CLIMATE ACTION PLAN
CONSISTENCY CHECKLIST INTRODUCTION

In December 2015, the City adopted a Climate Action Plan (CAP) that outlines the actions that City will undertake to achieve its proportional share of State greenhouse gas (GHG) emission reductions. The purpose of the Climate Action Plan Consistency Checklist (Checklist) is to, in conjunction with the CAP, provide a streamlined review process for proposed new development projects that are subject to discretionary review and trigger environmental review pursuant to the California Environmental Quality Act (CEQA).[1]

Analysis of GHG emissions and potential climate change impacts from new development is required under CEQA. The CAP is a plan for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to a cumulative GHG emissions effect may be determined not to be cumulatively considerable if it complies with the requirements of the CAP.

This Checklist is part of the CAP and contains measures that are required to be implemented on a project-by-project basis to ensure that the specified emissions targets identified in the CAP are achieved. Implementation of these measures would ensure that new development is consistent with the CAP's assumptions for relevant CAP strategies toward achieving the identified GHG reduction targets. Projects that are consistent with the CAP as determined through the use of this Checklist may rely on the CAP for the cumulative impacts analysis of GHG emissions. Projects that are not consistent with the CAP must prepare a comprehensive project-specific analysis of GHG emissions, including quantification of existing and projected GHG emissions and incorporation of the measures in this Checklist to the extent feasible. Cumulative GHG impacts would be significant for any project that is not consistent with the CAP.

The Checklist may be updated to incorporate new GHG reduction techniques or to comply with later amendments to the CAP or local, State, or federal law.

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[1] Certain projects seeking ministerial approval may be required to complete the Checklist. For example, projects in a Community Plan Implementation Overlay Zone may be required to use the Checklist to qualify for ministerial level review. See Supplemental Development Regulations in the project's community plan to determine applicability.

City Council Approved July 12, 2016
Revised June 2017

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CAP CONSISTENCY CHECKLIST SUBMITTAL APPLICATION

- The Checklist is required only for projects subject to CEQA review.[2]
- If required, the Checklist must be included in the project submittal package. Application submittal procedures can be found in Chapter 11: Land Development Procedures of the City's Municipal Code.
- The requirements in the Checklist will be included in the project's conditions of approval.
- The applicant must provide an explanation of how the proposed project will implement the requirements described herein to the satisfaction of the Planning Department.

Application Information

Contact Information

Project No./Name: The San Diego River Discovery Center at Grant Park

Property Address: 2450 Camino del Rio North

Applicant Name/Co.: The San Diego River Park Foundation - Rob Hutsel, Executive Director

Contact Phone: Foundation: (619) 297-7380 Contact Email: Rhutsel@sandiegoriver.org

Was a consultant retained to complete this checklist? ■ Yes ☐ No If Yes, complete the following

Consultant Name: Rick Espana, AICP Contact Phone: (619) 233-1023

Company Name: RNT Architects Contact Email: espana@rntarchitects.com

Project Information

1. What is the size of the project (acres)? Project Area 2.54 ac, Total site area = 17.42 ac
2. Identify all applicable proposed land uses:
   - ☐ Residential (indicate # of single-family units):
   - ☐ Residential (indicate # of multi-family units):
   - ☐ Commercial (total square footage):
   - ☐ Industrial (total square footage):
   - ■ Other (describe): San Diego River Interpretive Center
3. Is the project or a portion of the project located in a Transit Priority Area? ■ Yes ☐ No
4. Provide a brief description of the project proposed:

The project is a 9,950 SF interpretive center designed to support the recommendations of the City of San Diego approved River Park Master Plan to promote awareness, education, and stewardship of the San Diego River. The project will provide an interpretative center, meeting spaces, outdoor activity spaces, an interpretative water feature for younger children, native landscape orientation, and extension of the River Pathway for public use. The project has set sustainability goals of Net Zero or near net zero energy use and/or LEED Gold equivalent or higher.

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[2] Certain projects seeking ministerial approval may be required to complete the Checklist. For example, projects in a Community Plan Implementation Overlay Zone may be required to use the Checklist to qualify for ministerial level review. See Supplemental Development Regulations in the project's community plan to determine applicability.

CAP CONSISTENCY CHECKLIST QUESTIONS

Step 1: Land Use Consistency

The first step in determining CAP consistency for discretionary development projects is to assess the project's consistency with the growth projections used in the development of the CAP. This section allows the City to determine a project's consistency with the land use assumptions used in the CAP.

Step 1: Land Use Consistency		
Checklist Item (Check the appropriate box and provide explanation and supporting documentation for your answer)	Yes	No
A. Is the proposed project consistent with the existing General Plan and Community Plan land use and zoning designations?;[3] OR, B. If the proposed project is not consistent with the existing land use plan and zoning designations, and includes a land use plan and/or zoning designation amendment, would the proposed amendment result in an increased density within a Transit Priority Area (TPA)[4] and implement CAP Strategy 3 actions, as determined in Step 3 to the satisfaction of the Development Services Department?; OR, C. If the proposed project is not consistent with the existing land use plan and zoning designations, does the project include a land use plan and/or zoning designation amendment that would result in an equivalent or less GHG-intensive project when compared to the existing designations?	☑	☐

If "***Yes***," proceed to Step 2 of the Checklist. For question B above, complete Step 3. For question C above, provide estimated project emissions under both existing and proposed designation(s) for comparison. Compare the maximum buildout of the existing designation and the maximum buildout of the proposed designation.

If "***No***," in accordance with the City's Significance Determination Thresholds, the project's GHG impact is significant. The project must nonetheless incorporate each of the measures identified in Step 2 to mitigate cumulative GHG emissions impacts unless the decision maker finds that a measure is infeasible in accordance with CEQA Guidelines Section 15091. Proceed and complete Step 2 of the Checklist.

The project site is within the Park, Open Space, and Recreation and Commercial Employment land use designation of the General Plan. The Land Use Element of the Mission Valley Community Plan identifies the site within an area designated as Commercial Office. The underlying base zone(s) are OF-1-1 and MVPD-MV-CO within the San Diego River Subdistrict.

The project is consistent with the General Plan and community plan land use designations as well as the existing underlying zone.

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[3] This question may also be answered in the affirmative if the project is consistent with SANDAG Series 12 growth projections, which were used to determine the CAP projections, as determined by the Planning Department.

[4] This category applies to all projects that answered in the affirmative to question 3 on the previous page: Is the project or a portion of the project located in a transit priority area.

Step 2: CAP Strategies Consistency

The second step of the CAP consistency review is to review and evaluate a project's consistency with the applicable strategies and actions of the CAP. Step 2 only applies to development projects that involve permits that would require a certificate of occupancy from the Building Official or projects comprised of one and two family dwellings or townhouses as defined in the California Residential Code and their accessory structures.[5] All other development projects that would not require a certificate of occupancy from the Building Official shall implement Best Management Practices for construction activities as set forth in the Greenbook (for public projects).

Step 2: CAP Strategies Consistency			
Checklist Item (Check the appropriate box and provide explanation for your answer)	Yes	No	N/A
Strategy 1: Energy & Water Efficient Buildings			
1. *Cool/Green Roofs*. • Would the project include roofing materials with a minimum 3-year aged solar reflection and thermal emittance or solar reflection index equal to or greater than the values specified in the voluntary measures under California Green Building Standards Code (Attachment A)?; OR • Would the project roof construction have a thermal mass over the roof membrane, including areas of vegetated (green) roofs, weighing at least 25 pounds per square foot as specified in the voluntary measures under California Green Building Standards Code?; OR • Would the project include a combination of the above two options? Check "N/A" only if the project does not include a roof component. The project will include a combination of a vegetated and minimum 3-year aged solar reflection and thermal emittance roof with an index equal to or greater than the values specified in the voluntary measures under the California Green Building Standards Code (CGBSC). The project includes roofs that have a slope greater than 2:12 and less than 2:12. For roofs with a slope greater than 2:12, they will have a minimum 3-year aged solar reflectance of .63 with a thermal emittance of .75 and solar reflectance index of 75. Roofs with a slope less than 2:12 and will have a minimum 3-year aged solar reflectance of .20 with a thermal emittance of .75 and solar reflectance index of 12. At the main building, a smaller lower roof will contain a vegetated (green) roof visible from one of the view decks. See sheet A-1.2	☑	☐	☐

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[5] Actions that are not subject to Step 2 would include, for example: 1) discretionary map actions that do not propose specific development, 2) permits allowing wireless communication facilities, 3) special events permits, 4) use permits or other permits that do not result in the expansion or enlargement of a building (e.g., decks, garages, etc.), and 5) non-building infrastructure projects such as roads and pipelines. Because such actions would not result in new occupancy buildings from which GHG emissions reductions could be achieved, the items contained in Step 2 would not be applicable.

2. *Plumbing fixtures and fittings*

With respect to plumbing fixtures or fittings provided as part of the project, would those low-flow fixtures/appliances be consistent with each of the following:

Residential buildings:

- Kitchen faucets: maximum flow rate not to exceed 1.5 gallons per minute at 60 psi;
- Standard dishwashers: 4.25 gallons per cycle;
- Compact dishwashers: 3.5 gallons per cycle; and
- Clothes washers: water factor of 6 gallons per cubic feet of drum capacity?

Nonresidential buildings:

- Plumbing fixtures and fittings that do not exceed the maximum flow rate specified in Table A5.303.2.3.1 (voluntary measures) of the California Green Building Standards Code (See Attachment A); and
- Appliances and fixtures for commercial applications that meet the provisions of Section A5.303.3 (voluntary measures) of the California Green Building Standards Code (See Attachment A)?

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Check "N/A" only if the project does not include any plumbing fixtures or fittings.

The project will include plumbing fixtures, fittings and appliances will meet the current State Green Building Code standards and will not exceed the maximum flow rates specified in Table A5 303.2.3.1 in the CGCBS. Consistencies with requirements have been confirmed by the project's mechanical engineer.

For applicable appliances and fixtures that are to be used for commercial services, they shall comply with Section A5.303.3 of the CGBSC.

Strategy 3: Bicycling, Walking, Transit & Land Use

3. *Electric Vehicle Charging*

- Multiple-family projects of 17 dwelling units or less: Would 3% of the total parking spaces required, or a minimum of one space, whichever is greater, be provided with a listed cabinet, box or enclosure connected to a conduit linking the parking spaces with the electrical service, in a manner approved by the building and safety official, to allow for the future installation of electric vehicle supply equipment to provide electric vehicle charging stations at such time as it is needed for use by residents?

- Multiple-family projects of more than 17 dwelling units: Of the total required listed cabinets, boxes or enclosures, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use by residents?

- Non-residential projects: Of the total required listed cabinets, boxes or enclosures, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use?

Check "N/A" only if the project is a single-family project or would not require the provision of listed cabinets, boxes, or enclosures connected to a conduit linking the parking spaces with electrical service, e.g., projects requiring fewer than 10 parking spaces.

Per the California Green Building Code Table 5.106.5.3.3, the project would be required to provide two electric vehicle charging spaces (minimum one space ready for use). The project would include two electric vehicle parking spaces with individual charging units as depicted on the Exhibit A plan set (Sheet No. AS-1.1).

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Strategy 3: Bicycling, Walking, Transit & Land Use

(Complete this section if project includes non-residential or mixed uses)

4. *Bicycle Parking Spaces*

Would the project provide more short- and long-term bicycle parking spaces than required in the City's Municipal Code (Chapter 14, Article 2, Division 5)?[6]

Check "N/A" only if the project is a residential project.

The project exceeds the minimum requirements of the SDMC, Chapter 14, Article 2, Division 5, by providing eight short-term spaces and one long-term space where two short-term and zero long-term bicycle spaces are required as depicted on the Exhibit A plan set (Sheet No. AS-1.1 and A-1.0).

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[6] Non-portable bicycle corrals within 600 feet of project frontage can be counted towards the project's bicycle parking requirements.

5. *Shower facilities*

If the project includes nonresidential development that would accommodate over 10 tenant occupants (employees), would the project include changing/shower facilities in accordance with the voluntary measures under the California Green Building Standards Code as shown in the table below?

Number of Tenant Occupants (Employees)	Shower/Changing Facilities Required	Two-Tier (12" X 15" X 72") Personal Effects Lockers Required
0-10	0	0
11-50	1 shower stall	2
51-100	1 shower stall	3
101-200	1 shower stall	4
Over 200	1 shower stall plus 1 additional shower stall for each 200 additional tenant-occupants	1 two-tier locker plus 1 two-tier locker for each 50 additional tenant-occupants

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Check "N/A" only if the project is a residential project, or if it does not include nonresidential development that would accommodate over 10 tenant occupants (employees).

The project will not exceed 10 full-time employees therefore no shower facilities are required for this project.

6. *Designated Parking Spaces*

If the project includes a nonresidential use in a TPA, would the project provide designated parking for a combination of low-emitting, fuel-efficient, and carpool/vanpool vehicles in accordance with the following table?

Number of Required Parking Spaces	Number of Designated Parking Spaces
0-9	0
10-25	2
26-50	4
51-75	6
76-100	9
101-150	11
151-200	18
201 and over	At least 10% of total

This measure does not cover electric vehicles. See Question 4 for electric vehicle parking requirements.

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Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces. The required designated parking spaces are to be provided within the overall minimum parking requirement, not in addition to it.

Check "N/A" only if the project is a residential project, or if it does not include nonresidential use in a TPA.

Per SDMC requirements, a minimum of six designated parking spaces for carpool and zero emissions vehicles are required if there are 51-75 automobile parking spaces on the premises. The project proposes to provide six spaces (four carpool/zero emissions spaces and two electric vehicle spaces) as depicted on the Exhibit A plan set (Sheet No. AS-1.1).

7. *Transportation Demand Management Program*

If the project would accommodate over 50 tenant-occupants (employees), would it include a transportation demand management program that would be applicable to existing tenants and future tenants that includes:

At least one of the following components:

- Parking cash out program
- Parking management plan that includes charging employees market-rate for single-occupancy vehicle parking and providing reserved, discounted, or free spaces for registered carpools or vanpools
- Unbundled parking whereby parking spaces would be leased or sold separately from the rental or purchase fees for the development for the life of the development

And at least three of the following components:

- Commitment to maintaining an employer network in the SANDAG iCommute program and promoting its RideMatcher service to tenants/employees
- On-site carsharing vehicle(s) or bikesharing
- Flexible or alternative work hours
- Telework program
- Transit, carpool, and vanpool subsidies
- Pre-tax deduction for transit or vanpool fares and bicycle commute costs
- Access to services that reduce the need to drive, such as cafes, commercial stores, banks, post offices, restaurants, gyms, or childcare, either onsite or within 1,320 feet (1/4 mile) of the structure/use?

Check "N/A" only if the project is a residential project or if it would not accommodate over 50 tenant-occupants (employees).

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The project will not exceed 10 full-time employees. This section does not apply.

Step 3: Project CAP Conformance Evaluation (if applicable)

The third step of the CAP consistency review only applies if Step 1 is answered in the affirmative under option B. The purpose of this step is to determine whether a project that is located in a TPA but that includes a land use plan and/or zoning designation amendment is nevertheless consistent with the assumptions in the CAP because it would implement CAP Strategy 3 actions. In general, a project that would result in a reduction in density inside a TPA would not be consistent with Strategy 3.The following questions must each be answered in the affirmative and fully explained.

1. **Would the proposed project implement the General Plan's City of Villages strategy in an identified Transit Priority Area (TPA) that will result in an increase in the capacity for transit-supportive residential and/or employment densities?**

   Considerations for this question:
   - Does the proposed land use and zoning designation associated with the project provide capacity for transit-supportive residential densities within the TPA?
   - Is the project site suitable to accommodate mixed-use village development, as defined in the General Plan, within the TPA?
   - Does the land use and zoning associated with the project increase the capacity for transit-supportive employment intensities within the TPA?

2. **Would the proposed project implement the General Plan's Mobility Element in Transit Priority Areas to increase the use of transit?**

   Considerations for this question:
   - Does the proposed project support/incorporate identified transit routes and stops/stations?
   - Does the project include transit priority measures?

3. **Would the proposed project implement pedestrian improvements in Transit Priority Areas to increase walking opportunities?**

   Considerations for this question:
   - Does the proposed project circulation system provide multiple and direct pedestrian connections and accessibility to local activity centers (such as transit stations, schools, shopping centers, and libraries)?
   - Does the proposed project urban design include features for walkability to promote a transit supportive environment?

4. **Would the proposed project implement the City of San Diego's Bicycle Master Plan to increase bicycling opportunities?**

   Considerations for this question:
   - Does the proposed project circulation system include bicycle improvements consistent with the Bicycle Master Plan?
   - Does the overall project circulation system provide a balanced, multimodal, "complete streets" approach to accommodate mobility needs of all users?

5. **Would the proposed project incorporate implementation mechanisms that support Transit Oriented Development?**

   Considerations for this question:
   - Does the proposed project include new or expanded urban public spaces such as plazas, pocket parks, or urban greens in the TPA?
   - Does the land use and zoning associated with the proposed project increase the potential for jobs within the TPA?
   - Do the zoning/implementing regulations associated with the proposed project support the efficient use of parking through mechanisms such as: shared parking, parking districts, unbundled parking, reduced parking, paid or time-limited parking, etc.?

6. **Would the proposed project implement the Urban Forest Management Plan to increase urban tree canopy coverage?**

   Considerations for this question:
   - Does the proposed project provide at least three different species for the primary, secondary and accent trees in order to accommodate varying parkway widths?
   - Does the proposed project include policies or strategies for preserving existing trees?
   - Does the proposed project incorporate tree planting that will contribute to the City's 20% urban canopy tree coverage goal?

CLIMATE ACTION PLAN CONSISTENCY CHECKLIST
ATTACHMENT A

This attachment provides performance standards for applicable Climate Action Pan (CAP) Consistency Checklist measures.

Table 1 **Roof Design Values for Question 1: Cool/Green Roofs supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan**

Land Use Type	Roof Slope	Minimum 3-Year Aged Solar Reflectance	Thermal Emittance	Solar Reflective Index
Low-Rise Residential	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16
High-Rise Residential Buildings, Hotels and Motels	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16
Non-Residential	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 residential and non-residential voluntary measures shown in Tables A4.106.5.1 and A5.106.11.2.2, respectively. Roof installation and verification shall occur in accordance with the CALGreen Code.

CALGreen does not include recommended values for low-rise residential buildings with roof slopes of ≤ 2:12 for San Diego's climate zones (7 and 10). Therefore, the values for climate zone 15 that covers Imperial County are adapted here.

Solar Reflectance Index (SRI) equal to or greater than the values specified in this table may be used as an alternative to compliance with the aged solar reflectance values and thermal emittance.

