikely to impact a natural or sensitive habitat. Nonetheless, a general biological resources assessment should be conducted of the entire project area to determine the suitability of the surrounding area to potentially support listed wildlife and plant species, and to evaluate the potential of the proposed project to directly or indirectly impact biological resources in the project area.

Migratory Bird Treaty Act of 1918

Despite the continuous daytime commercial activities that occur in downtown Laguna Beach, street trees located along Broadway Street, Ocean Avenue, and in the immediate vicinity of the proposed project could potentially provide suitable nesting habitat for bird and raptor species protected under the Migratory Bird Treaty Act of 1918. As such, construction activities in the vicinity should occur outside of the nesting season (generally February 15th through August 31). In the event that construction activities must occur during the nesting season, a pre-construction survey should be conducted prior to the start of any construction activities to determine whether the adjacent street trees contain any active nests. If so, then appropriate measures should be implemented to physically avoid the active nests and to minimize potential indirect impacts to nests.

Jurisdictional Waters

Because the proposed project would either directly or indirectly connect to both upstream and downstream waters that may potentially fall under the jurisdiction of the CCC, U.S. Army Corps of Engineers (ACOE), Regional Water Quality Control Board (RWQCB), California Department of Fish and Wildlife (CDFW), an analysis of all aquatic resources within the project site is recommended. The project site should be delineated using the protocols stipulated under Section 404 of the Clean Water Act and Sections 1600-1607 of the California Fish and Game Code, and guidance provided in regional supplements and court findings. Jurisdictional areas should also be delineated following the Cowardin Wetland Classification System and Coastal Act definitions as utilized by the CCC.

During this investigation, data should be collected to support preparation of a preliminary jurisdictional determination (PJD) application process with the ACOE due to the proximity of the project area to the Pacific Ocean and assumed federal jurisdiction. The PJD issued by the ACOE is a non-binding, written indication that there may be waters of the United States, including wetlands, on a parcel or indications of the approximate location(s) of waters of the United States or wetlands on a parcel. These PJDs are advisory and may not be appealed, but allow applicants to move ahead expeditiously to obtain ACOE permit authorization.

Given the location of the proposed project and Dudek's experience with regulatory permitting throughout Orange County, we highly recommend early consultation with the ACOE, RWQCB, CDFW, and CCC. Following the initial consultation, the City should compile the appropriate data and complete permit applications/notifications for the ACOE, RWQCB, CDFW, and the CCC. Due to the limited potential jurisdictional resources and minimal disturbance footprint at the project site, the proposed project would most likely qualify for one of the Clean Water Act Section 404 Nationwide Permits with the ACOE, a Clean Water Act Section 401 Water Quality Certification with the RWQCB, and a California Fish and Game Code Section 1602 Streambed Alteration Agreement with the CDFW.

The USACE, RWQCB, CDFW, and CCC require conceptual mitigation and monitoring plans that support the permit applications. Typically, the resource agencies will require mitigation that is within the same watershed as the impact area and the same type of habitat as those impacted (also referred to as "like mitigation"). A conceptual mitigation design should be prepared and should incorporate information required to demonstrate project viability and a high degree of certainty that mitigation goals will be achieved at the end of a maintenance and monitoring period.

Essential Fish Habitat Assessment

In compliance with the Magnuson–Stevens Fishery Conservation and Management Act (MFCMA) and in accordance with National Marine Fisheries Service (NMFS) regulations, an Essential Fish Habitat (EFH) assessment should be prepared to evaluate potential impacts/disturbance associated with proposed construction activities on fish, fish habitat, and on other marine resources within and adjacent to the project area. Essential Fish Habitat is regulated under the MFCMA, protecting waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (Magnuson-Stevens Act, 16 U.S.C. 1801 et seq.), which also includes eelgrass beds. Substrates include sediment, hard bottom, structures underlying waters, and associated biological communities.

Cultural Resources

Native American and Archaeological Resources

Assuming that a (Mitigated) Negative Declaration or an Environmental Impact Report is required to comply with CEQA, the proposed project will be subject to compliance with Assembly Bill (AB) 52, which requires lead agencies to provide tribes (who have previously requested notification) with early notification of the proposed project and, if requested, consultation to inform the CEQA process with respect to tribal cultural resources. AB 52 is a government-to-government process between the CEQA lead agency and California Native American Tribes.

To support this consultation process, a California Historical Resources Information Systems records search of the project area and, at a minimum, a 0.5-mile radius at the South Central Coastal Information Center, which houses cultural resource records for Orange County, should be conducted. The purpose of the records search will be to identify any previously recorded cultural resources that may be located within or near to the project area.

The California Native American Heritage Commission (NAHC) should also be contacted for a review of their Sacred Lands File. The NAHC will determine if any NAHC-listed Native American sacred lands are located within or adjacent to the project area. In addition, the NAHC will provide a list of Native American contacts for the project who should be contacted for additional information.

Following archival research, the project area should be surveyed to determine whether any archaeological resources are present and to confirm existing conditions. Based on the results of this the results of the records search, Native American coordination, cultural resources survey, and background research, appropriate measures to minimize impacts to archaeological resources should be recommended, if necessary.

Paleontological Resources

Due to its coastal location, the City of Laguna Beach has a higher than normal sensitivity for paleontological resources, specifically marine fossil deposits. As such, a paleontological records search at the Los Angeles County Museum of Natural History should be conducted for the project area. Following this records search, the project area should be surveyed to determine whether any paleontological resources are present and to confirm existing conditions. Based on the results of this records search and the cultural resources survey, appropriate measures to minimize impacts to paleontological resources should be recommended, if needed.

Geology and Soils

Like all other projects in the seismically-active Southern California region, the project area is subject to strong seismically-induced ground shaking during an earthquake. This ground shaking can result in damage to the proposed project, as well as loss and injury in the broader project area. Additionally, a review of the California Division of Mines and Geology's April 1998 Seismic Hazards Zones Map[5] found that the entire project area is susceptible to seismically-induced liquefaction, and adjacent areas to the north and northeast are subject to seismically-induced landslide impacts.

As such, a site-specific geotechnical/soils study should be prepared to determine the particular characteristic and limitations of the soils that underlay the project area and would be trusted to support the proposed project. This study should make specific design and engineering recommendations based on the unique characteristics of the soils to inform the engineering and design process and ultimately help to ensure structural integrity in the event of an earthquake.

Hazards and Hazardous Materials

Hazardous Materials Sites

The GeoTracker online database is the State Water Resources Control Board's (SWRCB) data management system for sites that impact, or have the potential to impact, water quality in the state, with emphasis on groundwater. GeoTracker contains records for sites that require cleanup, such as Leaking Underground Storage Tank (LUST) Sites, Department of Defense Sites, and Cleanup Program Sites. GeoTracker also contains records for permitted facilities such as Irrigated Lands, Oil and Gas production, operating Permitted USTs, and Land Disposal Sites[6].

Geotracker was used to search the project area to determine whether any possible recognized environmental concerns (e.g., LUST Site or other potentially hazardous materials site) occur in the project area. Should any such potentially hazardous site be identified in the project area, adequate measures should be implemented during construction activities to ensure the safety of construction workers and nearby businesses, visitors and residents. The following is a sampling[7] of nearby sites that have "open" cleanup cases and may require further investigation in a Phase I Environmental Site Assessment, as well as soil sampling and/or similar evaluation:

- Mobil Gas Station #18-HJ6 (104 North Coast Highway): This site is listed on the LUST Cleanup Site database. Geotracker identifies the cleanup status of this site as "Open - Verification Monitoring". The SWRCB identified the potential contaminant of concern

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5 http://gmw.consrv.ca.gov/shmp/download/quad/LAGUNA_BEACH/maps/ozn_lagb.pdf
6 https://geotracker.waterboards.ca.gov/
7 This list is not necessarily comprehensive. Additionally, inclusion on this list does not necessarily denote a recognized environmental concern. A more exhaustive regulatory database records search should be conducted as part of continued environmental due diligence leading up to the start of construction activities.

for this site as gasoline. As a LUST Cleanup Site, the primary concern for the proposed project in relation to this site would be groundwater contamination and an associated groundwater plume that may have migrated below the location of the storm drain alignments. Ongoing remediation activities have been conducted in response to LUST Cleanup Site determination. The latest Groundwater Monitoring Report[8] (dated October 28, 2016) for this site evaluated remedial options found that groundwater contaminants appear to be consistent with historical results and trends and that groundwater sampling and monitoring should continue as scheduled into the future.

A subsurface groundwater plume associated with this gas station use was previously identified in the immediate area of the intersection of North Coast Highway and Broadway Street. Despite ongoing remediation activities that are actively overseen by the SWRCB, and despite continued compliance with federal, state, and local provisions related to cleanup efforts, construction of the proposed project may still result in environmental and health impacts if not properly addressed. As such, mitigation measures should be recommended that specifically layout action that would occur in the event that subsurface earthwork activities encounter evidence of soil and/or groundwater contamination (staining, odors). The intent of such mitigation should be to equally protect the health of the environment, residents, construction workers, and visitors in the area.

In addition, several other sites in the project area are also identified on the Geotracker database. However, the balance of these sites have a “closed” cleanup status.

Tsunami Inundation

According to the California Geological Survey’s Tsunami Inundation Map for Emergency Planning for the Laguna Beach Quadrangle[9], the southern half of the project area, including the new ocean outlets, are located within a designated “Tsunami Inundation Area”. As such, design of the proposed project should take into consideration the risk of tsunami, and feasible measures should be implemented to minimize the risk of damage in the event of a tsunami.

Hydrology and Water Quality

The CCC routinely requires a sea level rise analysis to be submitted for CDP applications that involve any projects adjacent to or on the beach. As such, it is recommend that Sea Level Rise

8 https://geotracker.waterboards.ca.gov/esi/uploads/geo_report/7566923677/T0605902540.PDF
9 http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/Orange/Documents/Tsunami_Inundation_LagunaBeach_Quad_Orange.pdf

analysis be conducted to accompany the formal CDP submittal that meets the recently adopted CCC Sea Level Rise Policy Guidance document.

Noise and Vibration

Due to the underground nature of the proposed project, it is expected that operation of the proposed project would not generate noise levels that exceed the existing ambient noise setting. However, project construction would involve the operation of construction equipment and concrete cutting, trenching, and other earthwork activities that would likely result in temporary and intermittent increases in the project area's existing noise and groundborne vibration levels. As such, the City of Laguna Beach should ensure that the CEQA document thoroughly evaluates construction noise and vibration and its potential effects on nearby commercial and residential land uses, focusing especially on noise-sensitive land uses (residences, school, hospitals, churches, etc.). Relevant state and local noise and vibration standards set forth in the City of Laguna Beach's Noise Ordinance[10] (Chapter 7.25 (Noise) of the City's Municipal Code) and Caltrans' September 2013 Transportation and Construction Vibration Guidance Manual[11] should be complied with during the construction phase.

Public Services

It is anticipated that construction activities will result in temporary lane closures along Broadway Street, Ocean Avenue, and North Coast Highway. Lane closures can contribute to traffic congestion in downtown Laguna Beach, and may potential impact the ability of first responders to navigating the downtown area in a timely and efficient manner. In particular, firefighters, paramedics, and police officers stationed at either Laguna Beach Fire Station #1 ("Downtown Fire Station") or the Laguna Beach Police Department headquarters could be impacted if project construction creates additional traffic congestion that "spills over" onto Forest Avenue, 3rd Street, and other nearby streets.

As such, a construction management plan should be prepared to recommend feasible measures designed to reduce the impact of temporary construction traffic and any necessary lane/street closures. Such measures may include, but are not limited to, providing early notification of closures to the Laguna Beach Fire and Police Departments, as well as residents and nearby businesses; the use of signage before and during construction activities that clearly delineates detour routes around the lane/street closures; and providing flagmen to direct traffic in the vicinity of the closures.

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[10] http://qcode.us/codes/lagunabeach/
[11] http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf

Transportation and Traffic

As discussed above, it is expected that construction activities will result in temporary lane closures in the immediate project area. Lane closures can contribute to traffic congestion in downtown Laguna Beach, which could result in short-term inconveniences and annoyances for visitors and residents.

Thus, a construction management plan should be prepared to recommend feasible measures designed to reduce the impact of temporary construction traffic and any necessary lane/street closures.

Energy

Based on recent CEQA court decisions and case law, the City should ensure that the upcoming CEQA document provide the appropriate level of energy demand analysis. Consistent with Appendix F of the CEQA Guidelines, the energy impact analysis should evaluate the proposed project's energy demands, including electricity, natural gas, and petroleum/fuel requirements during both construction and operational activities. This analysis should also focus on the wasteful or inefficient use of energy (or lack thereof), as well as any energy-efficient components to be implement by the proposed project.

LIMITATIONS AND CONCLUSION

The preceding environmental constraints analysis is based on a conceptual and rudimentary design of the proposed project. Any substantial revisions to the alignment alternatives shown on the Attached Exhibit 1 could alter the finding of this analysis.

In regard to design, it can be reasonably concluded that the alignment alternatives that involve tying into the existing storm drain (or into the existing storm drain's headwall) would likely be an prove an simpler path with the CCC (and likely other oversight/regulatory agencies) and result in a more streamlined permitting, regulatory, and approval process. Conversely, the design alternatives that require construction of new ocean outlets may face a higher level of scrutiny, as these facilities would represent brand new improvements on Main Beach at locations where such facilities do not currently exist.

Previous CEQA documents have been prepared for similar/related projects in the downtown area. In 1997, a Final Environmental Impact Report (EIR) (SCH #96011072) was prepared and certified by the City for the Laguna Canyon Channel Improvements project. This previous EIR evaluated three alignment alternatives, all beginning at Beach Street. Subsequent to certification, an Addendum to this EIR was prepared in 1999 as a result of a revision to the preferred alignment. Although the Final EIR and Addendum were certified by the City, this prior project was never initiated.

In addition, the City prepared and adopted a Mitigated Negative Declaration (MND) in 2011 for the Laguna Canyon Channel Rehabilitation project. This project involves the demolition and replacement of a portion of Reach 1 of the Laguna Canyon Channel, from the Main Beach outlet to approximately 40 feet upstream. While originally envisioned to be a standalone project, this project is now planned to be implemented alongside the proposed project. It does not appar as if a Notice of Determination was filed with the State Clearinghouse for this project[12].

Based on a understanding of these prior CEQA documents and projects, as well as based on a understanding of a preliminary understanding of the proposed project, the existing project area, and the potential environmental impacts that could result from implementation of the proposed project, it is assumed that preparation a Mitigated Negative Declaration (MND) will be required to evaluate and disclose possible environmental effects.

Depending on whether or not the City Council ever adopted the 2011 MND, preparation of a Subsequent MND that tiers off the 2011 MND for the Laguna Canyon Channel Rehabilitation project may be an option for the City to consider, although nearly six years have passed since preparation of this particular MND. As such, this document may not provide the most accurate baseline conditions nor the most defensible foundation for a tiered CEQA document. Thus, the more conservative approach involves starting with a clean slate and preparing a new standalone MND that evaluates both the proposed project and the previously proposed and studies Laguna Canyon Channel Rehabilitation project as a single action. The approach would enable the City to evaluate potential environmental impacts as a whole and avoid confusion amongst the public while also avoiding any claims of piecemealing analysis of the various project components.

Notwithstanding, it is always recommended that the City prepare a CEQA Initial Study and all supporting technical studies prior to determining the most appropriate CEQA document and approach moving forward. Technical studies needed may include, but not necessarily limited to the following: construction air quality and greenhouse gas emissions assessment; biological resources assessment; cultural resources evaluation; hazardous materials assessment, hydrology study, and construction noise impact assessment. Additionally, early coordination with all relevant resource agencies, including the CCC, ACOE, CDFW and RWQCB, as well as with the City's land use counsel and environmental consultant, should occur to outline the forthcoming CEQA and permitting process.

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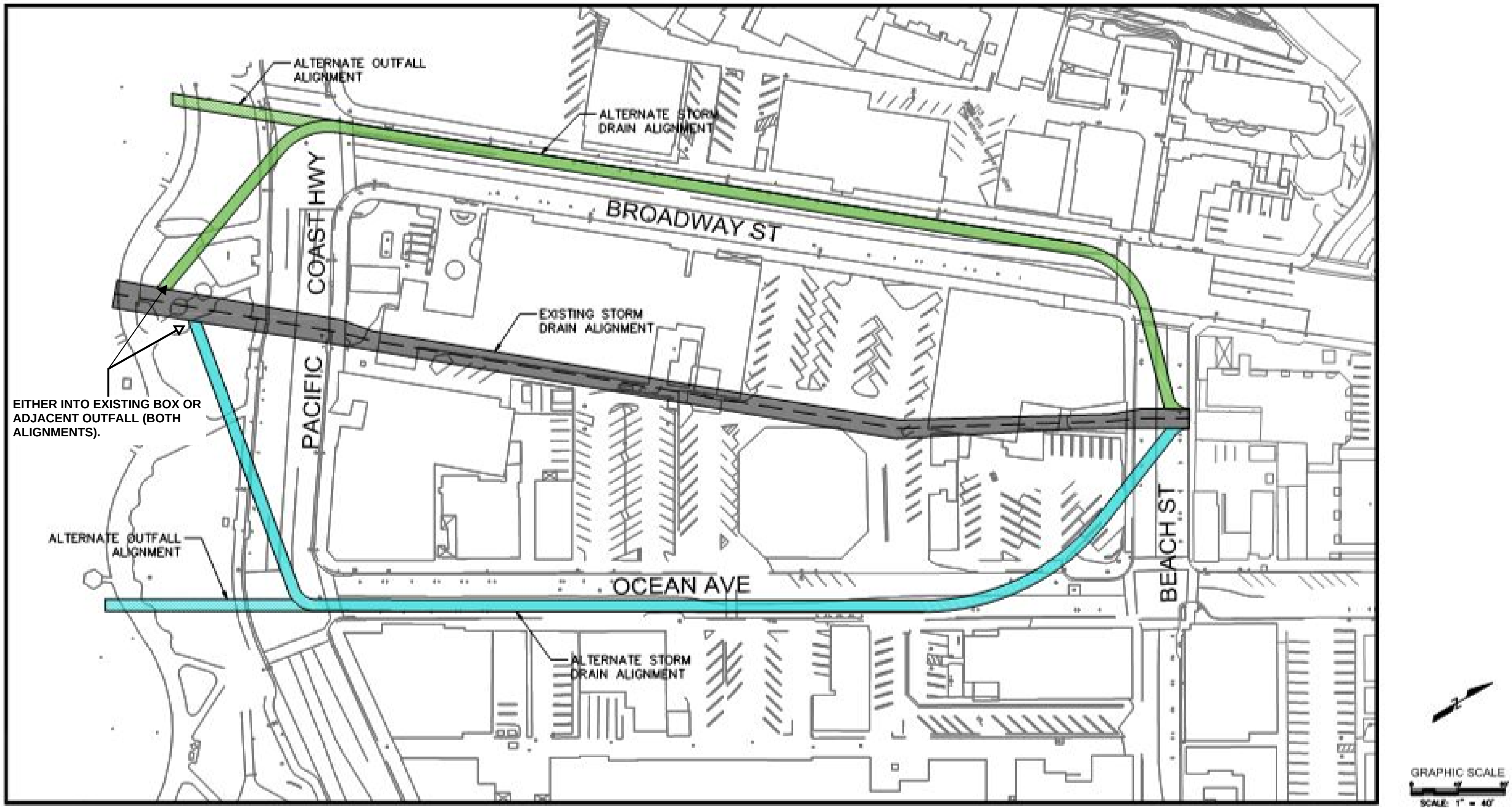
[12] http://www.ceqanet.ca.gov/ProjDocList.asp?ProjectPK=610065



Composite Alternatives Exhibit - Environmental Review

APPENDIX C

Geotechnical Review

LAGUNA CANYON CHANNEL IMPROVEMENTS
EARTH MATERIALS SUMMARY
AND
PRELIMINARY CONSTRUCTION DESIGN CONSIDERATIONS

General Explanation of the Source for Preliminary Earth Materials Summary

Our summary is based on having conducted subsurface investigations at the beach in 2 separate locations and then near the mouth of Laguna Canyon near the Village Entrance east of the intersection of Forest Avenue and Laguna Canyon Road, Figure 1. These investigations consisted of CPT soundings combined with drilling and soil sampling. Therefore, the subsurface conditions previously encountered should be representative of those to be encountered along the alignments from Beach Street to PCH on both Broadway and Ocean Avenue.