Table 2 **Fixture Flow Rates for Non-Residential Buildings related to Question 2: Plumbing Fixtures and Fittings supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan**

Fixture Type	Maximum Flow Rate
Showerheads	1.8 gpm @ 80 psi
Lavatory Faucets	0.35 gpm @60 psi
Kitchen Faucets	1.6 gpm @ 60 psi
Wash Fountains	1.6 [rim space(in.)/20 gpm @ 60 psi]
Metering Faucets	0.18 gallons/cycle
Metering Faucets for Wash Fountains	0.18 [rim space(in.)/20 gpm @ 60 psi]
Gravity Tank-type Water Closets	1.12 gallons/flush
Flushometer Tank Water Closets	1.12 gallons/flush
Flushometer Valve Water Closets	1.12 gallons/flush
Electromechanical Hydraulic Water Closets	1.12 gallons/flush
Urinals	0.5 gallons/flush

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 non-residential voluntary measures shown in Tables A5.303.2.3.1 and A5.106.11.2.2, respectively. See the California Plumbing Code for definitions of each fixture type.

Where complying faucets are unavailable, aerators rated at 0.35 gpm or other means may be used to achieve reduction.

Acronyms:
gpm = gallons per minute
psi = pounds per square inch (unit of pressure)
in. = inch

Table 3 **Standards for Appliances and Fixtures for Commercial Application related to Question 2: Plumbing Fixtures and Fittings supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan**

Appliance/Fixture Type	Standard	
Clothes Washers	Maximum Water Factor (WF) that will reduce the use of water by 10 percent below the California Energy Commissions' WF standards for commercial clothes washers located in Title 20 of the *California Code of Regulations.*	
Conveyor-type Dishwashers	0.70 maximum gallons per rack (2.6 L) (High-Temperature)	0.62 maximum gallons per rack (4.4 L) (Chemical)
Door-type Dishwashers	0.95 maximum gallons per rack (3.6 L) (High-Temperature)	1.16 maximum gallons per rack (2.6 L) (Chemical)
Undercounter-type Dishwashers	0.90 maximum gallons per rack (3.4 L) (High-Temperature)	0.98 maximum gallons per rack (3.7 L) (Chemical)
Combination Ovens	Consume no more than 10 gallons per hour (38 L/h) in the full operational mode.	
Commercial Pre-rinse Spray Valves (manufactured on or after January 1, 2006)	Function at equal to or less than 1.6 gallons per minute (0.10 L/s) at 60 psi (414 kPa) and • Be capable of cleaning 60 plates in an average time of not more than 30 seconds per plate. • Be equipped with an integral automatic shutoff. • Operate at static pressure of at least 30 psi (207 kPa) when designed for a flow rate of 1.3 gallons per minute (0.08 L/s) or less.	

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 non-residential voluntary measures shown in Section A5.303.3. See the California Plumbing Code for definitions of each appliance/fixture type.

Acronyms:
L = liter
L/h = liters per hour
L/s = liters per second
psi = pounds per square inch (unit of pressure)
kPa = kilopascal (unit of pressure)

CULTURAL RESOURCES SURVEY REPORT: DISCOVERY CENTER AT GRANT PARK, SAN DIEGO, CALIFORNIA

Submitted to:

City of San Diego
Development Services Department
1222 First Avenue
San Diego, California 92101-4154

Prepared for:

The San Diego River Park Foundation
4891 Pacific Highway, Suite 114
San Diego, CA 92110

Prepared by:

HELIX Environmental Planning
7578 El Cajon Boulevard
La Mesa, California 91942

Mary Robbins-Wade, RPA	**Kristina Davison**
Director of Cultural Resources	**Staff Archaeologist**

September ~~2014~~2015

HELIX Job No. RNT-01

USGS quadrangle:	La Jolla (7.5' series)
Acreage:	17 acres
Keywords:	Negative archaeological survey; San Diego River; Mission Valley; City of San Diego, San Diego County; Township 16 South, Range 3 West, unsectioned

TABLE OF CONTENTS

ATTACHMENTS

CONFIDENTIAL ATTACHMENTS

This report form shall be used when a site-specific survey for historical resources was completed and no archaeological resources were identified within the project area (APE). This form may be used, rather than completion of an Archaeological Resource Management Report, when archaeological resources were identified and, based on an evaluation, were determined to be non-significant or are potentially significant but will not be directly impacted by the proposed development project. Completion of the required site-specific survey and this report form must conform to the Historical Resources Guidelines of the Land Development Manual.

I. PROJECT DESCRIPTION AND LOCATION

(Include the geographic limits of the study area and a description of the proposed development project).

The Discovery Center at Grant Park project is located on the northeast corner of Camino Del Rio North and Qualcomm Way in the Mission Valley Community Plan area of the City of San Diego (Figures 1 and 2). The project is located north of Interstate 8 and west of Interstate 805. The San Diego River and its associated floodplain cross through the northern portion of the project site, and Murray Canyon lies roughly one mile to the northwest. The project area is within an unsectioned portion of Township 16 South, Range 3 West, on the USGS 7.5' La Jolla quadrangle.

The Discovery Center project consists of an interpretive center and associated facilities. The project proposes to construct a two-story, 8,250 square foot building with a view deck, a separate one-story, 1,200 square foot building, and an observation pier extending north into the San Diego River floodplain. Associated access, parking, water quality, and utility improvements would also be constructed. The landscape plan includes retention of a substantial proportion of the site's existing vegetation, removal of invasive and non-native vegetation, and new landscaping composed primarily of native vegetation. The San Diego River Trail would be extended through the project site along the southern bank of the San Diego River. The trail would consist of a 10-foot wide porous concrete surface with a minimum 2-foot wide decomposed granite shoulder area on each side. A retaining wall ranging up to approximately four feet in height would be constructed along much of the interface between the San Diego River Trail and adjacent native vegetation.

The cultural resources study includes a records search, a field survey to determine whether any archaeological resources are present, and contacting the Native American Heritage Commission and the local Native American community.

II. SETTING

Natural Environment (Past and Present)

The project area is in the coastal plains of western San Diego County, situated within and south of the San Diego River. The climate is characterized as semi-arid cool (Griner and Pryde 1976). Annual temperatures range from an average January low of about 44° F to an average July high of 75° F, and annual rainfall averages around 10 inches (Griner and Pryde 1976). The project is underlain by Quaternary deposits (Kennedy 1975), and the mapped soil types for the project are gravel pits and riverwash, with riverwash being a majority of the site's soil composition (Bowman 1973). Vegetation supported by these soils is generally limited to scattered coast live oaks, sycamores, and sparse shrubs and forbs (Bowman 1973). These plant species, oaks in particular, are known to have been used by Native people for food, medicine, tools, shelter, ceremonial and other uses (Christenson 1990; Hedges and Beresford 1986; Luomala 1978; Shipek 1970). Many of the animal species found in riparian communities would have been used by native populations as well.

A large portion of the site was previously used for sand mining and was subsequently filled, but the parcel is currently undeveloped. A majority of the project area has been altered by the property's past use as a sand mine. Presently, both native and non-native (invasive) vegetation are present, including coast live oaks, Emory baccharis, river willow, mule fat, and lemonadeberry. The southern portion of the site, which would be affected by the construction of the proposed facilities, appears to be nearly entirely composed of fill soils from an unknown location (see below discussion of aerial photographs).

Ethnography/History

Several summaries discuss the prehistory of San Diego County and provide a background for understanding the archaeology of the general area surrounding the project. Moratto's (1984) review of the archaeology of California contains important discussions of Southern California, including the San Diego area, as does a relatively recent book by Neusius and Gross (2007). Bull (1983, 1987), Carrico (1987), Gallegos (1987), and Warren (1985, 1987, 1998) provide summaries of archaeological work and interpretations, and another paper (Arnold et al. 2004) discusses advances since 1984. A culture history of the San Diego area is included as Attachment D.

The project area is within lands that have traditionally been inhabited by the Kumeyaay people, also known as Diegueño or Ipai/Tipai (Luomala 1978). Two ethnohistoric village sites associated with Mission San Diego de Alcala existed in Mission Valley: *Cosoy* (or *Kosoi*) and *Nipaquay* (Carrico 1993). In her introduction to the autobiography of Delfina Cuero, Shipek wrote that around 1900 many Diegueño Indians lived in Mission Valley and in various other places around San Diego, including "at the foot of Rose Canyon, along Ocean Beach, around the edge of Mission Bay (False Bay), and all up and down Mission

Valley. Each of these locations has been corroborated independently by non-Indian 'old timers' in San Diego" (Shipek 1970:9).

Mission Valley supported agricultural uses from the Mission period until the development of commercial and residential uses in the last 50 years or so. Dairies were still present in some parts of the Valley in the 1970s. Sand and gravel mining has also been conducted in the vicinity, including within the current project area. The area surrounding the project site has been subject to a great deal of disturbance over many years from sand and gravel operations, construction of roadways, development of commercial and residential uses, channelization of the San Diego River, and other improvements. The history of the Mission Valley area is presented in Attachment D.

III. AREA OF POTENTIAL EFFECT (APE)

(Describe the nature and extent of anticipated direct, indirect and cumulative impacts).

Although the development footprint is confined to the southwestern portion of the project site (see Figure 3), for the purposes of this report, the Area of Potential Effect (APE) is defined as the entire project site.

IV. STUDY METHODS

(Include a description of the specific methods used in the identification and evaluation of archaeological resources for this study).

A records search was conducted at the South Coastal Information Center (SCIC) at San Diego State University in August 2014, to supplement in-house records from other previous projects in the vicinity, including a recent cultural resources survey for a project located to the east, just south of Interstate 8. The records search map is included as Confidential Attachment A. The Native American Heritage Commission (NAHC) was contacted for a Sacred Lands File Check and a list of Native American contacts (Confidential Attachment B). Letters regarding the project were sent to contacts listed by the NAHC and are included in Confidential Attachment B.

The project APE was surveyed for cultural resources on September 3, 2014 by Kristina Davison of HELIX and Anthony LaChappa of Red Tail Monitoring and Research (Native American monitor). The project area was walked in 5 meter transects in clear areas, and 10 meter transects in areas of dense vegetation and ground cover, where feasible. The area within and immediately adjacent to the San Diego River was not walked, due to extremely poor ground visibility and transient activity. Similarly, a small area that was very densely populated by transient camps was not surveyed, due to safety concerns and lack of ground visibility. Soil throughout the southern half of the project site appears to be fill from an offsite location, which is further supported by aerial photography of the project site. Building materials, modern debris, and broken cobbles litter the project site in areas clear of vegetation; dense vegetation occupies a majority of the project site. The slope along the project's northern boundary was also examined up to the vegetation line, though that area has also suffered disturbances from the construction of the railway. No archaeological resources were observed, however as stated previously a majority of the project area had little to no ground visibility at the time of the survey. ~~The depth of the fill on-site is unknown.~~ The geotechnical report indicated, "Undocumented fill soil was encountered in all borings to depths ranging from approximately 15 to 30 feet below existing grade" (Geocon 2014:2). It is possible that whatever cultural materials may have been present were destroyed when the site was mined for sand in the 1950s-1960s; however, there is a potential for ~~buried~~ cultural resources in the undocumented fill ~~alluvial~~ soils, which appears to have come from the nearby area along the river.

V. RESULTS OF STUDY
Background Research

HELIX's cultural resource division (formerly Affinis) conducted a records search at SCIC in August 2014, to supplement in-house records from other projects in the vicinity. The project APE has been surveyed for cultural resources in the past in association with studies for the San Diego River Park Master Plan, as well as other projects in the vicinity such as sewer and bike trail projects. Seven archaeological resources have been recorded within a 1-mile radius of the project area, none within or adjacent to the project APE. Of the recorded resources, two of the sites are "Early Man" sites, which are not generally accepted as cultural in nature due to the primarily geologic features that have been identified as cultural by some researchers but are questioned by most archaeologists (Carter 1952 site record, Reeves 1977 site record). Two of the sites are described as lithic scatters, and one resource is an isolated lithic flake. Two of the recorded sites are historic, one of which is the former location of the Adams Avenue Trolley Carbarn (ca. 1913-1979) that was demolished in conjunction with a proposed construction project (Bevel 1998 site record, on-file at SCIC). The other historic site is a single-family residence designed by notable San Diego architect Irving Gill.

Historic maps and aerial photographs were reviewed for the current project. No structures are present within the project on USGS topographic maps from 1930 (15' La Jolla quadrangle), 1943 (7.5' Del Mar quadrangle), and 1967 (7.5' Del Mar quadrangle) nor on aerial photographs from 1953 and 1964 (historicaerials.com). The 1953 aerial photograph shows the site as being densely vegetated; by 1964, the site had been mined for sand, which resulted in ponding throughout a majority of the property. By the time of the 1980 aerial photograph, the property was filled, the road currently known as Qualcomm Way was constructed, and the berms separating the northern portion from the southern portion were present.

The Native American Heritage Commission (NAHC) was contacted for a Sacred Lands File Search of the project area in August 2014. The search "failed to indicate the presence of Native American cultural resources in the immediate project area" (Confidential Attachment B). In September 2014, notification letters were sent to parties of interest as indicated in the NAHC response. To date, the only comment received has been from the Viejas Band of Kumeyaay Indians. The Viejas response indicated that the project site has "cultural significance or ties to Viejas." They requested that a Viejas Cultural Monitor be on-site for all ground-disturbing activities, "to inform us of any inadvertent discovery of cultural artifacts, cremation sites, or human remains". Any additional comments received will be forwarded to City of San Diego staff. Native American correspondence is included as Confidential Attachment B of this report.

Field Reconnaissance

The archaeological survey was conducted on September 3, 2014. Portions of the project site currently support a diverse range of vegetation, limiting ground visibility to the dirt road and its associated slopes. Ground visibility was fair to poor even in areas that were not occupied by dense vegetation, due to a cover of leaf duff and detritus in many areas. Extensive disturbance was evident at the time of the survey. No cultural resources were observed during the survey and none have been previously recorded in the project area.

Evaluation

No cultural resources have been identified within or adjacent to the project APE and no impacts to cultural resources are anticipated. However, the property is along the San Diego River, an area that is rich in cultural resources and of importance to the Native American (Kumeyaay) people. In addition, the APE is underlain by alluvial soils, though the southern half of the site contains fill soils from the 1960s-1970s (historicaerials.com, aerial photographs from 1964 and 1980). The presence of fill soils does not negate the possibility of encountering cultural material during ground-disturbing activity. Based on this, there is a potential for subsurface cultural resources.

VI. RECOMMENDATIONS

(Include recommendations for mitigation of significant indirect and cumulative impacts and monitoring, as appropriate).

No impacts to cultural resources are anticipated, as no cultural material was observed during the survey. However, ground visibility was quite poor over most of the project site. In addition, there is a potential for subsurface cultural resources given the alluvial setting, the presence of undocumented fill soils apparently from nearby areas, and the location in an area generally rich in cultural resources. Based on this, archaeological and Native American monitoring is recommended for ground-disturbing activities in the APE. The

City's standard mitigation measures for archaeological and Native American monitoring are included as Attachment E.

VII. SOURCES CONSULTED

SOURCES CONSULTED	DATE	
■National Register of Historic Places	Month and Year:	August 2014
■California Register of Historical Resources	Month and Year:	August 2014
■City of San Diego Historical Resources Register	Month and Year:	August 2014
Archaeological/Historical Site Records:		
■South Coastal Information Center	Month and Year:	August 2014
□ San Diego Museum of Man	Month and Year:	
Other Sources Consulted:		
Native American Heritage Commission	Month and Year:	August 2014

VIII. CERTIFICATION

Preparer: Mary Robbins-Wade Title: Director of Cultural Resources

Signature: Mary Robbins-Wade Date: ~~September 19, 2014~~ September 10, 2015

Preparer: Kristina Davison Title: Staff Archaeologist

Signature: Kristina K Davison Date: ~~September 19, 2014~~ September 10, 2015

IX. ATTACHMENTS

A National Archaeological Data Base Information
B Bibliography
C Maps/Figures
  - ■ U.S.G.S. Quadrangle
  - ■ Project Maps (Delineate area of actual survey of Project Map, or largest scale map available).
  - ■ Site Plan
D Culture History
E Mitigation Monitoring Reporting Program

ATTACHMENT A

NATIONAL ARCHAEOLOGICAL DATA BASE INFORMATION

NATIONAL ARCHAEOLOGICAL DATA BASE INFORMATION

Authors: Mary Robbins-Wade and Kristina Davison
Consulting Firm: HELIX Environmental Planning, Inc., 7578 El Cajon Boulevard, La Mesa, CA 91942
Report Date: September ~~2014~~ 2015
Report Title: Cultural Resources Survey Report: Discovery Center at Grant Park, San Diego, California.
Submitted to: City of San Diego Development Services Department, 1222 First Avenue, San Diego, California 92101-4154
Prepared for: The San Diego River Park Foundation, 4891 Pacific Highway, Suite 114, San Diego, CA 92110
Contract number: RNT-01
USGS quadrangles: La Jolla (7.5' series)
Acreage: 17 acres
Keywords: Negative archaeological survey; San Diego River; Mission Valley; City of San Diego, San Diego County; Township 16 South, Range 3 West, unsectioned

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ATTACHMENT B

BIBLIOGRAPHY

BIBLIOGRAPHY

Arnold, J.E., M.R. Walsh, and S.E. Hollimon.
2004 Archaeology of California. *Journal of Archaeological Research* 12:1-73.

Bowman, Roy H.
1973 *Soil Survey, San Diego Area, California, Part I*. United States Department of Agriculture, Beltsville, MD.

Bull, Charles S.
1983 Shaking the Foundations: The Evidence for San Diego Prehistory. *Casual Papers: Cultural Resource Management* 1(3):15-64. Cultural Resource Management Center, San Diego State University.

1987 A New Proposal: Some Suggestions for San Diego Prehistory. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by Dennis Gallegos, pp. 35-42. San Diego County Archaeological Society, Research Paper 1.

Carrico, Richard L.
1987 Sixty-five Years of San Diego County Archaeology. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by Dennis Gallegos, pp. 1-14. San Diego County Archaeological Society, Research Paper 1.

1993 Ethnohistoric Period. In *Draft Historic Properties Background Study for the City of San Diego Clean Water Program*, pp. V-1--V-24. Brian F. Mooney Associates, San Diego. Report submitted to City of San Diego, Clean Water Program for Greater San Diego.

Christenson, Lynne E.
1990 *The Late Prehistoric Yuman People of San Diego County, California: Their Settlement and Subsistence System*. Ph.D. dissertation, Department of Anthropology, Arizona State University, Tempe. University Microfilms, Ann Arbor.

Gallegos, Dennis
1987 A Review and Synthesis of Environmental and Cultural Material for the Batiquitos Lagoon Region. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by Dennis Gallegos, pp. 23-34. San Diego County Archaeological Society, Research Paper 1.