Earth Materials

Based upon our review of aerial photographs, in-house geotechnical reports, and the results of our onsite subsurface explorations, it should be anticipated that the site is generally underlain by a thick accumulation of interfingered, or undifferentiated beach deposits, alluvium, and at depth by Topanga Formation bedrock of Miocene Age. All earth materials on site are considered acceptable for use as compacted fill provided there is no debris or concentrations of organic material in the excavated materials.

Artificial Fill (Af)

Based on previous exploration observations artificial fill could range from about 2 to potentially greater than 10 feet thick. The thickest accumulations could be encountered on Broadway and Ocean Avenue due to past commercial construction and the associated underground improvements. In general, the fill near PCH consisted of red-brown, light to dark brown, and black sand, which is moist to very moist, and medium dense to dense. As observed, some of the fill was found to locally contain concrete and asphalt rubble. Existing shallow fill materials are considered unsuitable for the support of the proposed channel improvements unless improved in some manner.

Undocumented Fills (Afu) should be anticipated to be present scattered at various locations throughout the site and may consist of silty sands with some debris. The uncertified fill is considered unsuitable in its present form for structural support of channel improvements

Undifferentiated Beach Deposits and Alluvium (Qb/Qal)

As encountered in our subsurface excavations and cone penetrometer tests, the alignments will be predominantly underlain by interfingered beach deposits and alluvium. In general, these deposits have consisted of a thinly to thickly bedded sequences of clayey silt, silty sand, fine to medium sand, with local clay laminae, gravel, and trace cobbles. Moisture contents ranged from damp to saturated. Sandy materials are generally medium dense, and fine-grain beds range from firm to stiff. These deposits are generally considered suitable for the support of proposed structural foundation elements. The thickness of this deposit gradually increases seaward.

Alluvium (Qal)

Progressing up canyon from the location of the preponderance of beach deposits near PCH there is a potential to encounter poorly to moderately consolidated, interlayered, poorly sorted sand, sandy silt, and sandstone fragments. At the mouth of Laguna Canyon near 3rd Street, the alluvium was generally loose near the surface, becoming medium dense and increasingly consolidated at depths below 10 to 20± feet with a maximum depth of 125 feet. We anticipate that this is the reason the existing channel was founded with pile construction. Lag deposits consisting of several feet of gravels, cobbles and boulders typically overlie bedrock. In general it should be anticipated that the alluvium thickens toward Ocean Avenue away from Broadway.

Topanga Formation Bedrock (Tt)

Based on our prior subsurface exploration, mapping of local outcrops and review of available boring logs, the bedrock consists of moderately soft to moderately hard, moderately cemented, massive to moderately well bedded, light yellow to tan and olive fine-grained sandstone, with minor interbeds of gray claystone shale. Bedrock is exposed at the surface west of Broadway, and with increasing depth of bedrock from west to east and southeast. Based on our exploratory observations and review of referenced reports, the maximum depth to bedrock near PCH is at least 54± feet below beach grades and greater than 125 feet above 3rd Street. The bedrock underlying the site is considered suitable for the support of proposed structural improvements.

Groundwater

Groundwater was encountered within previous borings and in previous cone penetrometer test excavations at an elevation of 6± feet near PCH and at elevations of 17.5 feet above 3rd Street. The presence of groundwater beneath the site will generally be relatively consistent within the beach/alluvial deposits and is loosely correlated to the adjacent tide levels.

Groundwater is not anticipated to significantly affect the proposed structure, provided hydrostatic loading is considered in the design.

Appraisal of Liquefaction Potential

During seismic ground shaking, loss of bearing strength due to liquefaction can result in the deformation of earth materials, settlement, and rupturing of underground utilities. Factors known to influence liquefaction include soil type, grain size, relative density, depth to groundwater, and intensity and duration of seismic ground shaking.

Based on our prior liquefaction analyses, the site should be considered to be liquefiable. Prior analyses have indicated a total settlement potential of 4 to 11 inches at the ground surface. The reconstructed portion of the channel may experience settlement due to liquefaction; however, the magnitude is undetermined, as the earth materials have not been fully evaluated and depth of existing piles is unknown. It is noted that similar settlement will occur throughout the remaining channel and adjacent improvements.

Liquefaction-Induced Lateral Displacement

Liquefaction-induced lateral displacement, or lateral spreading, can occur in areas where liquefiable soil underlies gently sloping ground. The channel improvement site has a gradual slope towards the ocean from Beach Street and is underlain by liquefiable soil; therefore, lateral spreading is possible. Based on current state of practice methods, it is difficult to accurately predict the amount of movement that could occur and the associated damage to improvements. However, our calculations indicate a lateral spreading towards the ocean of up to 13 feet could occur in the area. The impact on the structure is undetermined, as the pile depths are unknown.

Construction Constraints for Preliminary Design Consideration

Following are our preliminary considerations:

- Construction vibrations will potentially create settlement of the existing site soils and impact the improvements adjacent to the trenching operations.

- In general, slope stability is not a design consideration as the site is relatively level, however, local stability of the alluvial soils aligning the channel will need to be evaluated.

- As groundwater will be encountered during construction of the improvements, dewatering should be anticipated. A dewatering contractor should be consulted to design and construct an appropriate system based on the excavation depth required, transmissivity of the soil, shoring system used, and other construction factors.

- Due to the liquefaction potential and the variability of soil types and settlement potentials it may be necessary to design a pile supported channel. Further testing will be required prior to final design.

- The gradient of the channel improvements is confined by outfall at the beach and the flow line of the existing structures above Beach Street. However, provided the gradient of the channel would not be disrupted by differential settlement of up to a foot it may be possible to design the structure with adequate gradient and flexibility to mitigate the effects of both liquefaction and differential settlement.

- Onsite materials should excavate with conventional earthmoving equipment. Caving conditions are highly likely. Casing of drilled excavations should be anticipated.

- Due to the potential of caving of the trench sidewalls, loss of ground adjacent to the trenching operation will potentially result in settlement that could impact existing structures. Therefore, it should be anticipated that shoring will be required from a safety perspective and to reduce damage to adjacent properties.

The CPT study will provide answers to many of the unresolved preliminary topics discussed herein. In particular, the layout of the CPT testing will allow the evaluation of total depth to bedrock differences between the Broadway and Ocean Avenue alignments. This may influence the selection of the preferred alignment depending upon the character of the varying soil types.

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

1. Geofirm, 2003, "Geotechnical Investigation for Foundation Design, Village Entrance Parking Structure and Associated Improvements East of the Intersection of Forest Avenue and Laguna Canyon Road, Laguna Beach, California" Project No. 70684-01, Report No. 03-5148, dated July 23.

2. Geofirm, 2005, "Preliminary Geotechnical Investigation for Foundation Design, Proposed New Lifeguard Headquarters Facility, Main Beach, Laguna Beach, California" Project No. 71581-00, Report No. 05-5594, dated August 10.

3. Geofirm, 2008, "Preliminary Geotechnical Report for Foundation Design, Proposed Sewer Pump Station, Main Beach, Laguna Beach, California" Project No. 71831-00, Report No. 08-6394, dated December 5.

4. Geofirm, 2009, "Preliminary Geotechnical Report for Foundation Design, Proposed Sewer Pump Station, Main Beach, Laguna Beach, California" Project No. 71831-00, Report No. 09-6464, dated March 16.

5. Geofirm, 2010, "Geotechnical Investigation and Foundation Report for Proposed Laguna Channel Rehabilitation, Main Beach to Pacific Coast Highway, Station 1=00 to 1=42.5, Laguna Beach, California" Project No. 71875-00, Report No. 10-6681, dated April 16.

PROVIDED IN
FLASH DRIVE

APPENDIX D

Hydrology

Rain Gage Data
Drainage Map
Loss Rate Calculations
Regional 100-Year

Hydraulics

1-D XPSWMM
WSPG (QA/QC)
1-D/2-D XPSWMM
2D HEC-RAS 5.0 (QA/QC)

APPENDIX E

Facility Inspection Report

LAGUNA CANYON CHANNEL
FACILITY INSPECTION REPORT
From Beach Street to Pacific Coast Highway

Final Version

Prepared for:

The City of Laguna Beach
505 Forest Avenue
Laguna Beach, California 92651
Contact: Christina Templeton, PE

Prepared by:

DUDEK
27372 Calle Arroyo
San Juan Capistrano, California 92675
Contact: Thomas J. Ryan, PE

DECEMBER 19, 2016

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TABLE OF CONTENTS

Section **Page No.**

APPENDICES

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1 INTRODUCTION

The purpose of this inspection report is to assess the general structural condition of the existing Laguna Canyon Channel between Beach Street and South Coast Highway and to provide recommendations for areas where remediation is necessary. This investigation and its findings will serve as a supplemental document to the two previous inspections reports; the first prepared by Moffat & Nichol in 2005, and the second prepared by PBS&J in 2010.

This report serves as a portion of a larger study, the 2016 Laguna Canyon Channel Assessment prepared by DUDEK, whose purpose is to alleviate some of the flooding problems that periodically occur in the downtown area of Laguna Beach. If it is found to be feasible, the existing facility will be recommended for improvement to supplement other potential new storm drain alignments to mitigate flood potential.

A rehabilitation plan will be prepared that identifies and addresses the structural deficiencies observed during the inspection with accompanying restoration recommendations for the purpose of extending the channel's service life. A preliminary cost estimate will be prepared for the proposed improvements.

As part of the inspection, DUDEK verified the storm drain lateral locations and sizes with the as-built information. Hydraulic elements such as transition structures, potential flow restrictions, and culvert sizes were checked to ensure the hydraulic models were coded accurately.

The City seeks a rehabilitation plan to utilize the existing capacity of the channel in conjunction with proposed alternatives to increase the overall capacity of the system between Beach Street and the channel's outlet.

The tasks performed include:

- Visual inspection of the channel structure including photographic documentation of observed structural deficiencies which can be found in Appendix A of the report.
- Visual verification of the storm drainage facility compared to as-built plans, including lateral connections and sizes, transition structures, and culvert width and height.
- Prepare a structural inspection and assessment report that includes recommended remediation measures for the deficiencies identified.

2 BACKGROUND

The City's portion of the channel was constructed in 1928; subsequently development, including commercial buildings, has occurred above the top of the existing Reinforced Concrete Box (RCB) throughout this reach of the channel. The size of the channel/culvert varies throughout the project reach, with the most vertically restricted section located at the squash box below South Coast Highway. The squash box is a double 11' wide by 4.5' high RCB and the remainder of the upstream project channel reach is a single 12' wide by 6' high RCB, that transitions from a double 10' wide by 6' high RCB bridge structure at Beach Street. Upstream of Beach Street, the channel is primarily a rectangular concrete section with some culvert underpasses.