Geocon, Incorporated
2014 *Geotechnical Investigation San Diego River Discovery Center San Diego, California*. Geocon, Incorporated. Report on file at HELIX.

Griner, E. Lee, and Philip R. Pryde
1976 Climate, Soils, and Vegetation. In *San Diego: An Introduction to the Region*, edited by Philip R. Pryde, pp. 29-46. Kendall/Hunt Publishing Company, Dubuque, Iowa.

Hedges, Ken, and Christina Beresford
1986 *Santa Ysabel Ethnobotany*. San Diego Museum of Man Ethnic Technology Notes No. 20.

Historicaerials.com
1953- Aerial photographs at www.historicaerials.com.
1980

Kennedy, Michael P.
1975 *Geology of the San Diego Metropolitan Area, California*. California Division of Mines and Geology, Sacramento.

Luomala, Katherine
1978 Tipai-Ipai. In *California*, edited by Robert F. Heizer, pp. 592-609. *The Handbook of North American Indians*, vol. 8. William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Moratto, Michael J.
1984 *California Archaeology*. Academic Press, Orlando.

Neusius, Sarah W., and G. Timothy Gross
2004 *Seeking Our Past: An Introduction to North American Archaeology*. Oxford University Press, New York.

Shipek, Florence
1970 *The Autobiography of Delfina Cuero*. As told to Florence Shipek. Malki Museum Press, Banning, CA.

Warren, Claude N.
1985 Garbage about the Foundations: A Comment on Bull's Assertions. *Casual Papers: Cultural Resource Management* 2(1):82-90. Cultural Resource Management Center, San Diego State University.

1987 The San Dieguito and La Jolla: Some Comments. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by Dennis Gallegos, pp. 73-85. San Diego County Archaeological Society, Research Paper 1.

ATTACHMENT C

MAPS/FIGURES

I:\PROJECTS\R\RNT\RNT-01_SDRiverDiscovery\Map\ENV\Cultural\Fig1_Regional.mxd RNT-01 09/15/14 -KF

Regional Location Map

DISCOVERY CENTER AT GRANT PARK

HELIX
Environmental Planning

N

0 8
Miles

Figure 1

Source: USGS 7.5' Quadrangle; La Jolla,

I:\PROJECTS\R\RNT\RNT-01_SDRiverDiscovery\Map\ENV\Cultural\Fig2_Vicinity_USGS.mxd RNT-01 09/15/14 -KF

Project Vicinity Map

DISCOVERY CENTER AT GRANT PARK

Figure 2

0 2,000 Feet
0 0.5 Mile

HELIX
Environmental Planning

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Site Plan

DISCOVERY CENTER AT GRANT PARK

Figure 3

HELIX Environmental Planning

N 0 150 Feet

ATTACHMENT D

CULTURE HISTORY

GENERAL CULTURE HISTORY

Several summaries discuss the prehistory of San Diego County and provide a background for understanding the archaeology of the general area surrounding the project. Moratto's (1984) review of the archaeology of California contains important discussions of Southern California, including the San Diego area, as does a relatively new book by Neusius and Gross (2007). Bull (1983, 1987), Carrico (1987), Gallegos (1987), and Warren (1985, 1987) provide summaries of previous archaeological work and interpretations, and another paper (Arnold et al. 2004) discusses advances since 1984. The following is a brief discussion of the culture history of the San Diego region.

Carter (1957, 1978, 1980), Minshall (1976) and others (e.g., Childers 1974; Davis 1968, 1973) have long argued for the presence of Pleistocene humans in California, including the San Diego area. The sites identified as "early man" are all controversial. Carter and Minshall are best known for their discoveries at Texas Street and Buchanan Canyon. The material from these sites is generally considered nonartifactual, and the investigative methodology is often questioned (Moratto 1984).

The earliest accepted archaeological manifestation of native Americans in the San Diego area is the San Dieguito complex, dating to approximately 10,000 years ago (Warren 1967). The San Dieguito complex was originally defined by Rogers (1939), and Warren published a clear synthesis of the complex in 1967. The material culture of the San Dieguito complex consists primarily of scrapers, scraper planes, choppers, large blades, and large projectile points. Rogers considered crescentic stones to be characteristic of the San Dieguito complex as well. Tools and debitage made of fine-grained green metavolcanic material, locally known as felsite, were found at many sites which Rogers identified as San Dieguito. Often these artifacts were heavily patinated. Felsite tools, especially patinated felsite, came to be seen as an indicator of the San Dieguito complex. Many archaeologists felt that the San Dieguito culture lacked milling technology and saw this as an important difference between the San Dieguito and La Jolla complexes. Sleeping circles, trail shrines, and rock alignments have also been associated with early San Dieguito sites. The San Dieguito complex is chronologically equivalent to other Paleoindian complexes across North America, and sites are sometimes called "Paleoindian" rather than "San Dieguito". San Dieguito material underlies La Jolla complex strata at the C. W. Harris site in San Dieguito Valley (Warren, ed. 1966).

The traditional view of San Diego prehistory has the San Dieguito complex followed by the La Jolla complex at least 7000 years ago, possibly as long as 9000 years ago (Rogers 1966). The La Jolla complex is part of the Encinitas tradition and equates with Wallace's (1955) Millingstone Horizon. The Encinitas tradition is generally "recognized by millingstone assemblages in shell middens, often near sloughs and lagoons" (Moratto 1984:147). "Crude" cobble tools, especially choppers and scrapers, characterize the La Jolla complex (Moriarty 1966). Basin metates, manos, discoidals, a small number of Pinto series and Elko series points, and flexed burials are also characteristic.

Warren et al. (1961) proposed that the La Jolla complex developed with the arrival of a desert people on the coast who quickly adapted to their new environment. Moriarty (1966) and Kaldenberg (1976) have suggested an in situ development of the La Jolla people from the San Dieguito. Moriarty has since proposed a Pleistocene migration of an ancestral stage of the La Jolla people to the San Diego coast. He suggested this Pre-La Jolla complex is represented at Texas Street, Buchanan Canyon, and the Brown site (Moriarty 1987).

Since the 1980s, archaeologists in the region have begun to question the traditional definition of San Dieguito people simply as makers of finely crafted felsite projectile points, domed scrapers, and discoidal cores, who lacked milling technology. The traditional defining criteria for La Jolla sites (manos, metates, "crude" cobble tools, and reliance on lagoonal resources) have also been questioned (Bull 1987; Cárdenas and Robbins-Wade 1985; Robbins-Wade 1986). There is speculation that differences between artifact assemblages of "San Dieguito" and "La Jolla" sites reflect functional differences rather than temporal or cultural variability (Bull 1987; Gallegos 1987). Gallegos (1987) has proposed that the San Dieguito, La Jolla, and Pauma complexes are manifestations of the same culture, with differing site types "explained by site location, resources exploited, influence, innovation and adaptation to a rich coastal region over a long period of time" (Gallegos 1987:30). The classic "La Jolla" assemblage is one adapted to life on the coast and appears to continue through time (Robbins-Wade 1986; Winterrowd and Cárdenas 1987). Inland sites adapted to hunting contain a different tool kit, regardless of temporal period (Cárdenas and Van Wormer 1984).

Several archaeologists in San Diego, however, do not subscribe to the Early Prehistoric/Late Prehistoric chronology (see Cook 1985; Gross and Hildebrand 1998; Gross and Robbins-Wade 1989; Shackley 1988; Warren 1998). They feel that an apparent overlap among assemblages identified as "La Jolla," "Pauma," or "San Dieguito" does not preclude the existence of an Early Milling period culture in the San Diego region, whatever name is used to identify it, separate from an earlier culture. One problem these archaeologists perceive is that many site reports in the San Diego region present conclusions based on interpretations of stratigraphic profiles from sites at which stratigraphy cannot validly be used to address chronology or changes through time. Archaeology emphasizes stratigraphy as a tool, but many of the sites known in the San Diego region are not in depositional situations. In contexts where natural sources of sediment or anthropogenic sources of debris to bury archaeological materials are lacking, other factors must be responsible for the subsurface occurrence of cultural materials. The subsurface deposits at numerous sites are the result of such agencies as rodent burrowing and insect activity. Various studies have emphasized the importance of bioturbative factors in producing the stratigraphic profiles observed at archaeological sites (see Gross 1992). Different classes of artifacts move through the soil in different ways (Bocek 1986; Erlandson 1984; Johnson 1989), creating vertical patterning (Johnson 1989) that is not culturally relevant. Many sites that have been used to help define the culture sequence of the San Diego region are the result of just such nondepositional stratigraphy.

The Late Prehistoric period is represented by the San Luis Rey complex in northern San Diego County and the Cuyamaca complex in the southern portion of the county. The San Luis Rey complex is the archaeological manifestation of the Shoshonean predecessors of the ethnohistoric Luiseño (named for the San Luis Rey Mission). The Cuyamaca complex represents the Yuman forebears of the Kumeyaay (Diegueño, named for the San Diego Mission). Agua Hedionda is traditionally considered to be the point of separation between Luiseño and Northern Diegueño territories.

Elements of the San Luis Rey complex include small, pressure-flaked projectile points (Cottonwood and Desert Side-notched series); milling implements, including mortars and pestles; *Olivella* shell beads; ceramic vessels; and pictographs (True et al. 1974). Of these elements, mortars and pestles, ceramics, and pictographs are not associated with earlier sites. True noted a greater number of quartz projectile points at San Luis Rey sites than at Cuyamaca complex sites, which he interpreted as a cultural preference for quartz (True 1966). He considered ceramics to be a late development among the Luiseño, probably learned from the Diegueño. The general mortuary pattern at San Luis Rey sites is ungathered cremations.

The Cuyamaca complex, reported by True (1970), is similar to the San Luis Rey complex, differing in the following points:

1. Defined cemeteries away from living areas;
2. Use of grave markers;
3. Cremations placed in urns;
4. Use of specially made mortuary offerings;
5. Cultural preference for side-notched points;
6. Substantial numbers of scrapers, scraper planes, etc., in contrast to small numbers of these implements in San Luis Rey sites;
7. Emphasis placed on use of ceramics; wide range of forms and several specialized items;
8. Steatite industry;
9. Substantially higher frequency of milling stone elements compared with San Luis Rey;
10. Clay-lined hearths (True 1970:53-54).

Both the San Luis Rey and Cuyamaca complexes were defined on the basis of village sites in the foothills and mountains. Coastal manifestations of both Luiseño and Kumeyaay differ from their inland counterparts. Fewer projectile points are found on the coast, and there tends to be a greater number of scrapers and scraper planes at coastal sites (Robbins-Wade 1986, 1988). Cobble-based tools, originally defined as "La Jolla", are characteristic of coastal sites of the Late Prehistoric period, as well (Cárdenas and Robbins-Wade 1985:117; Winterrowd and Cárdenas 1987:56).

MISSION VALLEY AREA

The project area is within lands that have traditionally been inhabited by the Kumeyaay people, also known as Diegueño or Ipai/Tipai (Luomala 1978). The area is rich in cultural resources, situated within Mission Valley and the San Diego River floodplain. These areas were occupied for thousands of years. Two ethnohistoric village sites associated with Mission San Diego de Alcala existed in Mission Valley: *Cosoy* (or *Kosoi*) and *Nipaquay* (Carrico 1993). In her introduction to the autobiography of Delfina Cuero, Shipek wrote that around 1900 many Diegueño Indians lived in Mission Valley and in various other places around San Diego, including "at the foot of Rose Canyon, along Ocean Beach, around the edge of Mission Bay (False Bay), and all up and down Mission Valley. Each of these locations has been corroborated independently by non-Indian 'old timers' in San Diego" (Shipek 1970:9). Seven archaeological resources have been recorded within a one-mile radius of the project area, none within or adjacent to the project APE itself. Of the recorded resources, two are archaeological sites, one is an isolated artifacts, two are controversial "Early Man" sites (generally accepted as not cultural in nature), and two are historic structures and structural remnants.

HISTORY OF MISSION VALLEY

By Stephen R. Van Wormer

A history of Mission Valley was prepared by Stephen R. Van Wormer for the SR 163/Friars Road Interchange project and is applicable to the current project as well. It is included here.

Spanish Mexican Period 1769 - 1848

This historic period in Mission Valley began in July 1769 with the founding of the Mission and Presidio of San Diego on present day Presidio Hill by a combined group of Spanish military forces and Catholic priests. The new settlement overlooked the valley, which the Spanish named La Cañada de San Diego, and the Native American Kumeyaay village of *Cosoy*, which was located on the south bank of the river less than a mile east of the Presidio. The first year the Spaniards planted their crops in the valley the San Diego River overflowed its banks and carried away everything that had been sown (Papageorge 1968; Ezell and Ezell 1987).

In August 1774 the Catholic priests moved the mission to its current location at the north end of the valley where the land appeared more suitable for cultivation, and the local natives could be educated apart from Spanish military personnel. Following completion of a dam and aqueduct system in the early 1800s the mission's vineyards, orchards, and crops flourished. The missionaries also introduced herds of livestock, especially horses and cattle, onto unirrigated lands (Papageorge 1968; Englehardt 1920).

At the western end of the valley, Presidio families continued to tend garden plots in the river bed. In the 1820s a small settlement grew up at the foot of Presidio Hill. The townspeople continued to plant in the nearby valley, and obtained their water either from the river or from under its sands (Papageorge 1968).

American Frontier Period 1850 – 1870 and Development of Intensive Agriculture 1870 – 1950

The early American Period in Mission Valley saw an expansion of unirrigated dry farming. Prolonged litigation over land titles within the boundaries of former mission lands retarded development in the east end of the valley. Some residents of Old Town continued to cultivate lands in the Valley's west end. This pattern continued until the 1870s when markets resulting from urban growth initiated more intensive agriculture.

The first attempt to establish a city on San Diego Bay within the current downtown area was in 1850, when William Heath Davis laid out his New Town tract. Water for the new community had to be hauled from the river. New Town failed to materialize from a lack of population and commercial interest. However, in 1869 Alonzo Horton succeeded where Davis had not and laid out his Horton's Addition tract, which grew into the modern city of San Diego. By 1873, San Diego had a population of 1,500 (Starr 1986). Phenomenal growth has characterized the city's development, along with that of all Southern California, ever since. In 1885 the city had around 5,000 inhabitants, in 1888 15,000 and in 1890 16,159. Every ten years from 1890 to 1930 San Diego registered around a 100 percent increase in population so that by 1930 the city had nearly 148,000 residents. The effect of this growth on Mission Valley was the gradual creation of a market for agricultural products and the expansion of more intensive agriculture. This was also made possible by improvement of pumping equipment allowing the irrigation of valley bottom lands (Henson 1960). Mission Valley received its current name in the 1870s (Papageorge 1968; Starr 1986). It became the scene of truck gardens and dairies as far east as the Mission.

Asian immigrants had a vital part in the spread of intensive agriculture, working leased land. Around twenty Japanese families and several Chinese farmers cultivated vegetable gardens, which were the envy of Caucasian neighbors. Chinese were probably in the valley before 1890. The Japanese arrived around 1905 (Jones 1973). Their effects on the landscape were pronounced. Intensively cultivated vegetable gardens were a feature of every farm (Jones 1973).

The drift to intensive agriculture also brought orchards, vines, and poultry ranches, practiced on a small scale by many valley residents. Two poultry ranches, one at the foot of Texas Street, the other near Linda Vista Road, were exclusively devoted to raising eggs and poultry for adjacent urban areas (Henson 1960).

Dairies were a second aspect of the trend toward intensive agriculture. Between 1884 and 1934 approximately twenty were established in Mission Valley. They developed in response to the nearby urban market, and increased in number as that market expanded.

The valley possessed cheap, flat land that provided the space required for dairy operations (Henson 1960). Dairyman focused on shipping cream to market until 1915 when Mr. Ernest Briden started bottling milk. Other dairymen in Mission Valley quickly followed his lead (Henson 1960). The Challenge Cream and Butter Association was located at the southeast corner of the study area and went through a transition over the years from a dairy to a retail distributor of dairy products, and, by 1960, had become a wholesaler of dairy products (Henson 1960).

In summary, the decades of the 1870s through the 1950s in Mission Valley were characterized by a persistent trend toward intensive agriculture which spread over undeveloped areas and displaced dry-farming. Slow at the start because of prolonged litigation over land ownership, the spread of intensive agriculture was augmented by improvements in technology, and the growth of an adjacent urban center (Papageorge 1968).

Commercialization 1950 - 2000

By 1930 intensive agriculture in Mission Valley had reached a near maximum, while the urban portion of San Diego had filled the mesa top to the south and grown to the valley's edge, presenting a clear division between the urbanized mesa above and the rural valley below (Papageorge 1968). In 1940 San Diego was a city of 203,341. By this time small scale non-agricultural commercial activities had begun to encroach on the valley's land. Sand and gravel businesses had existed there for many years, horse farms and riding stables were numerous, and a polo club was popular (Papageorge 1968). Commercialization remained on a small scale until the 1950s when unprecedented growth brought almost complete commercialization of the valley by the end of the twentieth century. Three major factors made this growth possible: flood control, road construction, and commercial pressure from population growth.

Flood Control

Flood control in the valley evolved over a period of almost 100 years. The first government action to bring flood control was an 1851 U.S. Coast Survey report that warned that San Diego Bay might be filled in by silting from the river. Lt. George Horatio Derby, of the U.S. Army Corps of Engineers was sent to San Diego in 1853 to build a dike to divert the river into False (current Mission) Bay. Although Derby wanted to excavate a new straight channel he was ordered to deepen the old channel and build a new levee from a point at the foot of Presidio Hill to the foot of Point Loma (1190 yards). Sixty laborers with carts and wheel barrows were put to work. Derby complained that the plan was not sound and funds insufficient. His predictions proved correct. The first major storm took out part of the dike and during heavy rains in 1855 the river flowed back into San Diego Bay (Papageorge 1968).

In 1875 Congress appropriated $80,000 for a government dike to turn the river once more into False Bay. Work was done under the supervision of Lt. Weeden and was completed in 1876. The government dike was raised twice, once in 1917, and again in 1933. Floods continued to be a periodic problem for valley farmers. A flood in 1895 damaged crops and washed out bridges and railway trestles. During the devastating rains of 1916 Mission Valley flooded, quickly wiping out the vegetable gardens of the Chinese and Japanese farmers and 10 of the 12 wells in use by the city. Major flooding was brought under control by completion of El Captain Dam in 1935, and the San Vicente Dam in 1947. Both of these structures store water from the water shed along the upper reaches of the San Diego River (Papageorge 1968).