Downstream of the Caltrans culvert, is a severely deteriorated double 11' wide by 6.5' high RCB. The City currently has plans to remove and replace a majority of this structure. As a result, this study did not cover the portion of storm drain culvert downstream of the Caltrans facility.

3 FIELD INSPECTION AND FINDINGS

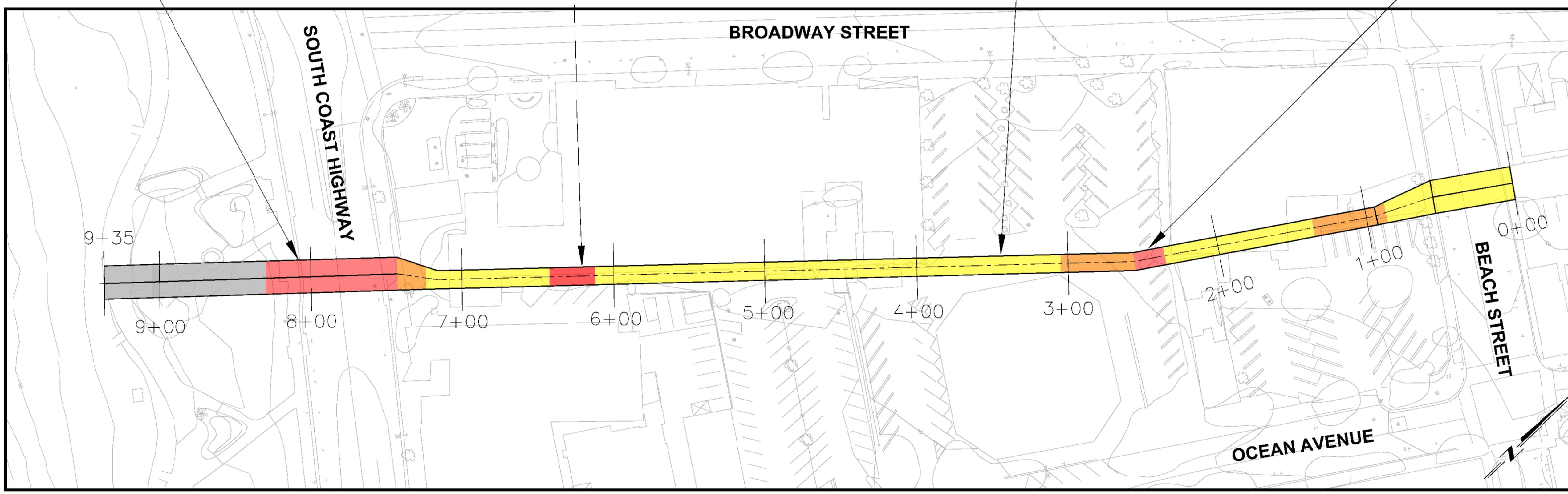
The general condition of the RCB between the beach outlet and Beach Street was assessed during two visual inspections. The reach between Beach Street and South Coast Highway was inspected on October 22, 2016. Due to high standing water in the downstream portion of the culvert, the initial inspection was terminated approximately 100 linear feet upstream of the Caltrans RCB. A second inspection was performed for the remaining project reach on November 22, 2016. A copy of the inspection notes and accompanying photographs can be found in Appendices A, B and C of this report.

The inspection began at the upstream edge of Beach Street, noted as Station 0+00. The inspection origin and stationing in this report was selected to match the 2010 inspection report for ease of comparison between the prior and current condition of the channel. The station, written description and photographs of each potential structural issue have been produced as documentation of the investigation findings. Some portions of the channel (mostly along the soffit or top slab of the RCB) exhibit extensive spalling and corrosion of bar reinforcement which can significantly reduce the structural integrity. Many of these locations are in a state of progressive deterioration. For the most extensive areas of deterioration, representative photos were obtained, and the starting and ending stations of the deteriorated areas have been noted.

An exhibit was created to summarize the general inspection findings (*Exhibit 1*). The exhibit is color coded to show the general locations and conditions of the culvert. Four (4) categories are presented for the varying levels of conditions. These conditions are explained in detail below. If several large cracks were found in a relatively short reach of culvert, the exhibit will show that entire section as one color. For example, if two locations were found to have significant deterioration, or Category 4, the section between the two locations may be lumped into one color. This is especially true for the sections that require removal and replacement. It is more feasible to improve one larger section than several intermittent sections.

During the inspection, previously remediated sections were found to be cracking and spalling. One large section looked to be a 4-foot by 3-foot patch including rebar that had slumped and was hanging down approximately 4 to 6-inches off the roof. Most likely this was due to a failed form during the curing process.

In addition, some sections that require replacement are located in areas where there are no buildings above, but rather parking lots. It would be beneficial to completely remove and replace the channel at these locations.



PLAN
NTS

LEGEND

(yellow)	GOOD TO FAIR CONDITION - MINOR CONCRETE REPAIRS RECOMMENDED (PATCHING AND/OR CRACK SEALING)
(orange)	FAIR TO POOR CONDITION - MODERATE CONCRETE REPAIRS RECOMMENDED (PARTIAL - DEPTH REMOVALS / ADDITIONAL BAR REINFORCEMENT / RECONSTRUCTION AND / OR PATCHING AND/OR CRACK SEALING
(red)	POOR TO VERY POOR CONDITION - EXTENSIVE CONCRETE REPAIRS RECOMMENDED (PARTIAL OR FULL - DEPTH REMOVALS / ADDITIONAL BAR REINFORCEMENT / RECONSTRUCTION AND / OR PATCHING AND / OR CRACK SEALING
(gray)	NOT ASSESSED

DUDEK
31878 CAMINO CAPISTRANO #200
SAN JUAN CAPISTRANO, CA 92675
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LAGUNA CANYON CHANNEL STUDY
FACILITY INSPECTION RESULTS
FOR CITY OF LAGUNA BEACH

EXHIBIT 01

9851

P:\101_Engineering\Laguna Beach\9851-Laguna Channel Study\CAD\Exhibits\9851 Exhibit 5 - Channel Inspection PLOTTED: 12/15/2016 12:23:07 PM

4 STRUCTURAL CAPACITY

Each deficiency noted during the inspection was categorized as one of four types of deterioration. Each category is defined below:

Deterioration Category 1: Surficial concrete cracking which appears to have propagated through to the reinforcing steel but which does not yet appear to have resulted in significant corrosion of the reinforcing steel. This category is generally represented in yellow on *Exhibit 1*.

Deterioration Category 2: Surficial concrete cracking which appears to have propagated through to the reinforcing steel and which has resulted in significant corrosion of the bar reinforcement. This category is generally represented in yellow on *Exhibit 1*, however, some more extensive areas exhibiting this type of deterioration may be represented in orange.

Deterioration Category 3: Delaminative concrete cracking in which the reinforced concrete member has incurred a significant reduction in its structural integrity due to cracking and spalling of the concrete and extensive corrosion of the underlying bar reinforcement. This category is generally represented in either orange or red on *Exhibit 1*.

Deterioration Category 4: Concrete spalling in which the reinforced concrete member has incurred significant deterioration and section loss due to deep delaminative cracking and spalling. Significant corrosion and/or loss of the reinforcing steel is typically also present, and delaminative cracking typically extends outward from the location of spalling. This category is generally represented in red on *Exhibit 1*.

Remediation measures are recommended for each of the deteriorated areas of the existing RCB. *Exhibit 1* presents a color-coded categorization of the various types of remediation methods recommended for each portion of the existing RCB.

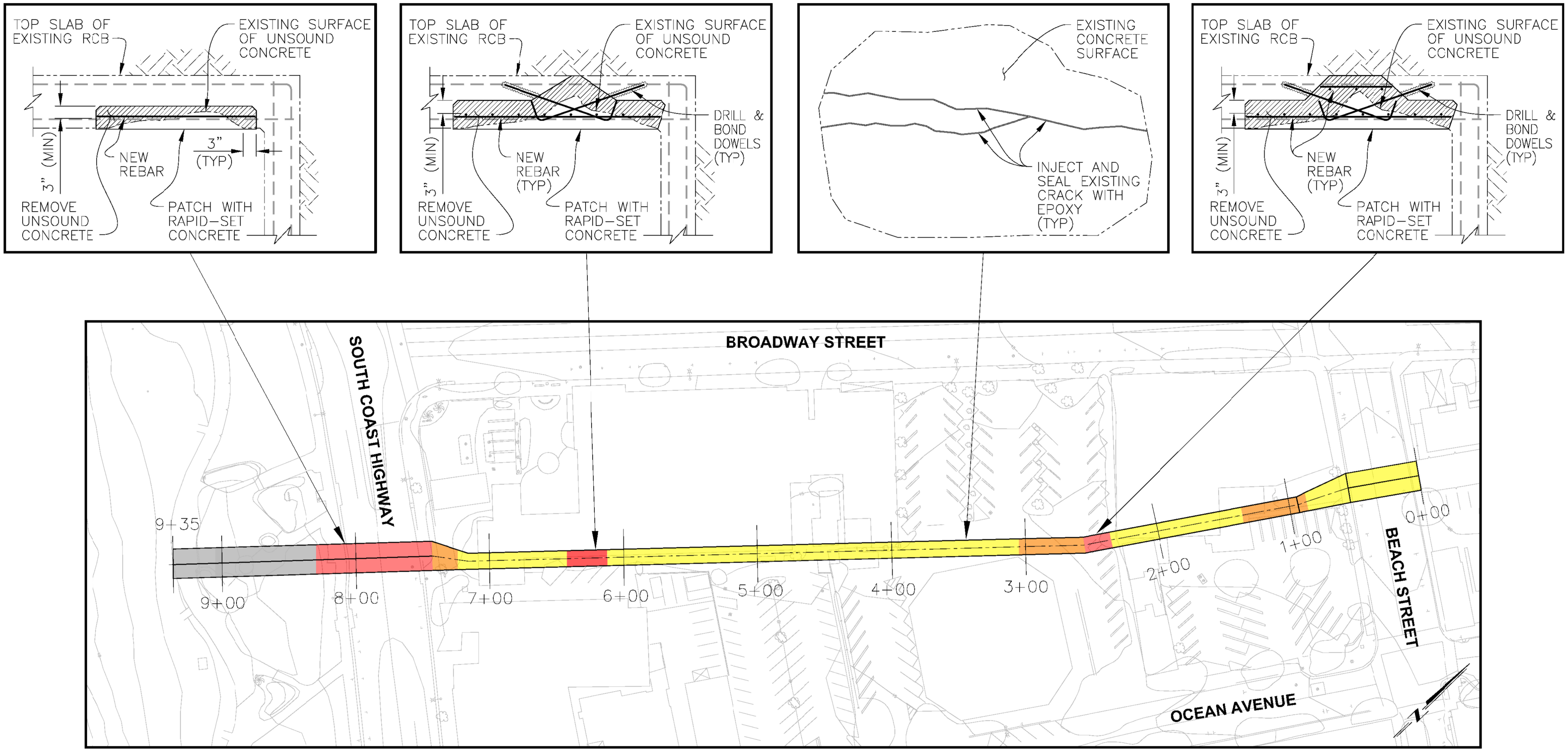
Yellow: Epoxy-injection of existing cracks and patching of existing (mostly-shallow) concrete spalls. Surface application of a commercial-grade corrosion-inhibitor.