Road Construction

In the 1860s a road crossed the valley at Old Town and went up the north side of the river to the mission (Papageorge 1968). By the early 1900s a road crossed the valley at the location of the current study area. It ran from 6th Street on the mesa, down the canyon currently occupied by the Cabrillo Freeway (SR 163), and across the valley to join roads entering from Linda Vista Mesa and Murray Canyon. This road would later be designated the 6th Street Extension. Two other roads ran the length of the valley on the north and south sides. These would later become Friars Road and Camino Del Rio. A series of road improvements during the 1930s rendered the valley more accessible to the urbanized area to the south. Beginning in 1930, roads were aligned and paved and in spots were relocated further up on the valley slopes to reduce the possibility of being flooded. Development was piecemeal, and accomplished along different stretches at different times. U.S. Highway 101 skirted past the western end of the valley. Three major roads entered from the northern mesa. East to west they were, Murphy Canyon Road, Murray Canyon Road, and Linda Vista Road. Five roads entered from the southern side. East to west they were Fairmont Avenue, Ward Road, Texas Street (also known as Sandrock Grade), 6th Street Extension, and Allen Grade, an unimproved private road. At the east end of the valley, Mission Gorge Road joined Fairmont Avenue near Camino del Rio, and extended through the upper valley and out Mission Gorge. Camino Del Rio and Friars Road ran the length of the lower valley on the southern and northern sides respectively. At this time there was no direct eastward connection with U.S. Highway 80, the principal route east, which ran along El Cajon Boulevard (Henson 1960), although a small road did access the valley through Alvarado Canyon (USGS 1901, 1930).

These road improvements rendered the valley more accessible to San Diego's urbanized core to the south. Non-farm residences, neighborhood commercial concerns, and sand and gravel plants were among the earliest urban intrusions. At the end of World War II population growth brought highway and freeway construction during the fifties that opened the entire valley to commercialization (Henson 1960),

The Second World War brought a phenomenal influx of population to San Diego and to the entire west coast. The population of San Diego for the years 1930, 1940 and 1950 respectively was 148,000, 203,000, and 334,000. Areas of growth were primarily south toward Chula Vista and National City, east toward El Cajon and La Mesa, and north onto Kearney Mesa where the wartime housing development of Linda Vista became established. This growth had two significant effects on Mission Valley. The urban areas to the east created a need for additional east-west access routes and the development on the northern mesas required access to lands on the north side of the valley. With the increased population, traffic on Camino del Rio became extremely congested. On weekdays the road was used by residents of the eastern suburbs who worked in the industrial and military areas to the southwest as well as college students traversing the valley in route to San Diego State College (Henson 1960).

To relieve these traffic problems, Mission Valley saw a second phase of road development during the late 1940s and early 1950s, that included the construction of three major roads: the Cabrillo, Mission Valley, and Alvarado "Freeways." The latter two were actually limited access highways rather than multi-lane divided routes free of intersectional crossings. The Mission Valley and Alvarado routes traversed the valley from east to west with an interchange at the junction of the Mission Valley and Cabrillo Freeways (currently I-8 and SR 163). The Cabrillo Freeway, which was also Highway 395 and the former 6th Street Extension, was started in 1946 and completed in 1949. It ran from downtown San Diego, across Mission Valley, to a point on Kearney Mesa. The Alvarado Freeway extended up Alvarado Canyon from Fairmont Avenue to an interchange with U.S. Highway 80. The Mission Valley Freeway extended westward from Fairmont Avenue. It was built in sections, the last of which was completed in 1951 (Henson 1960).

Completion of these routes established a new way east through San Diego. The Alvarado and Mission Valley Freeways became part of U.S. Highway 80, while the congested former route down El Cajon Boulevard was designated U.S. Business Highway 80. In addition, the status of Mission Valley had changed radically. "Formerly located on the northern edge of San Diego and isolated from important transportation corridors, the valley had become a major transportation hub. Within a distance of six miles the valley touched upon three principal federal highways, U.S. 101, and 395 extending from the Canadian to the Mexican border, and U.S. 80 reaching from the east to the west coast" (Henson 1960).

For a number of reasons, the third phase of road development in Mission Valley closely followed the second. Highways completed in 1951 were quickly rendered obsolete by increased urban growth. The Korean War brought renewed activity to the national defense industries and military in San Diego. A special census of 1957 placed the population of the city at slightly over 494,000, while that of the entire urbanized metropolitan area surpassed 860,000. Much of the growth again took place in the La Mesa and El Cajon areas, but a substantial amount of construction began to occur north of the valley in Clairemont and Linda Vista.

In 1958 construction started on a new principal interchange for Highways 395 and 80 (currently SR 163 and I-8). By 1960 contracts had been let to convert the Mission Valley and Alvarado routes to full freeways. To accomplish this, all intersections were being converted into interchanges and lane capacity was increased from four to eight (Henson 1960). The amount of valley land converted to transportation use by 1960 was quite significant. In 1930 the valley had around 98 acres of land in principal roads, by 1953, 272 acres, and by 1960 the total amount of land in roads stood at 360 acres, or nearly one-tenth of the land surface (Henson 1960). In 1960 daily travel along U.S. Highway 80 between the 395 interchange and Taylor Street in Old Town amounted to 52,400 vehicles. Another 55,299 vehicles passed between the interchange and Texas Street, while 63,500 vehicles utilized Highway 395 between the interchange and Washington Street to the south, and 49,000 vehicles crossed Mission Valley from the interchange to Friars Road (Henson 1960).

Commercial Development

The transformation of Mission Valley into a major hub of principal traffic arteries had a major effect on land use. Property in the valley became more valuable and land uses correspondingly changed and intensified. Commercial ventures moved onto lands near the principal intersections and interchange. Dairies and farms were replaced by commercial concerns of various types. In 1930 1,453 acres of land in Mission Valley were in agricultural use, whereas 80 acres were associated with urban land use, which embraces commercial, residential, recreational, and miscellaneous urban land use. In 1935 the totals were 1,022 acres in agricultural and 832 acres in urban land uses. By 1960 agricultural land uses had diminished to 347 acres, while urban land-uses had increased to 1,457 (Henson 1960). A large portion of this non-agricultural use was dedicated to sand and gravel plants.

By 1960 a major complex of several sand and gravel plants was strung along the northern and eastern part of Mission Valley from Mission Gorge Road to Highway 395 (Henson 1960). The successful development of sand and gravel plants into large diversified business concerns occurred because of the construction booms that resulted from urban growth. The primary products of these plants, sand and gravel, and the mechanical nature of their operation furnished the basis for diversification into other products including concrete block, pre-mixed cement, clay brick, asphalt, and pre-stressed concrete (Henson 1960).

Two important sand and gravel operations were the R.E. Hazard Company plant and the Griffith Company. The R.E. Hazard Company extended along the east side of Highway 395 north of the river. Activities included excavation of sand and gravel, and the manufacture of asphalt, concrete block, and clay brick, as well as construction contracting. The R.E. Hazard plant had been purchased from former operators in 1927. The Griffith Company located its office and maintenance area in the valley in 1947. These operations extended from Highway 395 to the 6th Street Extension (current Ulric Street) on the north side of the river. Activities at this location were connected with office work, and maintenance and storage. The excavation and processing areas were located further up Murray Canyon (Henson 1960).

Commercial Development in the SR 163/Friars Road Interchange Area

Due to unprecedented population growth in San Diego generally, as well as expansion of the freeway system in the valley basin, Mission Valley became a prime target for commercial speculation. Developers began to put direct pressure on the City to allow new types of commercial establishments alongside the old dairies, farms and stables (Henson 1960). In the fall of 1956, the City Council recognized developer's desires and reversed a decision by the City Planning Commission, by allowing, for the first time, the rezoning of a parcel of Mission Valley from residential to commercial use for development of a ball park (Jones 1973).

The complete shift toward commercialization of the valley came with approval of the construction of May Company's Mission Valley Shopping Center in 1958. Like the earlier ball park, this project had been approved by the city council in opposition to recommendations of the Planning Commission. The 1958 May Company decision was decisive for the character of Mission Valley. Granting a rezone to allow general commercial construction on the May Company's 90 acres was a precedent for future commercialization (Jones 1973). By 1960 a major commercial area was under development around the interchange between Highway 80 and 395, rapidly replacing previous land uses (Figure 8). Between 1950 and 1960 seven motels, a 56 lane bowling alley, a school for swimming, a summer theater, and a baseball park had been added to the interchange's commercial area between Taylor and Texas Streets. The Challenge Cream and Butter Association still stood at the southeast corner of the interchange and two of the other three corners of the interchange were cleared, leveled, and vacant, while the remaining corner was still in crops. This commercial zone expanded both east and west along Highway 80, and as much as the narrowness of the valley permitted, north along Highway 395, creating a linear arrangement of commercial establishments rather than a tight node of businesses clustered around the interchange (Henson 1960). The $25 million May Company Mission Valley Shopping Center was opened in February 1961. A number of other businesses, from luxury apartments and movie theaters to car dealerships, continued to fill in the spaces between major developments – often with the assistance of a favorable City Council vote. By 1968, about half of Mission Valley was in some other use than agricultural. In 1969 the valley's second major regional shopping center, Fashion Valley, opened only a short distance from the original Mission Valley Center (Jones 1973) and immediately southwest of the proposed project. Development has continued at an ever increasing pace so that now the entire valley is filled with commercial or multi-unit residential buildings. Mission Valley has undergone continued development during this time that has included shopping centers, motels, and office buildings.

REFERENCES

Arnold, J.E., M.R. Walsh, and S.E. Hollimon.
2004 Archaeology of California. *Journal of Archaeological Research* 12:1-73.

Bocek, Barbara
1986 Rodent Ecology and Burrowing Behavior: Predicted Effects on Archaeological Site Formation. *American Antiquity* 51:589-603.

Bull, Charles S.
1983 Shaking the Foundations: The Evidence for San Diego Prehistory. *Casual Papers: Cultural Resource Management* 1(3):15-64.

1987 A New Proposal: Some Suggestions for San Diego Prehistory. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by D. Gallegos, pp. 35-44. San Diego County Archaeological Society, Research Paper 1.

Cárdenas, D. Seán, and Mary Robbins-Wade
1985 *An Archaeological Investigation of SDM-W-143/146: An Unique Coastal Luiseño Occupation Site in Carlsbad, California*. RBR & Associates, Inc., San Diego. Report submitted to the City of Carlsbad, Planning Department. Report on file, South Coastal Information Center, San Diego State University.

Cárdenas, D. Seán, and Stephen R. Van Wormer
1984 *Archaeological Investigation of SDI-4648 and SDM-W-348*. RBR & Associates, Inc., San Diego. Report submitted to the City of El Cajon, Planning Department. Report on file, South Coastal Information Center, San Diego State University.

Carrico, Richard L.
1987 Sixty-five Years of San Diego County Archaeology. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by D. Gallegos, pp. 1-14. San Diego County Archaeological Society, Research Paper 1.

1993 Ethnohistoric Period. In *Draft Historic Properties Background Study for the City of San Diego Clean Water Program*, pp. V-1--V-24. Brian F. Mooney Associates, San Diego. Report submitted to City of San Diego, Clean Water Program for Greater San Diego.

Carter, George F.
1957 *Pleistocene Man at San Diego*. Johns Hopkins Press, Baltimore.

1978 An American Lower Paleolithic. *Anthropological Journal of Canada* 16:2-38.

1980 *Earlier Than You Think: A Personal View of Man in America*. Texas A&M University Press, College Station.

Childers, W. Morlin
1974 Preliminary Report on the Yuha Burial, California. *Anthropological Journal of Canada* 12 (1):2-9.

Cook, John R.
1985 *An Investigation of the San Dieguito Quarries and Workshops near Rancho Santa Fe, California*. Mooney-Lettieri and Associates, San Diego. Submitted to County of San Diego, Department of Planning and Land Use. Report on file, South Coastal Information Center, San Diego State University.

Crabtree, Donald E., and E.L. Davis
1968 Experimental Manufacture of Wooden Implements with Tools of Flaked Stone. *Science* 159(3813):426-428.

Davis, E.L.
1968 Early Man in the Mojave Desert. *Eastern New Mexico University Contributions in Anthropology* 1 (4):42-47.

1973 People of the Old Stone Age at China Lake. Ms. on file, Great Basin Foundation, San Diego.

1976 Two Dated La Jolla Burials and Their Place in California Prehistory: A Review. *Pacific Coast Archaeological Society Quarterly* 12(4).

Erlandson, Jon M.
1984 A Case Study in Faunalturbation: Delineating the Effects of the Burrowing Pocket Gopher on the Distribution of Archaeological Materials. *American Antiquity* 49:785-790.

Gallegos, Dennis R.
1987 A Review and Synthesis of Environmental and Cultural Material for the Batiquitos Lagoon Region. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by Dennis Gallegos, pp. 23-34. San Diego County Archaeological Society, Research Paper 1.

Gross, G. Timothy

1999 *Archaeological Testing of the Proposed Improvements at the La Jolla Beach and Tennis Club, La Jolla, California*. Affinis, El Cajon. Report submitted to City of San Diego, Development Services Department. Report on file, South Coastal Information Center, San Diego State University.

Gross, G. Timothy, and John A. Hildebrand

1998 San Dieguito and La Jolla: Insights from the 1964 Excavations at the C.W. Harris Site. Paper presented at the 32nd Annual Meeting of the Society for California Archaeology, San Diego.

Gross, G. Timothy, and Mary Robbins-Wade

1989 *Archaeological Investigation of SDi-9772 (SDM-W-3411) San Marcos, California*. Affinis, El Cajon. Submitted to County of San Diego, Department of Planning and Land Use. Report on file, South Coastal Information Center, San Diego State University.

Johnson, Donald L.

1989 Subsurface Stone Lines, Stone Zones, Artifact-Manuport Layers, and Biomantles Produced by Bioturbation Via Pocket Gophers (*Thomomys bottae*). *American Antiquity* 54:370-389.

Kaldenberg, Russell L.

1976 *Paleo-technological Change at Rancho Park North, San Diego County, California*. Unpublished Master's thesis, Department of Anthropology, San Diego State University.

Luomala, Katherine

1978 Tipai-Ipai. In *California*, edited by Robert F. Heizer, pp. 592-609. *The Handbook of North American Indians*, vol. 8. William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Minshall, Herbert L.

1976 *The Broken Stones*. Copley Books, San Diego.

Moratto, Michael J.

1984 *California Archaeology*. Academic Press, Orlando.

Moriarty, James R., III
1966 Cultural Phase Divisions Suggested By Typological Change Coordinated with Stratigraphically Controlled Radiocarbon Dating in San Diego. *The Anthropological Journal of Canada* 4 (4):20-30.

1987 A Separate Origins Theory for Two Early Man Cultures in California. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by D. Gallegos, pp. 49-60. San Diego County Archaeological Society, Research Paper 1.

Neusius, Sarah W., and G. Timothy Gross
2004 *Seeking Our Past: An Introduction to North American Archaeology*. Oxford University Press, New York.

Robbins-Wade, Mary
1986 Rising Glen: SDM-W-143/146 (SDI-5213 C & D). *Casual Papers* 2 (2):37-58. Cultural Resource Management Center, San Diego State University, San Diego.

1988 Coastal Luiseño: Refining the San Luis Rey Complex. *Proceedings of the Society for California Archaeology, Fresno, California* 1:75-95. Society for California Archaeology, San Diego.

Rogers, Malcolm J.
1926 A Preliminary Survey of the La Jolla Finds, Manuscript on file at the San Diego Museum of Man.

1931 Fossil Human Remains from the Vicinity of San Diego, California. Manuscript on file at the San Diego Museum of Man.

1939 *Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas*. San Diego Museum of Man Papers No. 3. San Diego Museum of Man, San Diego.

1966 *Ancient Hunters of the Far West*. Union-Tribune Publishing Company, San Diego.

Shackley, M. Steven
1988 *Archaeological Investigations at SDi-5103. A San Dieguito Lithic Workshop, San Diego County, California*. Brian F. Mooney Associates, San Diego.

Shipek, Florence
1970 *The Autobiography of Delfina Cuero*. As told to Florence Shipek. Malki Museum Press, Banning, CA.

True, D.L.

1966 *Archaeological Differentiation of Shoshonean and Yuman Speaking Groups in Southern California*. Unpublished Ph.D. dissertation, Department of Anthropology, University of California, Los Angeles.

1970 *Investigation of a Late Prehistoric Complex in Cuyamaca Rancho State Park, San Diego County, California*. University of California, Los Angeles, Archaeological Survey Monographs Vol. 1. University of California, Los Angeles.

True, D.L., C.W. Meighan, and Harvey Crew

1974 *Archaeological Investigations at Molpa, San Diego County, California*. University of California Publications in Anthropology Vol. 2. University of California, Berkeley.

Wallace, William .J.

1955 A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11:214-230.

Warren, C.N.

1967 The San Dieguito Complex: A Review and Hypothesis. *American Antiquity* 32:168-185.

1985 Garbage about the Foundations: A Comment on Bull's Assertions. *Casual Papers: Cultural Resource Management* 2(1):82-90.

1987 The San Dieguito and La Jolla: Some Comments. In *San Dieguito-La Jolla: Chronology and Controversy*, edited by D. Gallegos, pp. 73-85. San Diego County Archaeological Society, Research Paper 1.

Warren, C.N. (editor)

1966 *The San Dieguito Type Site: M.J. Rogers' 1938 Excavation on the San Dieguito River*. San Diego Museum Papers No. 5, San Diego Museum of Man.

Warren, C.N., D.L. True, and Ardith A. Eudey

1961 Early Gathering Complexes of Western San Diego County: Results and Interpretations of an Archaeological Survey. In *University of California, Los Angeles Archaeological Survey Annual Report 1960-1961*, pp. 1-106.

Winterrowd, Cathy L., and D. Seán Cárdenas

1987 *An Archaeological Indexing of a Portion of the Village of La Rinconada de Jamo SDI-5017 (SDM-W-150)*. RBR & Associates, Inc., San Diego. Submitted to City of San Diego, Planning Department. Report on file, South Coastal Information Center, San Diego State University.

ATTACHMENT E

MITIGATION MEASURES FOR ARCHAEOLOGICAL AND NATIVE AMERICAN MONITORING

DRAINAGE STUDY
FOR
DISCOVERY CENTER AT GRANT PARK

(SITE DEVELOPMENT PERMIT)

Project # 369379
IO # XXXXX

Job Number 17010

October 6, 2014
Revised: September 10, 2015

DRAINAGE STUDY
FOR
DISCOVERY CENTER AT GRANT PARK

(SITE DEVELOPMENT PERMIT)

Project # 369379
IO # xxxxxxxx

Job Number 17010

BRENDAN CRAIG HASTIE
NO. 65809
EXP. 9/30/17
CIVIL

Brendan Hastie, P.E.
R.C.E. #65809
Exp. 09/17

Prepared For:

Mr. Rob Hutsel
San Diego River Park Foundation
4891 Pacific Highway
San Diego, California 92110
(619) 297-7380

Prepared By:

Rick Engineering Company
Water Resources Department
5620 Friars Road
San Diego, California 92110-2596
(619) 291-0707

October 6, 2014
Revised: September 10, 2015

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DRAINAGE STUDY
FOR
DISCOVERY CENTER AT GRANT PARK
(SITE DEVELOPMENT PERMIT)

REVISION PAGE(S)

September 10, 2015

This drainage study report presents a revision to the October 6, 2014 report pursuant to plan check comments (Cycle 3 Preliminary Review, LDR-Engineering Review) and to address additional modifications throughout the site. The following text identifies the plan check comment along with the response.

23. In the 2nd paragraph on page 2, please explain why the drainage from the ponding/sump areas is "hypothetically" would spill over onto Camino Del Rio North? Should it spill onto San Diego River? (New Issue)

Runoff will not overtop into Camino Del Rio North during a 100-year storm event, the explanation of flow patterns from the existing sump areas was only intended for general characteristics. However, backup calculations for the storage volume and maximum ponded surface elevation based on infiltration rates obtained by the geotechnical engineer have been included in the drainage study for reference, and the narratives for the pre-project and post-project drainage characteristics have been updated accordingly.

24. In the 2nd paragraph of page 9, please verify the FEMA water surface elevation. Should it be the 100-year storm event? (New Issue)

This is in reference to HMP compliance; therefore the project onsite storm drain system discharges flows below the Federal Emergency Management Agency (FEMA) 10-year water surface elevation (refer to "Water Quality Technical Report for Discovery Center at Grant Park," dated September 10, 2015 for more details).

25. On the pre-project exhibit, node 155 is shown at two different locations. Please revise. (New Issue)

This has been revised.

1.0 INTRODUCTION

1.1 Project Description

This drainage study presents hydrologic and hydraulic analyses for the proposed Discovery Center at Grant Park project in support of Site Development Permit (herein referred to as the "project"). The project is located within the City of San Diego, at the north-east corner of the Qualcomm Way and Camino Del Rio North intersection. For the location of the project see Figure 1, Vicinity Map, located at the end of Section 1.0. The proposed development consists of a multi-purpose building, exhibit building, small amphitheater, festival lawn, regional trail, and surface parking.

1.2 Drainage Characteristics

The project site consists of undeveloped area consisted of multiple ponding/sump areas with different low points and conveyance capacity, and with established vegetation. The project site is bounded by the regional trail that is adjacent to the San Diego River to the north, Qualcomm Way to the west and Camino Del Rio North to the south.

<u>Pre-Project Condition</u>

In the pre-project condition, runoff from the project site including the offsite runoff from currently undeveloped area south of Camino Del Rio North, (area bounded by the I-805 south bound off-ramp and Camino Del Rio North), that will be ultimately developed by the proposed "Discovery Place Camino Del Rio North" project prepared by Pasco Laret Suiter and Associates, and the surface runoff from portion of Camino Del Rio North ultimately will discharge to San Diego River. The runoff from the area located south of the Camino Del Rio North is captured by the existing 24-inch Reinforced Concrete Pipe (RCP) that conveys flows in northern direction. The street runoff from the southern portion of Camino Del Rio North is captured by four existing median inlets and conveyed by the existing 18" RCP to the above mentioned existing 24" RCP. The combined flows from the surface runoff of these two areas are further conveyed by the existing 24" RCP in northern direction to the northern side of Camino Del Rio North where the flows intercepted by the existing curb inlet from the surface runoff of the northern portion of Camino Del Rio are combined and conveyed by the existing 24” RCP in northern direction into the project site. The project site is an undeveloped area consisted of multiple ponding/sump areas. The combined runoffs from the project site and the offsite runoff will then pond in the multiple ponding/sump areas that have different conveyance capacity and the runoff will spill over from one to another until it gets to the maximum available ponding. From there the runoff will flow in west direction towards Qualcomm Way to the existing curb inlet into the existing storm drain pipe located along the street that discharges into the existing 4’Hx4’W double culvert box and ultimately discharges to San Diego River. However, based on the performed geotechnical investigation it was determined that the existing sump areas have a high infiltration rate that will allow the sump areas to infiltrate prior to overtopping. See below for further discussion, including backup calculations for the 100-year storm event.

Post-Project Condition

In the post-project condition, the drainage characteristics will remain similar to the pre-project condition. Runoff from the project site including the offsite runoff from the undeveloped area south of Camino Del Rio North, (area bounded by the I-805 south bound off-ramp and Camino Del Rio North), that will be ultimately developed by the proposed “Discovery Place Camino Del Rio North” project prepared by Pasco Laret Suiter and Associates, and the runoff from portion of Camino Del Rio North ultimately will also discharge to San Diego River. The runoff generated by the “Discovery Place Camino Del Rio North” project combined with the runoff generated by the portion of Camino Del Rio North is conveyed by the existing 24” RCP under Camino Del Rio North that ultimately discharges into the existing ponding/sump area within the project site area. The existing ponding/sump area per “Discovery Place Camino Del Rio North” project is proposed to serve as hydromodification management BMP facility and meet the hydromodification management requirements for their project.

Based on the project improvements, the project proposes improvements to the most northern portion of the existing 24” RCP storm drain system that directly outlets in the project site area. The improvements to that portion of the existing 24” RCP consist of extending the pipe under the proposed entrance area to a point where the flows will be discharged in the same ponding/sump area as proposed by the “Discovery Place Camino Del Rio North” project. Based on the existing condition topography prepared for the project and the provided location and volume of the proposed hydromodification basin proposed by the “Discovery Place Camino Del Rio North” (refer to Exhibit “A” letter of permission for offsite grading/improvements I.O. 24004423, PTS No.358394 and DWG. 37906-D), the hydromodification basin was re-delineated based on more accurate on-site existing topography. Refer to exhibit titled “Drainage Study Map for Discovery Center at Grant Park, Post-Project” located in Map Pocket 2 for the location of the relocated HMP basin. As shown in Appendix E of this Drainage Study, the remaining sump area does not overflow during a 100-year storm event due to the high infiltration rates.

1.3 Hydrology and Hydraulics

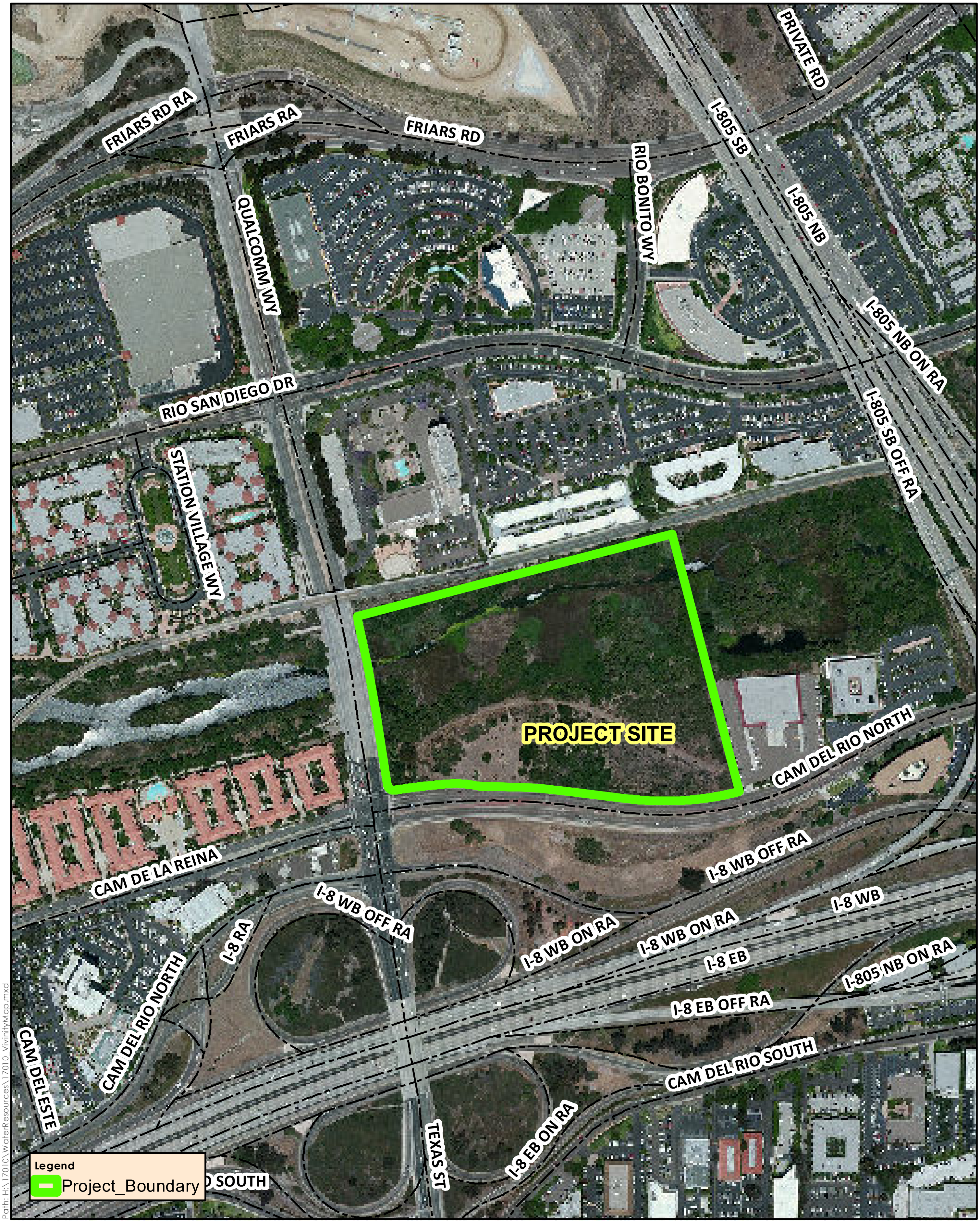
Hydrology and hydraulics are discussed in detail in Section 2.0 and 3.0 respectively of this report.

1.4 Water Quality

Post-project runoff will be treated via a network of storm water management features, designed pursuant to the guidelines of the City of San Diego Storm Water Standards, dated January 20, 2012 (herein referred to as the “Storm Water Standards”). Please refer to the report titled, “Water Quality Technical Report for Discovery Center at Grant Park,” with a revised date of September 10, 2015 (or any revisions thereafter), prepared by Rick Engineering Company (Job No. 17010), for more information on water quality.

1.5 Hydromodification Management Requirements

According to the Storm Water Standards, Priority Development Projects must be designed so that runoff rates and durations are controlled to maintain or reduce pre-project downstream erosion conditions and protect stream habitat. The project is considered as the Priority Development Project; therefore, the project is subject to the hydromodification management plan (HMP) requirement. In order to comply with the City of San Diego Storm Water Standards, dated January 20, 2012 and the Final Hydromodification Management Plan, dated March 2011, a preliminary HMP is discussed within the Water Quality Technical Report (WQTR) for the project. Based on the WQTR, it was determined that the project is exempt from hydromodification management requirements since it outfalls to an exempt receiving water, San Diego River.



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Date of Exhibit: 02.28.2014
Eagle Aerial Image: 05.2012

RICK
ENGINEERING COMPANY

Scale in Feet
0 200 400

North

Figure 1: Vicinity Map

Discovery Center at Grant Park

J-17010

2.0 HYDROLOGY

2.1 Methodology

The *City of San Diego Drainage Design Manual April 1984* requires that the Rational Method be used for hydrologic analysis of a watershed up to but not exceeding 1.0 square-mile (640 acres). The Rational Method computer program developed by Advanced Engineering Software (AES 2003) was used for this study because it satisfies the City of San Diego's design criteria.

2.1.1 AES Rational Method Computer Model

The AES hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The AES program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results. The code numbers and their significance are as follows:

Subarea Hydrologic Processes (Codes)

Code 1: Confluence analysis at node
Code 2: Initial subarea analysis
Code 3: Pipe flow travel time (computer-estimate pipe sizes)
Code 4: Pipe flow travel time (user-specified pipe size)
Code 5: Trapezoidal channel travel time
Code 6: Street flow analysis through a subarea
Code 7: User-specified information at a node
Code 8: Addition of the subarea runoff to mainline
Code 9: V-Gutter flow through subarea
Code 10: Copy mainstream data onto memory bank
Code 11: Confluence a memory bank with the mainstream memory
Code 12: Clear a memory bank
Code 13: Clear the mainstream memory
Code 14: Copy a memory bank onto the mainstream memory
Code 15: Hydrologic data bank storage functions

In order to perform the hydrologic analysis; base information for the study area is required. This information includes the existing drainage facility locations and sizes, existing land uses, flow patterns, drainage basin boundaries, and topographic elevations. Drainage basin boundaries, flow patterns, and topographic elevations are shown on the drainage exhibits located in the map pockets.

2.2 Criteria

The hydrologic conditions were analyzed in accordance with the City of San Diego's design criteria as follows:

Design Storm: 100-year

Runoff Coefficients*:
  0% Impervious C = 0.45
  100% Impervious C = 0.95

Soil Type: D

Rainfall Intensity: Based on time-intensity criteria per City of San Diego Drainage Design Manual

* Weighted runoff coefficients were used on a percentage of 0.95 and 0.45. Refer to Appendix C for runoff coefficient backup materials.

2.3 Hydrologic Results

Modified Rational Method Results

The project site for pre-project condition analyzed two (2) points of interest: 1) combined runoff from offsite and onsite flows south of the river trail, and 2) total runoff discharging to the ultimate point of interest, San Diego River.

Table 2.3.1 summarizes the 100-year peak flow rates at the two points of interest.

Table 2.3.1: Existing Condition 100-Year Peak Flow Rates Hydrologic Summary to Points of Interest

Node #	Weighted Runoff Coefficient	Area (acres)	Time of Concentration (minutes)	100-Year Peak Flow Rate (cfs [1])
155	0.64	8.3	6.39	14.1
190-155 (ultimate)	0.63	8.9	6.39	14.5

Note:
1. "cfs" = cubic feet per second

The project site for post-project condition analyzed three (3) points of interest: 1) combined runoff from offsite and undisturbed area east of the proposed project onsite flows (Basin 100), 2) runoff from the proposed storm drain system which conveys flows from the proposed project improvements only, and discharges in San Diego River, and 3) total runoff discharging to the ultimate point of interest, San Diego River.

Table 2.3.2 summarizes the 100-year peak flow rates at the four points of interest.

Table 2.3.2: Proposed Condition 100-Year Peak Flow Rates Hydrologic Summary to Points of Interest

Node #	Weighted Runoff Coefficient	Area (acres)	Time of Concentration (minutes)	100-Year Peak Flow Rate (cfs [1])
135	0.65	3.9	6.53	11.7
135 onsite undisturbed + offsite	0.71	6.3	6.29	16.5
290 onsite disturbed	0.68	2.6	7.49	6.4
290 ultimate	0.78	8.9	6.53	22.6

Note:
2. "cfs" = cubic feet per second

For fair comparison of the peak flow rates due to the project improvements, both, pre-project and post-project condition considered the ultimate, developed condition proposed by "Discovery Place Camino Del Rio North" project for the area bounded by the I-805 south bound off-ramp and Camino Del Rio North in the hydrologic analyses performed for the project.

The post-project drainage characteristics are similar to the pre-project condition; however, due to increased impervious area as a result of the project, the post-project peak flow will result in an increase to the ultimate discharge location, San Diego River. Since the project ultimate discharge location is San Diego River which is exempt river system and the project onsite storm drain system discharges flows below the Federal Emergency Management Agency (FEMA) 10-year water surface elevation (refer to "Water Quality Technical Report for Discovery Center at Grant Park," dated September 10, 2015 for more details) the impact of increased flows to San Diego River will be negligible and not analyzed and addressed in this report. However, due to the site high infiltration rates the combined runoff from offsite, undisturbed area east of the proposed project onsite, and a minor area of onsite runoff for the easterly turnaround, will collectively percolate in the ground within the existing sump areas. Runoff generated by a majority of the proposed project improvements will directly discharge to San Diego River at the proposed outfall location.

The watershed boundaries, rational method node numbers, flow patterns, and areas can be found on the workmaps titled, "Drainage Study Map for Discovery Center at Grant Park [Pre-project]," and "Drainage Study Map for Discovery Center at Grant Park [Post-project]," located in Map Pockets 1 and 2 of this report, respectively.

3.0 HYDRAULICS

3.1 Hydraulic Methodology and Criteria

The 100-year pre-project and post-project peak flow rates determined using the Modified Rational Method were used to evaluate the potential impacts to existing storm drain system due to the project improvements. The 100-year post-project peak flow rates were also used to preliminarily size the onsite storm drain system. If applicable, additional hydraulic analyses such as open channel sizing for brow ditches and vegetated swales, proposed inlet sizing, and energy dissipaters will be prepared during final engineering.

3.1.1 ...Pipe sizing

Pipe sizes were evaluated using Manning’s equation:

$$Q= (1.486/n)\ A\ R^{2/3}\ S^{1/2}$$

Where:

Q = discharge (cfs)

n = Manning coefficient of roughness

A = Cross-sectional Area of flow (sq. ft.)

R = Hydraulic radius (ft.) = A/WP (WP = Wetted Perimeter)

S = Slope of pipe (ft./ft.)

The Manning’s roughness coefficient “n” used for the hydraulic calculations for PVC pipe is 0.012. The pipe sizes were evaluated based on the AES rational method flow rates with a 30% bump up sizing factor.

3.2.1 Storm Drain System

Due to the proposed improvements of the “Discovery Place Camino Del Rio North” project prepared by Pasco Laret Suiter and Associates located south of Camino Del Rio North, between I-805 south bound off-ramp and Camino Del Rio North, the peak flow rates has increased in the existing 24” RCP located under Camino Del Rio North and ultimately discharging in the ponding/sump area located in the eastern site of the project. Hydraulic capacity calculations were performed to assess the adequacy of the portion of the 24” RCP that is proposed to be extended and relocated. Also, hydraulic calculations were performed to preliminarily size the onsite storm drain system.

Storm Drain Evaluation Results

The storm drain located across the Camino Del Rio North near the project entrance location is a 24” RCP. The hydraulic capacity of the 24” RCP was evaluated based on the assumed slope of 1.0%. Also, preliminary hydraulic calculations were performed to size the onsite storm drain pipes. The pipe sizes were evaluated based on the AES rational method peak flow rates with a 30% bump up sizing factor and an assumed pipe slope of 1.0%. A summary of the performed hydraulic analyses is provided in Appendix D. It was determined that the existing storm drain pipe has capacity to convey the 100-year peak flows. The required size for the existing storm drain pipe is 24”; therefore the pipe has adequate capacity to convey the increased flow due to the project improvements.