Orange: Epoxy-injection of existing cracks and patching of existing (mostly-shallow) concrete spalls. Partial-depth removal and patching of existing deeper concrete spalls with incorporation of new bar reinforcement to supplement significantly-corroded existing bar reinforcement. Surface application of a commercial-grade corrosion-inhibitor. The actual limits of the partial-depth removals will be determined by the Resident Engineer in the field during the removal operation in order to ensure complete removal of “unsound” concrete and reconstruction with a new reinforced concrete properly bonded to the adjoining “sound” concrete.

Red: Epoxy-injection of existing cracks and patching of existing (mostly-shallow) concrete spalls. Partial-depth removal and patching of existing deeper concrete spalls with incorporation of new bar reinforcement to supplement significantly-corroded existing bar reinforcement. Full-depth removal and reconstruction of existing severe concrete spalls with incorporation of new bar reinforcement to replace the debonded and significantly-corroded existing bar reinforcement. Surface application of a commercial-grade corrosion-inhibitor. The actual limits of the partial and full-depth removals will be determined by the Resident Engineer in the field during the removal operation in order to ensure complete removal of "unsound" concrete and reconstruction with a new reinforced concrete properly bonded to the adjoining "sound" concrete.

The deteriorated locations within the structure were documented during the inspection and subsequently categorized for remediation. In addition to the general locations of the various deterioration categories within the structure, the specific locations have been identified in the field inspection notes included as *Appendix C.*

An exhibit was created to display channel improvement recommendations (*Exhibit 2*). The exhibit displays the color coded channel shown in *Exhibit 1* and the correlating remediation recommendation details for the various stages of deterioration shown in the channel.



PLAN
NTS

LEGEND

(yellow)	GOOD TO FAIR CONDITION - MINOR CONCRETE REPAIRS RECOMMENDED (PATCHING AND/OR CRACK SEALING)
(orange)	FAIR TO POOR CONDITION - MODERATE CONCRETE REPAIRS RECOMMENDED (PARTIAL - DEPTH REMOVALS / ADDITIONAL BAR REINFORCEMENT / RECONSTRUCTION AND / OR PATCHING AND/OR CRACK SEALING
(red)	POOR TO VERY POOR CONDITION - EXTENSIVE CONCRETE REPAIRS RECOMMENDED (PARTIAL OR FULL - DEPTH REMOVALS / ADDITIONAL BAR REINFORCEMENT / RECONSTRUCTION AND / OR PATCHING AND / OR CRACK SEALING
(gray)	NOT ASSESSED

CITY OF LAGUNA BEACH CALIFORNIA

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LAGUNA CANYON CHANNEL STUDY
FACILITY INSPECTION RECOMMENDATIONS
FOR CITY OF LAGUNA BEACH

EXHIBIT
02
9851

5 CONCLUSION

The majority of the RCB from Beach Street to the beach outlet is generally in an acceptable service condition. The entire structure shows evidence of aging due to corrosion; however, most of the identified damaged areas shown in the inspection photos do not appear to compromise the structural integrity at this time, excluding the roof slab of the squash box directly under South Coast Highway and the downstream section of the outlet structure at the beach. This is not unexpected in a structure of this age and environmental exposure (highly-corrosive marine environment). The testing from previous inspection confirmed the potential corrosion due to the infiltration of chlorides. Unless steps are taken, the structure will continue to degrade, most probably at a more rapid rate than it has previously, especially at the roof slab of the squash box directly under South Coast Highway.

The remediation recommendations identified herein should be implemented in order for the existing RCB to provide the City's desired additional service life through 2040.

It is recommended that the Caltrans-owned portion of the existing RCB be remediated or replaced in the very near future by Caltrans due to its severely-deteriorated condition. Multiple major cracks, exposed rebar, and old utility crossings can be found in this section of culvert.

The downstream segment of the outlet structure is in extremely poor condition and shows significant degradation at the roof slab and on the walls. This particular segment of the existing RCB is not repairable. Complete reconstruction of the outlet structure is required and is currently being planned by the City. The existing concrete piles under this portion of the outlet structure were inaccessible for inspection. Future inspection of the piles to determine the extent of damage due to corrosion may be performed when the existing box is removed and the selected pile heads are exposed in the field. Remediation or reconstruction of the full length of the channel's downstream end from the squash box to the beach outlet will likely be needed in the future due to on-going structural deterioration.

With a majority of the inspected reach in fair condition, and the current plans to improve the outlet culvert, Dudek believes there is benefit to improving the existing facility. Although under sized for per current flood control standards, the facility's current capacity could be supplemented with additional storm drain bypass facilities. By doing this, the bypass storm drain sizes could be minimized.

For sections requiring full replacement under building structures, it is planned to construct an inner culvert within the existing facility. This will slightly reduce the hydraulic capacity of these sections but could still provide a cumulative system capacity increase with the implementation of additional bypass storm drains.

Based on the remediation recommendations a cost estimate of $265,000 was calculated for repairing the existing channel from Beach Street to the ocean. Calculations for the cost estimate can be found in *Appendix D*.

6 REFERENCES

1. Inspection Report; Laguna Canyon Channel Inspection Report & Analysis, April 2010, PBS&J.

2. Inspection Report; Laguna Channel Storm Drain Inspection Report and Analysis, February 2005, Moffat & Nichol Engineers.