3.2.1 Existing Sump Analysis for Proposed Condition

As described in the hydrologic results, Section 2.3 of this report, combined runoff from offsite and undisturbed area east of the proposed project onsite flows (Basin 100) will discharge in the ponding/sump area located east of the project improvements. Additional, detention analyses has been performed to determine if the ponding/sump areas have enough volume to store/infiltrate the received runoff without leaving the site, and the time required for the ponding/sump area to completely drain.

100-Year Storm Event Volume

The 100-year, 24-hour storm rainfall has been used to evaluate the volume generated by the offsite area part of the "Discovery Place Camino Del Rio North" project combined with the area from the portion of Camino Del Rio North and the onsite undisturbed area east of the project improvements, which ultimately discharges in the ponding/sump areas located east side of the project improvements. The calculated volume for the 100-year 24-hour storm rainfall will further be used to determine the ponding water surface elevation within the ponding/sump areas that will serve as an input in HEC-1 hydrologic model and determine how long it will take for the ponding/sump areas to completely drain. The relationship storage volume versus elevation and the relationship of infiltration discharge rate versus elevation must be determined for the HEC-1 hydrologic model for proposed project condition. These values comprise a rating curve, which HEC-1 hydrologic model uses to produce the outflow hydrograph from which the drawdown time can be determined for the ponding/sump areas to completely drain.

Volume – Elevation Relationship

The volume-elevation relationship was determined from the existing topography and proposed project grading plans. The surface area at varying ponding depths was used to calculate storage volume at incremental depths within the ponding/sump areas by using the conic method. For the geometry of the natural detention basins refer to "Drainage Study Exhibit for Discovery Center at Grant Park Post-Project" located in Map Pocket 1 in this report.

Discharge – Elevation Relationship

To determine the outflow characteristics (infiltration flow rate) of the ponding/sump areas at incremental elevations (discharge-elevation rating curve), the surface area at varying ponding depths was multiplied by the high infiltration rate of 28 inch per hour. The infiltration rate was based on the performed geotechnical investigation for the project in that area.

Detention Analyses Results

The results are showing that the ponding/sump areas have enough capacity to store the generated runoff from the 100-year 24-hour storm rainfall, generated by the offsite area part of the "Discovery Place Camino Del Rio North" project combined with the area from the portion of Camino Del Rio North and the onsite undisturbed area east of the project improvements and the calculated time for the ponding/sump areas to drain completely is two hours and forty minutes, which is less than the maximum vector control detention time of 96 hours per the County of San Diego criteria; therefore, the generated runoff will never leave the site.

See Appendix E for the summary of the performed detention analyses.

4.0 CONCLUSION

This drainage study presents the hydrologic and hydraulic analyses for Discovery Center at Grant Park project in support of Site Development Permit. The pre-project and post-project condition peak discharge rates were determined using the Modified Rational Method based on the hydrologic methodology and criteria described in the City of San Diego Drainage Design Manual, April 1984.

Existing storm drain capacities have been verified based on the post-project 100-year peak flow rates to evaluate potential impacts. The included hydrologic and hydraulic calculations quantify the change in runoff and verified the adequacy of the existing storm drain system. Preliminary hydraulic calculations were performed to size the onsite storm drain system. More detailed hydraulic calculations for the proposed onsite storm drain system will take place during final engineering of this project, and are not included in this report.

The 100-year peak flow rates will be utilized to size open channels and the proposed inlets if applicable during final engineering. Inlets will be sized to provide 100% capture of the flow. Riprap pads will be provided at outfall locations to help reduce velocities and minimize erosion.

The existing ponding/sump areas located east of the project improvements were evaluated to determine if they have capacity to store the generated runoff from the 100-year 24-hour storm rainfall, generated by the offsite area part of the “Discovery Place Camino Del Rio North” project combined with the area from the portion of Camino Del Rio North and the onsite undisturbed area east of the project improvements. Also, HEC-1 hydrologic model has been prepared to determine the time for the existing ponding/sump areas to drain completely.

Post-project runoff will be treated via a network of storm water management features, designed pursuant to the guidelines of the City of San Diego Storm Water Standards, dated January 20, 2012. Based on the “Water Quality Technical Report for Discovery Center at Grant Park,” dated September 10, 2015, it was determined that the project is exempt from hydromodification management requirements since it outfalls to exempt receiving water, San Diego River.

APPENDIX A

Modified Rational Method Output

[Pre-Project]

```
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2003 Advanced Engineering Software (aes)
             Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                           Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************* DESCRIPTION OF STUDY **************************
* H:17010, DISCOVERY CENTER AT GRANT PARK                                  *
* EXISTING CONDITION FOR 100-YR STORM EVENT                                *
* BASIN 100                                                                *
 **************************************************************************

  FILE NAME: DC100E00.RAT
  TIME/DATE OF STUDY: 17:55 10/02/2014
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   22.0     15.5    0.020/0.020/0.015   0.50    1.50 0.0100 0.125 0.0180
  3   25.0     18.0    0.020/0.020/0.015   0.67    2.00 0.0100 0.167 0.0180
  4   40.0     33.0    0.020/0.020/0.020   0.67    2.00 0.0100 0.167 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

+--------------------------------------------------------------------------+
| PER THE ULTIMATE CONDITION OF PROPOSED PROJECT SOUTH OF CAMINO DEL NORTH |
| INCLUDED OFFSITE RUN-ON PROVIDED BY OTHERS                               |
| FOR BOTH PRE-PROJECT AND POST-PROJECT CONDITION                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  4.21
  TOTAL AREA(ACRES) =     2.30   TOTAL RUNOFF(CFS) =      8.00

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    44.43  DOWNSTREAM(FEET) =    43.80
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.31
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.00
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   6.17
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    120.00 =    64.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.17
  RAINFALL INTENSITY(INCH/HR) =   4.18
  TOTAL STREAM AREA(ACRES) =     2.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.00

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9400
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     55.30
  DOWNSTREAM ELEVATION(FEET) =     54.40
  ELEVATION DIFFERENCE(FEET) =      0.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.983
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.44

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   54.40  DOWNSTREAM ELEVATION(FEET) =   53.30
  STREET LENGTH(FEET) =   131.50   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 40.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  33.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0180

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.71
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    5.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.36
  STREET FLOW TRAVEL TIME(MIN.) =   1.55   Tc(MIN.) =   7.55
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.915
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9200
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.54
  TOTAL AREA(ACRES) =      0.26        PEAK FLOW RATE(CFS) =       0.98

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =    7.10
  FLOW VELOCITY(FEET/SEC.) =  1.50   DEPTH*VELOCITY(FT*FT/SEC.) =   0.42
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    135.00 =   231.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.64  DOWNSTREAM(FEET) =    51.60
  FLOW LENGTH(FEET) =   306.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.45
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.98
  PIPE TRAVEL TIME(MIN.) =   2.09    Tc(MIN.) =   9.64
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    120.00 =   538.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.518
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.33   SUBAREA RUNOFF(CFS) =    1.10
  TOTAL AREA(ACRES) =      0.59   TOTAL RUNOFF(CFS) =    2.08
  TC(MIN.) =   9.64

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.64
  RAINFALL INTENSITY(INCH/HR) =   3.52
  TOTAL STREAM AREA(ACRES) =     0.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.08

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        8.00     6.17        4.178          2.30
      2        2.08     9.64        3.518          0.59

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        9.75     6.17       4.178
      2        8.81     9.64       3.518

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      9.75   Tc(MIN.) =    6.17
  TOTAL AREA(ACRES) =      2.89
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    120.00 =   538.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    140.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    43.80  DOWNSTREAM(FEET) =    43.56
  FLOW LENGTH(FEET) =    47.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.15
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.75
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   6.32
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    140.00 =   586.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.32
  RAINFALL INTENSITY(INCH/HR) =   4.15
  TOTAL STREAM AREA(ACRES) =     2.89
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.75

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     56.00
  DOWNSTREAM ELEVATION(FEET) =     55.10
  ELEVATION DIFFERENCE(FEET) =      0.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.356
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    140.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   55.10  DOWNSTREAM ELEVATION(FEET) =   49.40
  STREET LENGTH(FEET) =   777.30   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 40.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  33.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0180

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.58
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.56
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
  STREET FLOW TRAVEL TIME(MIN.) =   8.30   Tc(MIN.) =  14.30
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.977
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    2.33
  TOTAL AREA(ACRES) =      0.97        PEAK FLOW RATE(CFS) =       2.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.74
  FLOW VELOCITY(FEET/SEC.) =  1.78   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
  LONGEST FLOWPATH FROM NODE    145.00 TO NODE    140.00 =   877.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.30
  RAINFALL INTENSITY(INCH/HR) =   2.98
  TOTAL STREAM AREA(ACRES) =     0.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.72

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.75     6.32        4.148          2.89
      2        2.72    14.30        2.977          0.97

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       11.70     6.32       4.148
      2        9.72    14.30       2.977

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     11.70   Tc(MIN.) =    6.32
  TOTAL AREA(ACRES) =      3.86
  LONGEST FLOWPATH FROM NODE    145.00 TO NODE    140.00 =   877.30 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    155.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    43.24  DOWNSTREAM(FEET) =    43.00
  FLOW LENGTH(FEET) =    27.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.69
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.70
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   6.39
  LONGEST FLOWPATH FROM NODE    145.00 TO NODE    155.00 =   904.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.39
  RAINFALL INTENSITY(INCH/HR) =   4.14
  TOTAL STREAM AREA(ACRES) =     3.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.70

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION (APPENDIX X-A)
  WITH 10-MIN. ADDED =  11.19(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   132.60
  UPSTREAM ELEVATION(FEET) =     52.00
  DOWNSTREAM ELEVATION(FEET) =     47.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  NATURAL WATERSHED TIME OF CONCENTRATION =  11.19
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.319
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    187.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     47.00  DOWNSTREAM(FEET) =     43.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   477.40   CHANNEL SLOPE =  0.0084
  CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.197
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.57
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =  13.89
  Tc(MIN.) =  25.08
  SUBAREA AREA(ACRES) =     2.46       SUBAREA RUNOFF(CFS) =    2.43
  TOTAL AREA(ACRES) =      2.66         PEAK FLOW RATE(CFS) =       2.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   0.69
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    187.00 =   610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    187.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.197
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    1.55   SUBAREA RUNOFF(CFS) =    1.53
  TOTAL AREA(ACRES) =      4.21   TOTAL RUNOFF(CFS) =    4.26
  TC(MIN.) =  25.08
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    175.00 TO NODE    187.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.197
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.19   SUBAREA RUNOFF(CFS) =    0.19
  TOTAL AREA(ACRES) =      4.40   TOTAL RUNOFF(CFS) =    4.45
  TC(MIN.) =  25.08

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  25.08
  RAINFALL INTENSITY(INCH/HR) =   2.20
  TOTAL STREAM AREA(ACRES) =     4.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.45

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.70     6.39        4.136          3.86
      2        4.45    25.08        2.197          4.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       14.07     6.39       4.136
      2       10.67    25.08       2.197

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     14.07   Tc(MIN.) =    6.39
  TOTAL AREA(ACRES) =      8.26
  LONGEST FLOWPATH FROM NODE    145.00 TO NODE    155.00 =   904.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    155.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.39
  RAINFALL INTENSITY(INCH/HR) =   4.14
  TOTAL STREAM AREA(ACRES) =     8.26
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.07

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION (APPENDIX X-A)
  WITH 10-MIN. ADDED =  14.11(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   403.50
  UPSTREAM ELEVATION(FEET) =     51.00
  DOWNSTREAM ELEVATION(FEET) =     45.40
  ELEVATION DIFFERENCE(FEET) =      5.60
  NATURAL WATERSHED TIME OF CONCENTRATION =  14.11
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.997
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE   187.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     45.40  DOWNSTREAM(FEET) =     39.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   291.80   CHANNEL SLOPE =  0.0219
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.543
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.91
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   5.34
  Tc(MIN.) =  19.46
  SUBAREA AREA(ACRES) =     0.32       SUBAREA RUNOFF(CFS) =    0.37
  TOTAL AREA(ACRES) =      0.62         PEAK FLOW RATE(CFS) =       0.77

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   1.01
  LONGEST FLOWPATH FROM NODE    185.00 TO NODE    155.00 =   695.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    187.00 TO NODE    187.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.46
  RAINFALL INTENSITY(INCH/HR) =   2.54
  TOTAL STREAM AREA(ACRES) =     0.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.77

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       14.07     6.39        4.136          8.26
      2        0.77    19.46        2.543          0.62

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       14.54     6.39       4.136
      2        9.42    19.46       2.543

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     14.54   Tc(MIN.) =    6.39
  TOTAL AREA(ACRES) =      8.88
  LONGEST FLOWPATH FROM NODE    145.00 TO NODE    155.00 =   904.30 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      8.88  TC(MIN.) =      6.39
  PEAK FLOW RATE(CFS)   =     14.54
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

♀
```

APPENDIX B

Modified Rational Method Output
[Post-Project]

```
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2003 Advanced Engineering Software (aes)
             Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                           Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* H:17010, DISCOVERY CENTER AT GRANT PARK                                  *
* PROPOSED CONDITION FOR 100-YR STORM EVENT                                *
* BASIN 100                                                                *
 **************************************************************************

  FILE NAME: DC100P00.RAT
  TIME/DATE OF STUDY: 15:40 03/14/2014
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   22.0     15.5    0.020/0.020/0.015   0.50    1.50 0.0100 0.125 0.0180
  3   25.0     18.0    0.020/0.020/0.015   0.67    2.00 0.0100 0.167 0.0180
  4   40.0     33.0    0.020/0.020/0.020   0.67    2.00 0.0100 0.167 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9400
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     55.30
  DOWNSTREAM ELEVATION(FEET) =     54.40
  ELEVATION DIFFERENCE(FEET) =      0.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.983
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.44

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
```

```
============================================================================
  UPSTREAM ELEVATION(FEET) =   54.40  DOWNSTREAM ELEVATION(FEET) =   53.30
  STREET LENGTH(FEET) =   131.50   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 40.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  33.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0180

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.71
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    5.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.36
  STREET FLOW TRAVEL TIME(MIN.) =   1.55   Tc(MIN.) =   7.55
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.915
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9200
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.54
  TOTAL AREA(ACRES) =      0.26        PEAK FLOW RATE(CFS) =       0.98

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   7.10
  FLOW VELOCITY(FEET/SEC.) =  1.50   DEPTH*VELOCITY(FT*FT/SEC.) =   0.42
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =   231.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    52.64  DOWNSTREAM(FEET) =    51.60
  FLOW LENGTH(FEET) =   306.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.45
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.98
  PIPE TRAVEL TIME(MIN.) =   2.09    Tc(MIN.) =   9.64
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =   538.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.518
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.33   SUBAREA RUNOFF(CFS) =    1.10
  TOTAL AREA(ACRES) =      0.59   TOTAL RUNOFF(CFS) =    2.08
  TC(MIN.) =   9.64

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.64
  RAINFALL INTENSITY(INCH/HR) =   3.52
  TOTAL STREAM AREA(ACRES) =     0.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.08

+--------------------------------------------------------------------------+
| PER THE ULTIMATE CONDITION OF PROPOSED PROJECT SOUTH OF CAMINO DEL NORTH |
| INCLUDED OFFSITE RUN-ON PROVIDED BY OTHERS                               |
| FOR BOTH PRE-PROJECT AND POST-PROJECT CONDITION                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
```

```
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.00   RAIN INTENSITY(INCH/HOUR) =  4.21
  TOTAL AREA(ACRES) =     2.30   TOTAL RUNOFF(CFS) =      8.00

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    115.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    44.43  DOWNSTREAM(FEET) =    43.80
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.31
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.00
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   6.17
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    115.00 =    64.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.17
  RAINFALL INTENSITY(INCH/HR) =   4.18
  TOTAL STREAM AREA(ACRES) =     2.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.00

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.08     9.64        3.518          0.59
      2        8.00     6.17        4.178          2.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        9.75     6.17       4.178
      2        8.81     9.64       3.518

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      9.75   Tc(MIN.) =    6.17
  TOTAL AREA(ACRES) =      2.89
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =   538.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    120.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    43.80  DOWNSTREAM(FEET) =    43.56
  FLOW LENGTH(FEET) =    47.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.15
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.75
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   6.32
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    120.00 =   586.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.32
  RAINFALL INTENSITY(INCH/HR) =   4.15
  TOTAL STREAM AREA(ACRES) =     2.89
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.75

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9400
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =     56.00
  DOWNSTREAM ELEVATION(FEET) =     55.10
  ELEVATION DIFFERENCE(FEET) =      0.90
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.983
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.40
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.40

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    120.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =   55.10  DOWNSTREAM ELEVATION(FEET) =   49.40
  STREET LENGTH(FEET) =   777.30   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 40.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  33.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0180
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0180

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.59
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   8.25   Tc(MIN.) =  14.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.982
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.87      SUBAREA RUNOFF(CFS) =    2.34
  TOTAL AREA(ACRES) =      0.97        PEAK FLOW RATE(CFS) =       2.73

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  11.80
  FLOW VELOCITY(FEET/SEC.) =  1.77   DEPTH*VELOCITY(FT*FT/SEC.) =   0.66
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    120.00 =   877.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.25
  RAINFALL INTENSITY(INCH/HR) =   2.98
  TOTAL STREAM AREA(ACRES) =     0.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.73

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.75     6.32        4.148          2.89
      2        2.73    14.25        2.982          0.97

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       11.71     6.32       4.148
      2        9.74    14.25       2.982

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     11.71   Tc(MIN.) =    6.32
  TOTAL AREA(ACRES) =      3.86
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    120.00 =   877.30 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    43.24  DOWNSTREAM(FEET) =    42.50
  FLOW LENGTH(FEET) =    84.20   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.66
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.71
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   6.53
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    135.00 =   961.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.108
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.71   SUBAREA RUNOFF(CFS) =    1.31
  TOTAL AREA(ACRES) =      4.57   TOTAL RUNOFF(CFS) =   13.03
  TC(MIN.) =   6.53

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.53
  RAINFALL INTENSITY(INCH/HR) =   4.11
  TOTAL STREAM AREA(ACRES) =     4.57
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.03

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7300
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   144.80
  UPSTREAM ELEVATION(FEET) =     50.00
  DOWNSTREAM ELEVATION(FEET) =     45.70
  ELEVATION DIFFERENCE(FEET) =      4.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.576
  *CAUTION: SUBAREA SLOPE EXCEEDS COUNTY NOMOGRAPH
   DEFINITION. EXTRAPOLATION OF NOMOGRAPH USED.
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.71
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.71

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    40.70  DOWNSTREAM(FEET) =    40.00
  FLOW LENGTH(FEET) =     7.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.47
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.71
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   6.02
  LONGEST FLOWPATH FROM NODE    145.00 TO NODE    135.00 =   152.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.207
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  SUBAREA AREA(ACRES) =    1.49   SUBAREA RUNOFF(CFS) =    2.82
  TOTAL AREA(ACRES) =      1.72   TOTAL RUNOFF(CFS) =    3.53
  TC(MIN.) =   6.02

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.02
  RAINFALL INTENSITY(INCH/HR) =   4.21
  TOTAL STREAM AREA(ACRES) =     1.72
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       13.03     6.53        4.108          4.57
      2        3.53     6.02        4.207          1.72

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       16.25     6.02       4.207
      2       16.47     6.53       4.108

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     16.47   Tc(MIN.) =    6.53
  TOTAL AREA(ACRES) =      6.29
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    135.00 =   961.50 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      6.29  TC(MIN.) =      6.53
  PEAK FLOW RATE(CFS)   =     16.47
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

♀
```

```
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2003 Advanced Engineering Software (aes)
             Ver. 1.5A Release Date: 01/01/2003  License ID 1261

                           Analysis prepared by:

                          RICK ENGINEERING COMPANY
                              5620 Friars Road
                        San Diego, California 92110
                      619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* H:17010, DISCOVERY CENTER AT GRANT PARK                                  *
* PROPOSED CONDITION FOR 100-YR STORM EVENT                                *
* BASIN 200                                                                *
 **************************************************************************

  FILE NAME: C:\aes2003\DC200P00.RAT
  TIME/DATE OF STUDY: 20:04 09/14/2015
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  RAINFALL-INTENSITY ADJUSTMENT FACTOR = 1.000
  *USER SPECIFIED:
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)   5.000;  4.400
   2)  10.000;  3.450
   3)  15.000;  2.900
   4)  20.000;  2.500
   5)  25.000;  2.200
   6)  30.000;  2.000
   7)  40.000;  1.700
   8)  50.000;  1.500
   9)  60.000;  1.300
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: ONLY PEAK CONFLUENCE VALUES CONSIDERED
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   22.0     15.5    0.020/0.020/0.015   0.50    1.50 0.0100 0.125 0.0180
  3   25.0     18.0    0.020/0.020/0.015   0.67    2.00 0.0100 0.167 0.0180
  4   40.0     33.0    0.020/0.020/0.020   0.67    2.00 0.0100 0.167 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.10 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
  UPSTREAM ELEVATION(FEET) =     49.97
  DOWNSTREAM ELEVATION(FEET) =     47.04
  ELEVATION DIFFERENCE(FEET) =      2.93
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.762
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.77
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.77

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    210.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     47.04  DOWNSTREAM(FEET) =     45.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   117.90   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.018   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.897
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.19
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   1.65
  Tc(MIN.) =   7.65
  SUBAREA AREA(ACRES) =     0.34       SUBAREA RUNOFF(CFS) =    1.06
  TOTAL AREA(ACRES) =      0.56         PEAK FLOW RATE(CFS) =       1.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.37
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    210.00 =   267.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    225.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    40.00  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.44
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.83
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   8.43
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    225.00 =   522.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    225.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.748
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7600
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.35   SUBAREA RUNOFF(CFS) =    1.00
  TOTAL AREA(ACRES) =      0.91   TOTAL RUNOFF(CFS) =    2.83
  TC(MIN.) =   8.43

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    36.50  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =    27.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.76
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.83
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   8.49
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    240.00 =   549.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    240.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    255.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8800
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.90
  UPSTREAM ELEVATION(FEET) =     48.00
  DOWNSTREAM ELEVATION(FEET) =     47.70
  ELEVATION DIFFERENCE(FEET) =      0.30
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.370
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
```

```
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    260.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.70  DOWNSTREAM(FEET) =    42.40
  FLOW LENGTH(FEET) =    32.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.13
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.15
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   6.25
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    260.00 =    83.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    260.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.162
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7300
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.11   SUBAREA RUNOFF(CFS) =    0.33
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =    0.48
  TC(MIN.) =   6.25

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    270.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.40  DOWNSTREAM(FEET) =    40.94
  FLOW LENGTH(FEET) =   145.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.07
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      0.48
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   7.05
  LONGEST FLOWPATH FROM NODE    250.00 TO NODE    270.00 =   229.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.011
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.27   SUBAREA RUNOFF(CFS) =    0.49
  TOTAL AREA(ACRES) =      0.42   TOTAL RUNOFF(CFS) =    0.97
  TC(MIN.) =   7.05

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.05
  RAINFALL INTENSITY(INCH/HR) =   4.01
  TOTAL STREAM AREA(ACRES) =     0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.97

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    280.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    63.00
  UPSTREAM ELEVATION(FEET) =     48.00
  DOWNSTREAM ELEVATION(FEET) =     46.79
  ELEVATION DIFFERENCE(FEET) =      1.21
  URBAN SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.724
```

```
  TIME OF CONCENTRATION ASSUMED AS 6-MIN.
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.210
  SUBAREA RUNOFF(CFS) =      0.48
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    283.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =     46.79  DOWNSTREAM(FEET) =     45.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    64.00   CHANNEL SLOPE =  0.0202
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.095
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.77
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   0.60
  Tc(MIN.) =   6.60
  SUBAREA AREA(ACRES) =     0.16       SUBAREA RUNOFF(CFS) =    0.62
  TOTAL AREA(ACRES) =      0.28         PEAK FLOW RATE(CFS) =       1.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.85
  LONGEST FLOWPATH FROM NODE    275.00 TO NODE    283.00 =   127.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    283.00 TO NODE    285.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    42.27  DOWNSTREAM(FEET) =    41.80
  FLOW LENGTH(FEET) =    44.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.95
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.10
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   6.79
  LONGEST FLOWPATH FROM NODE    275.00 TO NODE    285.00 =   171.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    283.00 TO NODE    285.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.060
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.22   SUBAREA RUNOFF(CFS) =    0.46
  TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =    1.57
  TC(MIN.) =   6.79

****************************************************************************
  FLOW PROCESS FROM NODE    285.00 TO NODE    270.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    41.80  DOWNSTREAM(FEET) =    40.94
  FLOW LENGTH(FEET) =    88.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.18
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      1.57
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   7.14
  LONGEST FLOWPATH FROM NODE    275.00 TO NODE    270.00 =   260.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.14
  RAINFALL INTENSITY(INCH/HR) =   3.99
  TOTAL STREAM AREA(ACRES) =     0.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.57
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    287.00 TO NODE    270.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4800
  S.C.S. CURVE NUMBER (AMC II) =   0
  NATURAL WATERSHED NOMOGRAPH TIME OF CONCENTRATION (APPENDIX X-A)
  WITH 10-MIN. ADDED =  12.93(MIN.)
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   291.20
  UPSTREAM ELEVATION(FEET) =     50.10
  DOWNSTREAM ELEVATION(FEET) =     45.00
  ELEVATION DIFFERENCE(FEET) =      5.10
  NATURAL WATERSHED TIME OF CONCENTRATION =  12.93
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.128
  SUBAREA RUNOFF(CFS) =      0.48
  TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      0.48

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.93
  RAINFALL INTENSITY(INCH/HR) =   3.13
  TOTAL STREAM AREA(ACRES) =     0.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.48

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.97     7.05        4.011          0.42
      2        1.57     7.14        3.993          0.50
      3        0.48    12.93        3.128          0.32

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        2.90     7.05       4.011
      2        2.91     7.14       3.993
      3        2.46    12.93       3.128

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      2.91   Tc(MIN.) =    7.14
  TOTAL AREA(ACRES) =      1.24
  LONGEST FLOWPATH FROM NODE    287.00 TO NODE    270.00 =   291.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    240.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   406.00  DOWNSTREAM(FEET) =    35.50
  FLOW LENGTH(FEET) =   309.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.16
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      2.91
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   7.33
  LONGEST FLOWPATH FROM NODE    287.00 TO NODE    240.00 =   600.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.958
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.26   SUBAREA RUNOFF(CFS) =    0.46
  TOTAL AREA(ACRES) =      1.50   TOTAL RUNOFF(CFS) =    3.37
  TC(MIN.) =   7.33

****************************************************************************
```

```
  FLOW PROCESS FROM NODE    245.00 TO NODE    245.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        3.37     7.33       3.958        1.50
  LONGEST FLOWPATH FROM NODE    287.00 TO NODE    245.00 =   600.20 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1        2.83     8.49       3.737        0.91
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    245.00 =   549.90 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1       6.04       7.33        3.958
     2       6.01       8.49        3.737

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      6.04   Tc(MIN.) =    7.33
  TOTAL AREA(ACRES) =      2.41

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    245.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    240.00 TO NODE    290.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    35.50  DOWNSTREAM(FEET) =    34.50
  FLOW LENGTH(FEET) =    67.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.89
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.04
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   7.49
  LONGEST FLOWPATH FROM NODE    287.00 TO NODE    290.00 =   667.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    290.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.927
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  SUBAREA AREA(ACRES) =    0.21   SUBAREA RUNOFF(CFS) =    0.37
  TOTAL AREA(ACRES) =      2.62   TOTAL RUNOFF(CFS) =    6.41
  TC(MIN.) =   7.49

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    290.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   7.49
  RAINFALL INTENSITY(INCH/HR) =   3.93
  TOTAL STREAM AREA(ACRES) =     2.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.41

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    290.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.53   RAIN INTENSITY(INCH/HOUR) =  4.11
  TOTAL AREA(ACRES) =     6.29   TOTAL RUNOFF(CFS) =     16.47

****************************************************************************
  FLOW PROCESS FROM NODE    290.00 TO NODE    290.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.53
  RAINFALL INTENSITY(INCH/HR) =   4.11
  TOTAL STREAM AREA(ACRES) =     6.29
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.47

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        6.41     7.49        3.927          2.62
      2       16.47     6.53        4.109          6.29

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       22.60     6.53       4.109
      2       22.15     7.49       3.927

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     22.60   Tc(MIN.) =    6.53
  TOTAL AREA(ACRES) =      8.91
  LONGEST FLOWPATH FROM NODE    287.00 TO NODE    290.00 =   667.20 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      8.91  TC(MIN.) =      6.53
  PEAK FLOW RATE(CFS)   =     22.60
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

♀
```

APPENDIX C

Backup Calculations
for
Weighted Runoff Coefficients

Weighted Runoff Coefficient Calculations - Proposed Condition

Discovery Center at Grant Park
JN: 17010
Date: 10-6-2014

U/S Node #	D/S Node #	Soil Type	Sub Basin Area, A (acres)	Impervious Area (ac)	Pervious Area (ac)	Runoff coefficient impervious area	Runoff coefficient pervious area	Weighted Runoff Coefficient^1, C_w
Offsite runoff from Discovery Place Camino Del Rio North								
117	117	D	2.3					**0.83***
Offsite Area								
100	105	D	0.11	0.10	0.01	0.95	0.45	0.94
105	110	D	0.15	0.14	0.01	0.95	0.45	0.92
110	115	D	0.33	0.33	0.00	0.95	0.45	0.95
125	130	D	0.10	0.09	0.01	0.95	0.45	0.94
130	120	D	0.87	0.78	0.09	0.95	0.45	0.90
140	135	D	0.71	0.00	0.71	0.95	0.45	0.45
		Total area (ac):	**2.25**	**63.7%**		**Area weighted runoff coefficient:**		**0.77**

U/S Node #	D/S Node #	Soil Type	Sub Basin Area, A (acres)	Impervious Area (ac)	Pervious Area (ac)	Runoff coefficient impervious area	Runoff coefficient pervious area	Weighted Runoff Coefficient^1, C_w
145	150	D	0.23	0.13	0.10	0.95	0.45	0.73
155	150	D	1.49	0.00	1.49	0.95	0.45	0.45
		Total area (ac):	**1.72**	**7.7%**		**Area weighted runoff coefficient:**		**0.49**

U/S Node #	D/S Node #	Soil Type	Sub Basin Area, A (acres)	Impervious Area (ac)	Pervious Area (ac)	Runoff coefficient impervious area	Runoff coefficient pervious area	Weighted Runoff Coefficient^1, C_w
Basin 200								
200	205	D	0.22	0.17	0.05	0.95	0.45	0.83
205	210	D	0.34	0.24	0.10	0.95	0.45	0.80
220	225	D	0.35	0.22	0.14	0.95	0.45	0.76
235	230	D	0.26	0.00	0.26	0.95	0.45	0.46
250	255	D	0.04	0.03	0.01	0.95	0.45	0.88
265	260	D	0.11	0.06	0.05	0.95	0.45	0.73
260	270	D	0.27	0.00	0.27	0.95	0.45	0.45
275	280	D	0.12	0.12	0.00	0.95	0.45	0.95
280	283	D	0.16	0.16	0.00	0.95	0.45	0.95
283	285	D	0.22	0.03	0.19	0.95	0.45	0.52
287	270	D	0.32	0.02	0.30	0.95	0.45	0.48
245	290	D	0.21	0.00	0.21	0.95	0.45	0.45
		Total area (ac):	**2.63**	**40.0%**		**Area weighted runoff coefficient:**		**0.65**

Note:
1 - Based on the 1984 City of San Diego Drainage Design Manual, Ci = 0.95 for 100% impervious area & Cp=0.45 for 0% impervious area
* - Calculated based on the provided information by Pasco Laret Suiter and Associates for the proposed "Discovery Place Camino Del Rio North" project

Weighted Runoff Coefficient Calculations - Existing Condition

Discovery Center at Grant Park
JN: 17010
Date: 10-6-2014

U/S Node #	D/S Node #	Soil Type	Sub Basin Area, A (acres)	Impervious Area (ac)	Pervious Area (ac)	Runoff coefficient impervious area	Runoff coefficient pervious area	Weighted Runoff Coefficient[1], C_w
Offsite runoff from Discovery Place Camino Del Rio North								
117	117	D	**2.3**					**0.83***
Basin 100								
125	130	D	0.11	0.10	0.01	0.95	0.45	0.94
130	135	D	0.15	0.14	0.01	0.95	0.45	0.92
135	120	D	0.33	0.33	0.00	0.95	0.45	0.95
145	150	D	0.10	0.09	0.01	0.95	0.45	0.92
150	140	D	0.87	0.78	0.09	0.95	0.45	0.90
Total area (ac):			**1.55**	**92.9%**		**Area weighted runoff coefficient:**		**0.92**

170	155	D	1.55	0.00	1.55	0.95	0.45	0.45
160	165	D	0.20	0.00	0.20	0.95	0.45	0.45
165	155	D	2.46	0.00	2.46	0.95	0.45	0.45
175	155	D	0.19	0.00	0.19	0.95	0.45	0.45
185	190	D	0.30	0.00	0.30	0.95	0.45	0.45
190	155	D	0.32	0.00	0.32	0.95	0.45	0.45
Total area (ac):			**5.03**	**0.0%**		**Area weighted runoff coefficient:**		**0.45**

Note:
1 - Based on the 1984 City of San Diego Drainage Design Manual, Ci = 0.95 for 100% impervious area & Cp=0.45 for 0% impervious area
* - Calculated based on the provided information by Pasco Laret Suiter and Associates for the proposed "Discovery Place Camino Del Rio North" project

APPENDIX D

Summary of Storm Drain Pipes Hydraulic Calculations

JN: 17010
Discovery Center at Grant Park
04-30-2014

Preliminary Storm Drain Size

The purpose of this table is to provide an estimated pipe size to convey the 100-year flow rates with a sizing factor.

Manning's n: 0.012

Sizing Factor (%): 30

		Slope at:	0.5%		1.0%	
Pipe segment from Node to Node	**Q_{100} (cfs[1])**	**Q_{100} with Sizing Factor (cfs[1])**	**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**
115-120	9.8	12.7	1.78	24"	1.56	24"
120-135	11.7	15.2	1.90	24"	1.67	24"
150-135	0.7	0.9	0.66	8"	0.58	8"
210-215	1.8	2.3	0.94	12"	0.83	10"
225-215	1.1	1.4	0.78	10"	0.69	10"
215-230	2.9	3.8	1.13	18"	0.99	12"
230-240	3.3	4.3	1.18	18"	1.04	18"
240-245	3.3	4.3	1.18	18"	1.04	18"
255-260	0.2	0.3	0.41	6"	0.36	6"
265-260	0.5	0.7	0.58	8"	0.51	6"
260-270	0.9	1.2	0.73	10"	0.64	8"
283-285	1.6	2.1	0.90	12"	0.79	10"
285-270	1.6	2.1	0.90	12"	0.79	10"
270-245	2.9	3.8	1.13	18"	0.99	12"
245-290	6.0	7.8	1.48	18"	1.30	18"

Note:

1. "cfs" = cubic feet per second.
2. Minimum pipe sizes are calculated using the Manning's equation and are based on the flow rates with 30% factor.

H:\17010_Discovery_Center\WaterResources\Hydraulics\Pipeflow\17010_Hydraulics_Storm_Drain_Sizing.xls

APPENDIX E

Existing Sump Analysis for Proposed Condition

RICK™
ENGINEERING COMPANY

5620 Friars Road
San Diego, CA 92110-2596

Tel: (619) 291-0707
Fax: (619) 291-4165

Date 10-3-2014
Job No. 17010
Page 1
Done By SS
Checked By

Proposed Condition (100-YR, 24 HR):

* EXISTING SUMP IN PROPOSED CONDITION

CALCULATED VOLUME FOR

$P_{24}^{100\text{-YR}}$ – 24 HOUR RAINFALL (inches) = 4.5 in/hr

$$VOL = C \cdot P_{24} \cdot A = 0.716 \; 4.5\text{in} \times 6.3\text{acres}$$

$$VOL = 20.30\text{ acre-inches} = 1.69\text{ ac-ft}$$

$$\boxed{V = 1.69\text{ ac-ft}}$$

$$A = 6.3\text{ acres}$$

$$C = \frac{0.83 \times 2.3 + 0.65 \times 3.97}{6.27} = 0.716$$

BASED ON THE CALCULATED VOLUME FOR THE $P_{24\text{-HOUR}}$ PRECIPITATION FOR THE 100-YR EVENT AND THE VARIABLE FLOW RATES CALCULATED BASED ON THE 28 in/hr HYDRAULIC CONDUCTIVITY THE WATER WILL POND UP TO AN ELEVATION OF 41.57

- VOLUME GENERATED BY THE AREA OF BASIN 100. SEE "DRAINAGE STUDY EXHIBIT FOR DISCOVERY CENTER AT GRANT PARK, POST-PROJECT" FOR LOCATION OF BASIN 100.