3. Interim Study, Laguna Canyon Channel, Facility No. 102, June 1988, Orange County EMA.

4. Project Report; Laguna Canyon Channel, Facility No. 102k, March 1984, Orange County EMA.

APPENDIX A

October 22, 2016
Field Survey and Inspection Photos

STA 0+17.5 (East) – Photo 1

STA 0+19.5 (East) – Photo 3

STA 0+19.5 (East) – Photo 4

STA 0+33 (East) – Photo 5

Appendix A – Field Survey and Inspection
October 22, 2016

STA 0+33 (East) – Photo 6

STA 0+40 (East) – Photo 7

STA 0+40 (East) – Photo 8

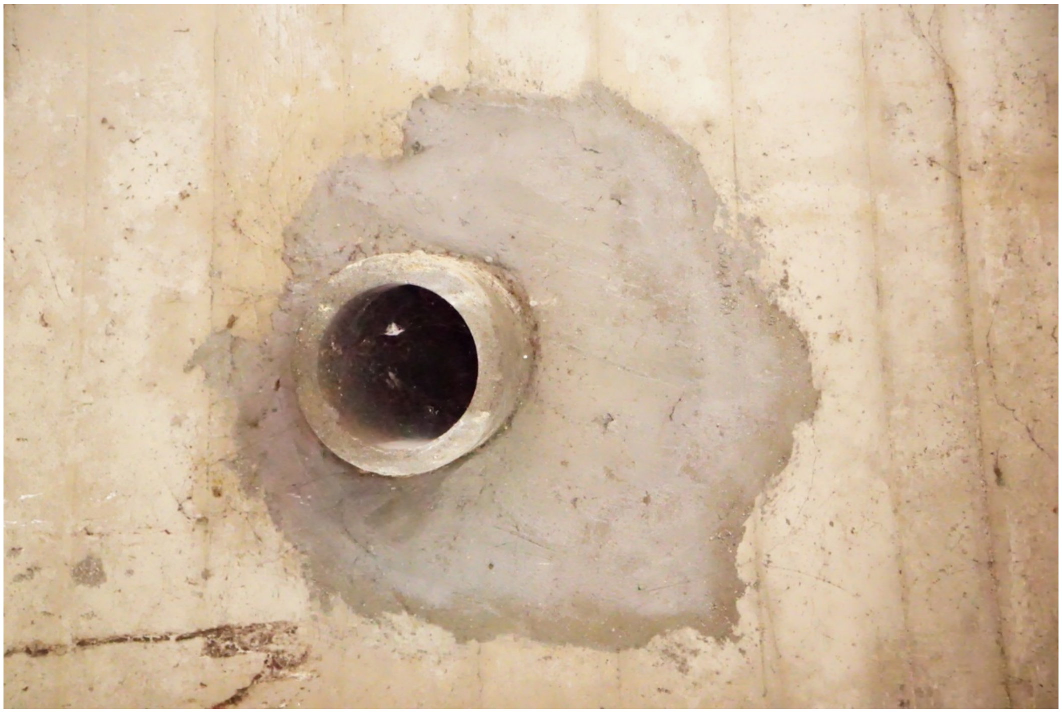
STA 0+50 (East) – Photo 9

STA 0+52 (East) – Photo 10

STA 0+00 (West) – Photo 11

STA 0+05 (West) – Photo 12

STA 0+05 (West) – Photo 13



STA 0+35 (West) – Photo 14

STA 0+48 (West) – Photo 15

STA 0+82 – Photo 16

STA 0+84 – Photo 17

STA 0+92– Photo 18

STA 1+01 – Photo 19

STA 1+03 – Photo 20

STA 1+08 – Photo 21

STA 1+08 – Photo 22

STA 1+19 – Photo 23

STA 1+22 – Photo 24

STA 1+22 – Photo 25

STA 1+22 – Photo 26

STA 1+22 – Photo 27

STA 1+30 – Photo 29

STA 1+30 – Photo 30

STA 1+41 – Photo 31

STA 1+48 – Photo 32

STA 1+72 – Photo 5579

STA 1+93 – Photo 5585

STA 2+05 – Photo 5587

STA 2+30 – Photo 5588

STA 2+39 – Photo 5590

STA 2+39 – Photo 5592

STA 2+39 – Photo 5593

STA 2+55 – Photo 5595

STA 2+55 – Photo 5596

STA 2+55 – Photo 5597

STA 2+55 – Photo 5598

STA 2+70 – Photo 5599

STA 2+70 – Photo 5600

STA 2+70 – Photo 5601

STA 2+82 – Photo 5602

STA 2+98 – Photo 5603

STA 3+16 – Photo 5605

STA 3+25 – Photo 5606

STA 3+25 – Photo 5607

STA 3+30 – Photo 5608

STA 3+48 – Photo 5610

STA 3+58 – Photo 5611

STA 3+76 – Photo 5613

STA 3+93 – Photo 5614

STA 3+96 – Photo 5615

STA 3+98 – Photo 5616

STA 4+05 – Photo 5618

STA 4+05 – Photo 5619

STA 4+22 – Photo 5620

STA 4+22 – Photo 5621

STA 4+22 – Photo 5622

STA 4+32 – Photo 5623

STA 4+32 – Photo 5624

STA 4+45 – Photo 5625

STA 5+22 – Photo 5627

STA 5+55 – Photo 5630

STA 5+58 – Photo 5631

STA 5+58 – Photo 5632

STA 5+58 – Photo 5633

STA 5+84 – Photo 5634

STA 6+06 – Photo 5635

STA 6+06 – Photo 5636

STA 6+06 – Photo 5637

STA 6+40 – Photo 5638

STA 6+40 – Photo 5639

STA 6+40 – Photo 5640

STA 6+73 – Photo 5643

STA 6+73 – Photo 5644

STA 6+80 – Photo 5645

STA 6+80 – Photo 5646

STA 6+90 – Photo 5648

STA 6+95 – Photo 5695

STA 7+14 – Photo 2656

STA 7+14 – Photo 2657

STA 7+40 – Photo 2667

STA 7+40 – Photo 2664

STA 7+40 – Photo 2666

STA 7+43 (North) – Photo 2672

STA 7+54 (North) – Photo 2673

STA 7+54 (North) – Photo 2674

STA 7+54 (North) – Photo 2675

STA 7+54 (North) – Photo 2676

STA 7+54 (North) – Photo 2677

STA 7+68 (North) – Photo 2678

STA 7+68 (North) – Photo 2681

STA 7+81 (North) – Photo 2682

STA 7+92 (North) – Photo 2683

STA 7+92 (North) – Photo 2685

STA 7+92 (North) – Photo 2689

STA 7+92 (North) – Photo 2690

STA 7+92 (North) – Photo 2697

STA 7+92 (North) – Photo 2700

STA 7+42 (South) – Photo 2703

STA 7+42 (South) – Photo 2704

STA 7+42 (South) – Photo 2706

STA 7+51 (South) – Photo 2707

STA 7+55 (South) – Photo 2709

STA 7+57 (South) – Photo 2711

STA 7+62 (South) – Photo 2712

STA 7+62 (South) – Photo 2713

STA 7+62 (South) – Photo 2714

STA 7+67 (South) – Photo 2717

STA 7+76 (South) – Photo 2720

STA 7+86 (South) – Photo 2722

STA 7+86 (South) – Photo 2723

STA 7+86 (South) – Photo 2726

STA 7+89 (South) – Photo 2727

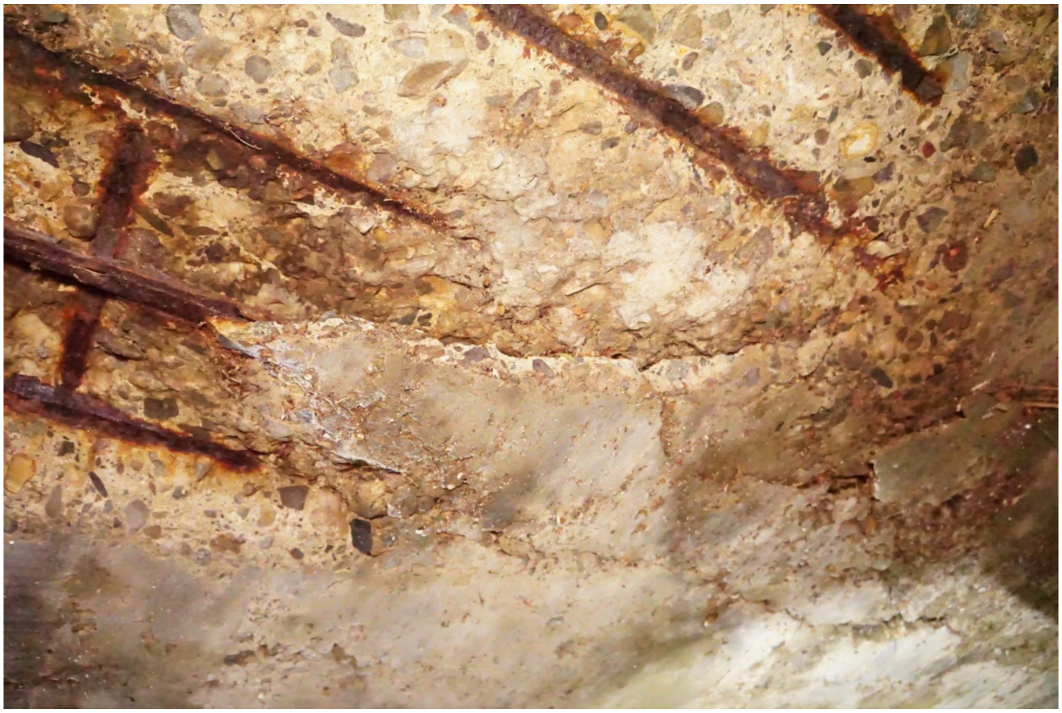
STA 7+89 (South) – Photo 2728

STA 7+92 (South) – Photo 2734

STA 7+92 (South) – Photo 2735

STA 8+01 – Photo 2738

STA 8+01 – Photo 2739



STA 8+01 – Photo 2740

STA 8+01 – Photo 2741

STA 8+01 – Photo 2742

STA 8+01 – Photo 2748

STA 8+01 – Photo 2749

STA 8+01 – Photo 2752

STA 8+01 – Photo 2753

STA 8+17 – Photo 2755

STA 8+17 – Photo 2756

STA 8+28 – Photo 2757

STA 8+28 – Photo 2758

STA 8+28 – Photo 2759

STA 8+28 – Photo 2762

APPENDIX B

November 22, 2016
Field Survey and Inspection Photos

STA 7+14 – Photo 2656

STA 7+14 – Photo 2657

STA 7+40 – Photo 2667

STA 7+40 – Photo 2664

STA 7+40 – Photo 2666

STA 7+43 (North) – Photo 2672

STA 7+54 (North) – Photo 2673

STA 7+54 (North) – Photo 2674

STA 7+54 (North) – Photo 2675

STA 7+54 (North) – Photo 2676

STA 7+54 (North) – Photo 2677

STA 7+68 (North) – Photo 2678

STA 7+68 (North) – Photo 2681

STA 7+81 (North) – Photo 2682

STA 7+92 (North) – Photo 2683

STA 7+92 (North) – Photo 2685

STA 7+92 (North) – Photo 2689

STA 7+92 (North) – Photo 2690

STA 7+92 (North) – Photo 2697

STA 7+92 (North) – Photo 2700

STA 7+42 (South) – Photo 2703

STA 7+42 (South) – Photo 2704

STA 7+42 (South) – Photo 2706

STA 7+51 (South) – Photo 2707

STA 7+55 (South) – Photo 2709

STA 7+57 (South) – Photo 2711

STA 7+62 (South) – Photo 2712

STA 7+62 (South) – Photo 2713

STA 7+62 (South) – Photo 2714

STA 7+67 (South) – Photo 2717

STA 7+76 (South) – Photo 2720

STA 7+86 (South) – Photo 2722

STA 7+86 (South) – Photo 2723

STA 7+86 (South) – Photo 2726

STA 7+89 (South) – Photo 2727

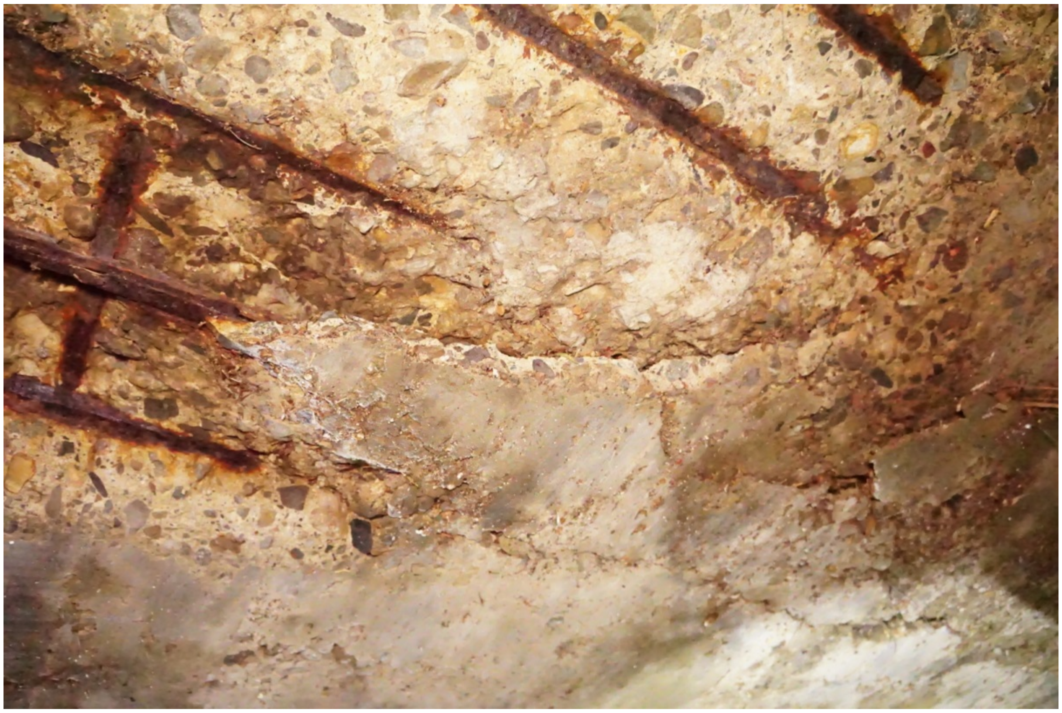
STA 7+89 (South) – Photo 2728

STA 7+92 (South) – Photo 2734

STA 7+92 (South) – Photo 2735

STA 8+01 – Photo 2738

STA 8+01 – Photo 2739



STA 8+01 – Photo 2740

STA 8+01 – Photo 2741

STA 8+01 – Photo 2742

STA 8+01 – Photo 2748

STA 8+01 – Photo 2749

STA 8+01 – Photo 2752

STA 8+01 – Photo 2753

STA 8+17 – Photo 2755

STA 8+17 – Photo 2756

STA 8+28 – Photo 2757

STA 8+28 – Photo 2758

STA 8+28 – Photo 2759

STA 8+28 – Photo 2762

APPENDIX C
Inspection Logs

Laguna Canyon Channel Field Inspection

Team: Tom Ryan
Brittany Bair
Jen O'Brien
Garret White
Greg Rende

Footnote: Station 0+00 Begins at upstream face of double culvert at Beach Street

DBL Box

Station	Barrel	Photos	Notes	Field Notes	Structural Notes: Condition Category	Structural Notes: Recommended Remediation
0+00	East		See Notes on West Barel			
0+17.5	East	1,2	Plugged 24" Outlet - Cracking around plug	Epoxy	1	Inject Cracks with Epoxy
0+19.5	East	3,4	Roof Spalling (utility line), concrete sound	Epoxy	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
0+33	East	5,6	36-inch Outlet w/ Flapgate (45 deg conf. angle). Good condition		0	None
0+40	East	7,8	Roof-small rebar exposed - 2 locations	Epoxy	1	Remove unsound concrete & patch. Inject Cracks with Epoxy.
0+50	East	9	Roof Spalling, surrounding concrete sound	Epoxy	1	Remove unsound concrete & patch. Inject Cracks with Epoxy.
0+52	East	10	Roof Spalling, unsound concrete	Remove old concrete & Patch	3	Remove unsound concrete & patch. Inject Cracks with Epoxy.
0+64	East		End of Double RCB, Begin of Transition to Single RCB		0	None

Station	Barrel	Photos	Notes	Field Notes		
0+00	West	11	Upstream Pier Damage (Spalling concrete)	Patch	1	Remove unsound concrete & patch.
0+05	West	12	Deteriorating Roof Bolt	Remove, fill/patch	1	Remove unsound concrete & patch.
0+19.5	West	13	Utility along Roof, left side		1	Remove unsound concrete & patch. Inject Cracks with Epoxy.
0+35	West	14	6-inch Outlet		0	None
0+48	West	15	Rebar exposed in Roof	Remove old concrete & Patch	2	Remove unsound concrete & patch.

Single Box

Station	Barrel	Photos	Notes	Field Notes		
0+60	-		Transition from Double to Single Box (rt. Side only)		0	None
0+80	-		End of 20-ft Transition		0	None
0+82	-	16	Illicit Connection 3" Steel Pipe	Document and Coordinate w/ City	0	None
0+84	-	17	Roof Rebar Exposed entire roof	Remove concrete and patch	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
0+92	-	18	Roof Rebar Exposed entire roof	Remove concrete and patch	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
1+01	-	19	Roof Rebar Exposed entire roof	Remove concrete and patch	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
1+03	-	20	Large Hole in roof w/ Rebar	Remove concrete and patch	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
1+08	-	21,22	Roof Drain (Grated). Thickness of Concrete = 7"		0	None
1+19	-	23pl	6-inch Illicit Discharge	Document and Coordinate w/ City	0	None
1+22	-	24,25,26,27,28	Crack with exposed rebar	Remove concrete and patch	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
1+30	-	29,30	Crack with exposed rebar	Remove concrete and patch	2	Remove unsound concrete & patch.
1+41	-	31	Roof Drain (Grated). 18x18"		0	None
1+48	-	32 = (5576)	Roof Drain (Grated). 6"x4"		0	None
1+72	-	5579	Expansion Joint. Filler material old - RC Good condition		0	None
1+93	-	5585	Roof Spalling w/ exposed rebar.	Patch only.	2	Remove unsound concrete & patch.
2+05	-	5587	Roof Spalling	Remove old conctret and Patch	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
2+30	-	5588	Angle Pt. In culvert		1	Remove unsound concrete & patch. Inject Cracks with Epoxy.
2+30	-	5588	Corner of Roof - Spalling (small patch)	Patch only.		
2+39	-	5590, 5592, 5593	Major Spall in Roof	Major Roof Repair (possible redo)	4	Full-depth removal of roof slab in the vicinty of the major spall, remove all surrounding unsound concrete, provide new bar reinforcement and construct full-depth patch.
2+55	-	5595, 5596, 5597, 5598	Expansion Joint. Spalling, Exposed Rebar, (bats)	Deep Patch across top of roof.	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
2+70	-	5599, 5600, 5601	24" Lateral Outlet		0	None
2+82	-	5602	Roof Spalling - Deep hole	Remove conctete and deep patch.	3	Remove unsound concrete & patch. Inject Cracks with Epoxy.
2+98	-	5603	Roof Spalling - Deep hole	Remove conctete and deep patch.	3	Remove unsound concrete & patch. Inject Cracks with Epoxy.
3+16	-	5604, 5605	Cold Joint, Roof Spalling	Remove concrete and patch	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
3+25	-	5606, 5607	Plugged 6-inch Outlet		0	None
3+30	-	5608, 5609	Roof Spalling. Water 2" deep in invert	Remove concrete and patch	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
3+48	-	5610, 5611	Roof Spalling	Remove concrete and patch	1	Remove unsound concrete & patch. Inject Cracks with Epoxy.
3+58	-	5612	Roof Spalling	Remove concrete and patch	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
3+76	-	5613	Roof Expansion Joint. Water 6" deep in invert		0	None
3+93	-	5614	Illicit Connection 4" Pipe	Document and Coordinate w/ City	0	None
3+96	-	5615	Roof Spalling, minor	Epoxy	1	Inject Cracks with Epoxy
3+98	-	5616, 5617	Illicit Pipe Connection	Document and Coordinate w/ City	0	None
4+05	-	5618, 5619	Illicit Sewer Connection - Roof	Remove (?)	2	Remove unsound concrete & patch.
4+22	-	5620, 5621, 522	Roof Spall - Deep Crack	Remove conctrete and Replace	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
4+32	-	5623, 5624	Illicit discharge (3 Pipes) - 4-5" Diameters	Document and Coordinate w/ City	0	None
4+35	-	"	Water 18" Deep		0	None
4+45	-	5625, 5626	24-inch SD Lateral		0	None
5+00	-	"	2+ feet of Water in invert		0	None
5+22	-	5627	Expansion Joint - light Cracking	Epoxy	1	Inject Cracks with Epoxy
5+55	-	5630	9" Inlet		1	Remove unsound concrete & patch.
5+58	-	5631, 5632, 5633	18" inlet, Roof Spall, Side wall Crack	Replace & Patch roof, epoxy crack	1	Remove unsound concrete & patch. Inject Cracks with Epoxy.
5+84	-	5634	8" inlet		0	None
6+06	-	5635, 5636, 5637	Side Crack & Roof Spall	Replace & Patch roof, epoxy crack	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
6+40	-	5638, 5639	Roof Spall - Previous patchwork failing	Replace existing patch & concrete - repatch	4	Full-depth removal of roof slab in the vicinty of the major spall, remove all surrounding unsound concrete, provide new bar reinforcement and construct full-depth patch.
6+55	-	5640	Roof Slab dropping - Bad Patch	Remove patch and replace (large portion)	3	Remove unsound concrete & patch. Inject Cracks with Epoxy.
6+73	-	5643, 5644	Illicit roof drain - 6"	Document and Coordinate w/ City	1	Remove unsound concrete & patch.
6+80	-	5645, 5646	Roof condensation, Large Spall, Water 2.5'+ deep	Remove concrete and patch	1	Remove unsound concrete & patch. Investigate cause of condensation.
6+90	-	5648	Expansion Joint		0	None
6+95	-	5695	Manhole Hatch		0	None
7+14	-		Begin Transition to Caltrans RCB, Water 3' deep.	End Inspection	0	None

Single Box

Station	Barrel	Photos	Notes	Field Notes		
7+14	-	2656, 2657	Spall on side wall	Beginning of Inspection	0	None
7+40	-	2659, 2667, 2664, 2666	Roof spalling w/ exposed rebar + Ductile iron pipe	End of transition/start of caltran box - Patch + Removal (City Side)	2	Remove unsound concrete & patch.

DBL Box

Station	Barrel	Photos	Notes	Field Notes		
7+43	North	2672	18" RCP from North		1	Remove abandoned steel pipe casing unsound concrete & patch.
7+54	North	2673-2677	Major roof spall + 18"x24" Outlet box		4	Full-depth removal of roof slab in the vicinty of the major spall, remove all surrounding unsound concrete, provide new bar reinforcement and construct full-depth patch.
7+68	North	2678, 2681	Major roof spall			
7+81	North	2682	Major roof spall			
7+92	North	2683, 2685, 2689, 2690, 2697, 2700	Huge Roof Spall, Brick Mortar, 24" RCP outlet			

Station	Barrel	Photos	Notes	Field Notes		
7+42	South	2703, 2704, 2706	18"-24" RCP outlet left side, old iron casing		1	Remove abandoned steel pipe casing unsound concrete & patch.
7+51	South	2708, 2709	Old plugged 18"		1	Remove unsound concrete & patch.
7+55	South	2708, 2709	Outlet Box 18"x30" - Caltrans		1	Remove unsound concrete & patch. Inject Cracks with Epoxy.
7+57	South	2711	Roof Spall Starts		4	Full-depth removal of roof slab in the vicinty of the major spall, remove all surrounding unsound concrete, provide new bar reinforcement and construct full-depth patch.
7+62	South	2712, 2713, 2714	Roof Spall Ends			
7+67	South	2717	6" Lateral (left side)		3	Remove unsound concrete & patch.
7+76	South	2720	Sidewall Crack (minor)		1	Remove unsound concrete & patch. Inject Cracks with Epoxy.
7+86	South	2722, 2723, 2726	Const. joint + major spall		2	Remove unsound concrete & patch.
7+89	South	2727, 2728	Right wall crack + left crack		2	Remove unsound concrete & patch. Inject Cracks with Epoxy.
7+92	South	2734, 2735	Roof Spall exposed rebar		3	Remove unsound concrete & patch.

Station	Barrel	Photos	Notes	Field Notes		
8+01	-	2738, 2739, 2740, 2741, 2742, 2748, 2749, 2752, 2753	Major Roof Spall - Start	Redo	4	Full-depth removal of roof slab in the vicinty of the major spall, remove all surrounding unsound concrete, provide new bar reinforcement and construct full-depth patch.
8+17	-	2755, 2756	Major Roof Spall - End + Old Utilities	End of Box - Start of Transition	1	Remove unsound concrete & patch. Inject Cracks with Epoxy.
8+23	-		Brick/Mortar		1	Remove brick and mortar plug and unsound concrete & patch. Inject Cracks with Epoxy.
8+28	-	2757, 2758, 2759, 2762	3' wide Bulkhead + 30" RCP Left side	End of Inspection	2	Remove unsound concrete & patch. Inject Cracks with Epoxy.

Structural Notes	
Condition Category 0:	Good Condition.
Condition Category 1:	Surficial concrete cracking which may have propagated through to the reinforcing steel but which does not yet appear to have resulted in significant corrosion of the reinforcing steel.
Condition Category 2:	Surficial concrete cracking which has propagated through to the reinforcing steel and which appears to have resulted in significant corrosion of the reinforcing steel.
Condition Category 3:	Delaminative concrete cracking in which the reinforced concrete member has incurred a reduction in its structural capacity due to cracking within the heart of the reinforced concrete member. Significant corrosion of the reinforcing steel is present.
Condition Category 4:	Concrete spalling in which the reinforced concrete member has incurred significant deterioration and section loss due to unchecked delaminative and surficial cracking. Significant corrosion and/or loss of the reinforcing steel is present. Delaminative

APPENDIX D

Existing Facility Improvements Cost Estimate

Laguna Canyon Channel Improvements - Existing Facility Improvments
Beach Street to South Coast Highway

Item No.	Item Description	PROJECT TOTAL				Notes
		Unit of Measure	Estimated Quantities	Unit Price	Item Total	
1	Inject Crack (Epoxy)	LF	480	$85	$40,800.00	24 lf x 20 locations = 248 lf
2	Remove Unsound Concrete	SF	264	$100	$26,400.00	24 sf x 11 locations = 264 sf
3	Portland Cement Concrete Patch	SF	192	$125	$24,000.00	24 sf x 8 locations = 192 sf
4	Structural Reinforced Concrete (Box Culvert)	CF	70	$150	$10,500.00	70 sf x 1 ft = 70 cf
5	Fiber-Reinforced Polymer Composite Surface Treatment	SF	600	$80	$48,000.00	lump sum 600 sf.
6	Removal of Abandoned Utility /Sleeves	LS	1	$1,000	$1,000.00	Near Caltrans culvert
7	Form Removal/Site Preparation (8%)	LS	1	$12,056	$12,056.00	Removal after several days of curing.
8	Mobilization/Bonding/Traffic Control (10%)	LS	1	$16,276	$15,000.00	Subsurface Construction
SUBTOTAL (CONSTRUCTION)					**$177,756**	
9	Administration (5%)	LS	1	$8,888	$8,887.80	
10	Engineering (10%)	LS	1	$17,776	$17,775.60	
11	Inspection (9%)	LS	1	$15,998	$15,998.04	
SUBTOTAL (ENGINEERING AND CONSTRUCTION ADMINISTRATION)					$42,661	
SUBTOTAL COST					$220,417	
CONTINGENCY				20%	$44,083	
TOTAL PROJECT					**$264,501**	

Quantity Calcs for Structural Items

Average of	24	LF per location x		20	locations =	480	LF
Average of	24	SF per location x		11	locations =	264	SF
Average of	24	SF per location x		8	locations =	192	SF
	70	SF x	1	ft	thickness =	70	CF
			600	SF			

APPENDIX E

RCNM Results

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/18/2017
Case Description: Laguna Canyon Channel Improvements_Demoltion - Large

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Receiver 260'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	260	5
All Other Equipment > 5 HP	No	50	85		260	5

Results

Equipment		Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax
Excavator		61.4	57.4	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP		65.7	62.7	N/A	N/A	N/A	N/A	N/A
	Total	65.7	63.8	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/18/2017
Case Description: Laguna Canyon Channel Improvements_Demoltion - Small

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Receiver 260'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	260	5
Compressor (air)	No	40		77.7	260	5
Concrete Saw	No	20		89.6	260	5
Concrete Saw	No	20		89.6	260	5
Generator	No	50		80.6	260	5
Generator	No	50		80.6	260	5

		Results						
		Calculated (dBA)			Noise Limits (dBA)			
				Day		Evening		Night
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Compressor (air)		58.3	54.4	N/A	N/A	N/A	N/A	N/A
Compressor (air)		58.3	54.4	N/A	N/A	N/A	N/A	N/A
Concrete Saw		70.3	63.3	N/A	N/A	N/A	N/A	N/A
Concrete Saw		70.3	63.3	N/A	N/A	N/A	N/A	N/A
Generator		61.3	58.3	N/A	N/A	N/A	N/A	N/A
Generator		61.3	58.3	N/A	N/A	N/A	N/A	N/A
	Total	70.3	67.9	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/18/2017
Case Description: Laguna Canyon Channel Improvements_Outfall Construction

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Receiver 320'	Residential	65	60	55

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Concrete Mixer Truck	No	40		78.8	320	0
Crane	No	16		80.6	320	0
Drill Rig Truck	No	20		79.1	320	0
Front End Loader	No	40		79.1	320	0
Dump Truck	No	40		76.5	320	0
Dump Truck	No	40		76.5	320	0
Dump Truck	No	40		76.5	320	0
Generator	No	50		80.6	320	0
Generator	No	50		80.6	320	0
Compactor (ground)	No	20		83.2	320	0
Backhoe	No	40		77.6	320	0
Roller	No	20		80	320	0

	Results						
	Calculated (dBA)			Noise Limits (dBA)			
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Concrete Mixer Truck	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Crane	64.4	56.5	N/A	N/A	N/A	N/A	N/A
Drill Rig Truck	63	56	N/A	N/A	N/A	N/A	N/A

Front End Loader		63	59	N/A	N/A	N/A	N/A	N/A
Dump Truck		60.3	56.3	N/A	N/A	N/A	N/A	N/A
Dump Truck		60.3	56.3	N/A	N/A	N/A	N/A	N/A
Dump Truck		60.3	56.3	N/A	N/A	N/A	N/A	N/A
Generator		64.5	61.5	N/A	N/A	N/A	N/A	N/A
Generator		64.5	61.5	N/A	N/A	N/A	N/A	N/A
Compactor (ground)		67.1	60.1	N/A	N/A	N/A	N/A	N/A
Backhoe		61.4	57.5	N/A	N/A	N/A	N/A	N/A
Roller		63.9	56.9	N/A	N/A	N/A	N/A	N/A
	Total	67.1	69.3	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/18/2017
Case Description: Laguna Canyon Channel Improvements_Transition Construction - Large

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Receiver 260'	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	260	5
Backhoe	No	40		77.6	260	5

Results

		Calculated (dBA)			Noise Limits (dBA)			
				Day		Evening		Night
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Crane		61.2	53.3	N/A	N/A	N/A	N/A	N/A
Backhoe		58.2	54.3	N/A	N/A	N/A	N/A	N/A
	Total	61.2	56.8	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/18/2017
Case Description: Laguna Canyon Channel Improvements_Transition Construction - Small

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Receiver 260'	Residential	65	60	55

Description		Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck		No	40		78.8	260	5
Generator		No	50		80.6	260	5
Generator		No	50		80.6	260	5
Compactor (ground)		No	20		83.2	260	5
Roller		No	20		80	260	5

Results

		Calculated (dBA)		Noise Limits (dBA)				
				Day		Evening		Night
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Concrete Mixer Truck		59.5	55.5	N/A	N/A	N/A	N/A	N/A
Generator		61.3	58.3	N/A	N/A	N/A	N/A	N/A
Generator		61.3	58.3	N/A	N/A	N/A	N/A	N/A
Compactor (ground)		63.9	56.9	N/A	N/A	N/A	N/A	N/A
Roller		60.7	53.7	N/A	N/A	N/A	N/A	N/A
	Total	63.9	63.9	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/18/2017
Case Description: Laguna Canyon Channel Improvements_Transition Construction - Trucks

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nearest Receiver 260'	Residential	65	60	55

Description		Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dump Truck		No	40		76.5	260	5
Dump Truck		No	40		76.5	260	5
Dump Truck		No	40		76.5	260	5

Results

		Calculated (dBA)		Noise Limits (dBA)				
				Day		Evening		Night
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Dump Truck		57.1	53.2	N/A	N/A	N/A	N/A	N/A
Dump Truck		57.1	53.2	N/A	N/A	N/A	N/A	N/A

Dump Truck		57.1	53.2	N/A	N/A	N/A	N/A	N/A
	Total	57.1	57.9	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 7/18/2017
Case Description: Laguna Canyon Channel Improvements_Underground Rehabilitation

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Nearest Receiver 250'	Residential	65	60	55

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Compressor (air)	No	40		77.7	250	10
Compressor (air)	No	40		77.7	250	10
Concrete Mixer Truck	No	40		78.8	260	5
Concrete Saw	No	20		89.6	250	10
Generator	No	50		80.6	250	10
Generator	No	50		80.6	250	10
Pumps	No	50		80.9	250	10
Welder / Torch	No	40		74	250	10
Dump Truck	No	40		76.5	260	5
All Other Equipment > 5 HP	No	50	85		250	10

Results

		Calculated (dBA)			Noise Limits (dBA)			
				Day		Evening		Night
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Compressor (air)		53.7	49.7	N/A	N/A	N/A	N/A	N/A
Compressor (air)		53.7	49.7	N/A	N/A	N/A	N/A	N/A
Concrete Mixer Truck		59.5	55.5	N/A	N/A	N/A	N/A	N/A
Concrete Saw		65.6	58.6	N/A	N/A	N/A	N/A	N/A
Generator		56.7	53.6	N/A	N/A	N/A	N/A	N/A
Generator		56.7	53.6	N/A	N/A	N/A	N/A	N/A
Pumps		57	54	N/A	N/A	N/A	N/A	N/A
Welder / Torch		50	46	N/A	N/A	N/A	N/A	N/A
Dump Truck		57.1	53.2	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP		61	58	N/A	N/A	N/A	N/A	N/A
	Total	65.6	64.6	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.