Discovery Center at Grant Park
JN: 17010
10-6-2014

Hydraulic Conductivity[1] (in/hr)	28

Contour Elevation (ft)	Area 1 (sq.ft.)	Area (ac)	Volume (cu. ft.)[2]	Volume Cumulative (cu.ft.)	Volume Cumulative (ac-ft)	Infiltration Discharge Rate (cfs)
35	650	0.015	0	0	0.000	0.421
36	1720	0.039	1142.452	1142.452	0.026	1.115
37	3109	0.071	2380.487	3522.939	0.081	2.015
38	4944	0.113	3991.191	7514.130	0.173	3.204
39	7293	0.167	6080.571	13594.702	0.312	4.727
40	19640	0.451	12967.021	26561.722	0.610	12.730
41	32263	0.741	25691.771	52253.493	1.200	20.911
41.57	42949	0.986	21362.907	73616.400	1.690	27.837
42	45502	1.045	38693.298	90946.791	2.088	29.492
43	52962	1.216	49184.832	140131.623	3.217	34.327
44	59068	1.356	55987.246	196118.870	4.502	38.285
45	63090	1.448	61067.962	257186.831	5.904	40.892
46	67107	1.541	65088.169	322275.001	7.398	43.495

Note:

[1] - Based on the performed field hydraulic conductivity testing by Geocon

[2] - Volume calculations based on conic method

Based on the calculated volume for the 24-hour precipitation for the 100-yr storm event and the calculated flow rates at different elevations and 28 in/hr hydraulic conductivity, the water will pond up to an elevation of 41.57. The calculated drawdowntime (using HEC-1) for the natural basin/pond east of the project will be 2 hours and 40 minutes.

```
1*****************************************                                                   ***************************************
 *                                       *                                                   *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *   U.S. ARMY CORPS OF ENGINEERS      *
 *               JUN   1998              *                                                   *   HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1                *                                                   *         609 SECOND STREET           *
 *                                       *                                                   *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   03OCT14  TIME  12:30:04   *                                                   *          (916) 756-1104             *
 *                                       *                                                   *                                     *
 *****************************************                                                   ***************************************




                                                X     X  XXXXXXX   XXXXX           X
                                                X     X  X        X     X         XX
                                                X     X  X        X                X
                                                XXXXXXX  XXXX     X       XXXXX   X
                                                X     X  X        X                X
                                                X     X  X        X     X          X
                                                X     X  XXXXXXX   XXXXX          XXX




            THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

            THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
            THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
            NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
            DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
            KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                                      HEC-1 INPUT                                             PAGE  1

           LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                         *DIAGRAM
 *** FREE ***
              1           ID   J-17010; DISCOVERY CENTER AT GRANT PARK
              2           ID   BASIN 100 - DETENTION EXISTING PONDS
              3           ID   THE PURPOSE OF THIS ANALYSES IS TO DETERMINE DRAWDOWN TIME
              4           ID   JULY 14, 2014  FILE NAME: DCB1H_2.HC1
              5           IT      40 01JAN90    1200     300
              6           IO       1       0

              7           KK  DETAIN
              8           KO       2       2       0       0      21
              9           RS       1    ELEV   41.57
             10           SV   0.000   0.026   0.081   0.173   0.312   0.610   1.200   1.690   3.217
             11           SQ   0.421   1.115   2.015   3.204   4.727  12.730  20.911  27.837  29.492
             12           SE   35.00   36.00   37.00   38.00   39.00   40.00   41.00   41.57   42.00
             13           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR       (<---) RETURN OF DIVERTED OR PUMPED FLOW

 *** HEC1 ERROR 4 *** NO HYDROGRAPHS AVAILABLE TO ROUTE
                 V
                 V
     7      DETAIN

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION

         1 ERRORS IN STREAM SYSTEM
1*****************************************                                                   ***************************************
 *                                       *                                                   *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                   *   U.S. ARMY CORPS OF ENGINEERS      *
 *               JUN   1998              *                                                   *   HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1                *                                                   *         609 SECOND STREET           *
 *                                       *                                                   *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   03OCT14  TIME  12:30:04   *                                                   *          (916) 756-1104             *
 *                                       *                                                   *                                     *
 *****************************************                                                   ***************************************




                            J-17010; DISCOVERY CENTER AT GRANT PARK
                            BASIN 100 - DETENTION EXISTING PONDS
                            THE PURPOSE OF THIS ANALYSES IS TO DETERMINE DRAWDOWN TIME
                            JULY 14, 2014  FILE NAME: DCB1H_2.HC1

    6 IO          OUTPUT CONTROL VARIABLES
                        IPRNT           1  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN          40  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1JAN90  STARTING DATE
                        ITIME        1200  STARTING TIME
                           NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      9JAN90  ENDING DATE
                       NDTIME        1920  ENDING TIME
                       ICENT           19  CENTURY MARK

                    COMPUTATION INTERVAL     .67 HOURS
```

```
                        TOTAL TIME BASE  199.33 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
   7 KK     *    DETAIN  *
            *            *
            **************

   8 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           2  PRINT CONTROL
                       IPLOT           2  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
                       IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                        IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2         300  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT        .667  TIME INTERVAL IN HOURS


               HYDROGRAPH ROUTING DATA

   9 RS          STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        ELEV  TYPE OF INITIAL CONDITION
                      RSVRIC       41.57  INITIAL CONDITION
                         X           .00 WORKING R AND D COEFFICIENT

  10 SV            STORAGE          .0        .0        .1        .2        .3        .6       1.2       1.7       3.2

  11 SQ          DISCHARGE          0.        1.        2.        3.        5.       13.       21.       28.       29.

  12 SE          ELEVATION       35.00     36.00     37.00     38.00     39.00     40.00     41.00     41.57     42.00
                                                                ***

***********************************************************************************************************************************

                                                  HYDROGRAPH AT STATION   DETAIN

***********************************************************************************************************************************
                                           *                                           *
 DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE * DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE * DA MON HRMN ORD  OUTFLOW  STORAGE   STAGE
                                           *                                           *
  1 JAN 1200   1      28.      1.7    41.6 *  4 JAN 0640 101       0.       .0    35.0 *  7 JAN 0120 201       0.       .0    35.0
  1 JAN 1240   2      12.       .6    39.9 *  4 JAN 0720 102       0.       .0    35.0 *  7 JAN 0200 202       0.       .0    35.0
  1 JAN 1320   3       3.       .2    37.9 *  4 JAN 0800 103       0.       .0    35.0 *  7 JAN 0240 203       0.       .0    35.0
  1 JAN 1400   4       1.       .0    36.3 *  4 JAN 0840 104       0.       .0    35.0 *  7 JAN 0320 204       0.       .0    35.0
  1 JAN 1440   5       0.       .0    35.0 *  4 JAN 0920 105       0.       .0    35.0 *  7 JAN 0400 205       0.       .0    35.0
  1 JAN 1520   6       0.       .0    35.0 *  4 JAN 1000 106       0.       .0    35.0 *  7 JAN 0440 206       0.       .0    35.0
  1 JAN 1600   7       0.       .0    35.0 *  4 JAN 1040 107       0.       .0    35.0 *  7 JAN 0520 207       0.       .0    35.0
  1 JAN 1640   8       0.       .0    35.0 *  4 JAN 1120 108       0.       .0    35.0 *  7 JAN 0600 208       0.       .0    35.0
  1 JAN 1720   9       0.       .0    35.0 *  4 JAN 1200 109       0.       .0    35.0 *  7 JAN 0640 209       0.       .0    35.0
  1 JAN 1800  10       0.       .0    35.0 *  4 JAN 1240 110       0.       .0    35.0 *  7 JAN 0720 210       0.       .0    35.0
  1 JAN 1840  11       0.       .0    35.0 *  4 JAN 1320 111       0.       .0    35.0 *  7 JAN 0800 211       0.       .0    35.0
  1 JAN 1920  12       0.       .0    35.0 *  4 JAN 1400 112       0.       .0    35.0 *  7 JAN 0840 212       0.       .0    35.0
  1 JAN 2000  13       0.       .0    35.0 *  4 JAN 1440 113       0.       .0    35.0 *  7 JAN 0920 213       0.       .0    35.0
  1 JAN 2040  14       0.       .0    35.0 *  4 JAN 1520 114       0.       .0    35.0 *  7 JAN 1000 214       0.       .0    35.0
  1 JAN 2120  15       0.       .0    35.0 *  4 JAN 1600 115       0.       .0    35.0 *  7 JAN 1040 215       0.       .0    35.0
  1 JAN 2200  16       0.       .0    35.0 *  4 JAN 1640 116       0.       .0    35.0 *  7 JAN 1120 216       0.       .0    35.0
  1 JAN 2240  17       0.       .0    35.0 *  4 JAN 1720 117       0.       .0    35.0 *  7 JAN 1200 217       0.       .0    35.0
  1 JAN 2320  18       0.       .0    35.0 *  4 JAN 1800 118       0.       .0    35.0 *  7 JAN 1240 218       0.       .0    35.0
  2 JAN 0000  19       0.       .0    35.0 *  4 JAN 1840 119       0.       .0    35.0 *  7 JAN 1320 219       0.       .0    35.0
  2 JAN 0040  20       0.       .0    35.0 *  4 JAN 1920 120       0.       .0    35.0 *  7 JAN 1400 220       0.       .0    35.0
  2 JAN 0120  21       0.       .0    35.0 *  4 JAN 2000 121       0.       .0    35.0 *  7 JAN 1440 221       0.       .0    35.0
  2 JAN 0200  22       0.       .0    35.0 *  4 JAN 2040 122       0.       .0    35.0 *  7 JAN 1520 222       0.       .0    35.0
  2 JAN 0240  23       0.       .0    35.0 *  4 JAN 2120 123       0.       .0    35.0 *  7 JAN 1600 223       0.       .0    35.0
  2 JAN 0320  24       0.       .0    35.0 *  4 JAN 2200 124       0.       .0    35.0 *  7 JAN 1640 224       0.       .0    35.0
  2 JAN 0400  25       0.       .0    35.0 *  4 JAN 2240 125       0.       .0    35.0 *  7 JAN 1720 225       0.       .0    35.0
  2 JAN 0440  26       0.       .0    35.0 *  4 JAN 2320 126       0.       .0    35.0 *  7 JAN 1800 226       0.       .0    35.0
  2 JAN 0520  27       0.       .0    35.0 *  5 JAN 0000 127       0.       .0    35.0 *  7 JAN 1840 227       0.       .0    35.0
  2 JAN 0600  28       0.       .0    35.0 *  5 JAN 0040 128       0.       .0    35.0 *  7 JAN 1920 228       0.       .0    35.0
  2 JAN 0640  29       0.       .0    35.0 *  5 JAN 0120 129       0.       .0    35.0 *  7 JAN 2000 229       0.       .0    35.0
  2 JAN 0720  30       0.       .0    35.0 *  5 JAN 0200 130       0.       .0    35.0 *  7 JAN 2040 230       0.       .0    35.0
  2 JAN 0800  31       0.       .0    35.0 *  5 JAN 0240 131       0.       .0    35.0 *  7 JAN 2120 231       0.       .0    35.0
  2 JAN 0840  32       0.       .0    35.0 *  5 JAN 0320 132       0.       .0    35.0 *  7 JAN 2200 232       0.       .0    35.0
  2 JAN 0920  33       0.       .0    35.0 *  5 JAN 0400 133       0.       .0    35.0 *  7 JAN 2240 233       0.       .0    35.0
  2 JAN 1000  34       0.       .0    35.0 *  5 JAN 0440 134       0.       .0    35.0 *  7 JAN 2320 234       0.       .0    35.0
  2 JAN 1040  35       0.       .0    35.0 *  5 JAN 0520 135       0.       .0    35.0 *  8 JAN 0000 235       0.       .0    35.0
  2 JAN 1120  36       0.       .0    35.0 *  5 JAN 0600 136       0.       .0    35.0 *  8 JAN 0040 236       0.       .0    35.0
  2 JAN 1200  37       0.       .0    35.0 *  5 JAN 0640 137       0.       .0    35.0 *  8 JAN 0120 237       0.       .0    35.0
  2 JAN 1240  38       0.       .0    35.0 *  5 JAN 0720 138       0.       .0    35.0 *  8 JAN 0200 238       0.       .0    35.0
  2 JAN 1320  39       0.       .0    35.0 *  5 JAN 0800 139       0.       .0    35.0 *  8 JAN 0240 239       0.       .0    35.0
  2 JAN 1400  40       0.       .0    35.0 *  5 JAN 0840 140       0.       .0    35.0 *  8 JAN 0320 240       0.       .0    35.0
  2 JAN 1440  41       0.       .0    35.0 *  5 JAN 0920 141       0.       .0    35.0 *  8 JAN 0400 241       0.       .0    35.0
  2 JAN 1520  42       0.       .0    35.0 *  5 JAN 1000 142       0.       .0    35.0 *  8 JAN 0440 242       0.       .0    35.0
  2 JAN 1600  43       0.       .0    35.0 *  5 JAN 1040 143       0.       .0    35.0 *  8 JAN 0520 243       0.       .0    35.0
  2 JAN 1640  44       0.       .0    35.0 *  5 JAN 1120 144       0.       .0    35.0 *  8 JAN 0600 244       0.       .0    35.0
  2 JAN 1720  45       0.       .0    35.0 *  5 JAN 1200 145       0.       .0    35.0 *  8 JAN 0640 245       0.       .0    35.0
  2 JAN 1800  46       0.       .0    35.0 *  5 JAN 1240 146       0.       .0    35.0 *  8 JAN 0720 246       0.       .0    35.0
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   2 JAN 1840  47       0.       .0    35.0 *  5 JAN 1320 147       0.       .0    35.0 *  8 JAN 0800 247       0.       .0    35.0
   2 JAN 1920  48       0.       .0    35.0 *  5 JAN 1400 148       0.       .0    35.0 *  8 JAN 0840 248       0.       .0    35.0
   2 JAN 2000  49       0.       .0    35.0 *  5 JAN 1440 149       0.       .0    35.0 *  8 JAN 0920 249       0.       .0    35.0
   2 JAN 2040  50       0.       .0    35.0 *  5 JAN 1520 150       0.       .0    35.0 *  8 JAN 1000 250       0.       .0    35.0
   2 JAN 2120  51       0.       .0    35.0 *  5 JAN 1600 151       0.       .0    35.0 *  8 JAN 1040 251       0.       .0    35.0
   2 JAN 2200  52       0.       .0    35.0 *  5 JAN 1640 152       0.       .0    35.0 *  8 JAN 1120 252       0.       .0    35.0
   2 JAN 2240  53       0.       .0    35.0 *  5 JAN 1720 153       0.       .0    35.0 *  8 JAN 1200 253       0.       .0    35.0
   2 JAN 2320  54       0.       .0    35.0 *  5 JAN 1800 154       0.       .0    35.0 *  8 JAN 1240 254       0.       .0    35.0
   3 JAN 0000  55       0.       .0    35.0 *  5 JAN 1840 155       0.       .0    35.0 *  8 JAN 1320 255       0.       .0    35.0
   3 JAN 0040  56       0.       .0    35.0 *  5 JAN 1920 156       0.       .0    35.0 *  8 JAN 1400 256       0.       .0    35.0
   3 JAN 0120  57       0.       .0    35.0 *  5 JAN 2000 157       0.       .0    35.0 *  8 JAN 1440 257       0.       .0    35.0
   3 JAN 0200  58       0.       .0    35.0 *  5 JAN 2040 158       0.       .0    35.0 *  8 JAN 1520 258       0.       .0    35.0
   3 JAN 0240  59       0.       .0    35.0 *  5 JAN 2120 159       0.       .0    35.0 *  8 JAN 1600 259       0.       .0    35.0
   3 JAN 0320  60       0.       .0    35.0 *  5 JAN 2200 160       0.       .0    35.0 *  8 JAN 1640 260       0.       .0    35.0
   3 JAN 0400  61       0.       .0    35.0 *  5 JAN 2240 161       0.       .0    35.0 *  8 JAN 1720 261       0.       .0    35.0
   3 JAN 0440  62       0.       .0    35.0 *  5 JAN 2320 162       0.       .0    35.0 *  8 JAN 1800 262       0.       .0    35.0
   3 JAN 0520  63       0.       .0    35.0 *  6 JAN 0000 163       0.       .0    35.0 *  8 JAN 1840 263       0.       .0    35.0
   3 JAN 0600  64       0.       .0    35.0 *  6 JAN 0040 164       0.       .0    35.0 *  8 JAN 1920 264       0.       .0    35.0
   3 JAN 0640  65       0.       .0    35.0 *  6 JAN 0120 165       0.       .0    35.0 *  8 JAN 2000 265       0.       .0    35.0
   3 JAN 0720  66       0.       .0    35.0 *  6 JAN 0200 166       0.       .0    35.0 *  8 JAN 2040 266       0.       .0    35.0
   3 JAN 0800  67       0.       .0    35.0 *  6 JAN 0240 167       0.       .0    35.0 *  8 JAN 2120 267       0.       .0    35.0
   3 JAN 0840  68       0.       .0    35.0 *  6 JAN 0320 168       0.       .0    35.0 *  8 JAN 2200 268       0.       .0    35.0
   3 JAN 0920  69       0.       .0    35.0 *  6 JAN 0400 169       0.       .0    35.0 *  8 JAN 2240 269       0.       .0    35.0
   3 JAN 1000  70       0.       .0    35.0 *  6 JAN 0440 170       0.       .0    35.0 *  8 JAN 2320 270       0.       .0    35.0
   3 JAN 1040  71       0.       .0    35.0 *  6 JAN 0520 171       0.       .0    35.0 *  9 JAN 0000 271       0.       .0    35.0
   3 JAN 1120  72       0.       .0    35.0 *  6 JAN 0600 172       0.       .0    35.0 *  9 JAN 0040 272       0.       .0    35.0
   3 JAN 1200  73       0.       .0    35.0 *  6 JAN 0640 173       0.       .0    35.0 *  9 JAN 0120 273       0.       .0    35.0
   3 JAN 1240  74       0.       .0    35.0 *  6 JAN 0720 174       0.       .0    35.0 *  9 JAN 0200 274       0.       .0    35.0
   3 JAN 1320  75       0.       .0    35.0 *  6 JAN 0800 175       0.       .0    35.0 *  9 JAN 0240 275       0.       .0    35.0
   3 JAN 1400  76       0.       .0    35.0 *  6 JAN 0840 176       0.       .0    35.0 *  9 JAN 0320 276       0.       .0    35.0
   3 JAN 1440  77       0.       .0    35.0 *  6 JAN 0920 177       0.       .0    35.0 *  9 JAN 0400 277       0.       .0    35.0
   3 JAN 1520  78       0.       .0    35.0 *  6 JAN 1000 178       0.       .0    35.0 *  9 JAN 0440 278       0.       .0    35.0
   3 JAN 1600  79       0.       .0    35.0 *  6 JAN 1040 179       0.       .0    35.0 *  9 JAN 0520 279       0.       .0    35.0
   3 JAN 1640  80       0.       .0    35.0 *  6 JAN 1120 180       0.       .0    35.0 *  9 JAN 0600 280       0.       .0    35.0
   3 JAN 1720  81       0.       .0    35.0 *  6 JAN 1200 181       0.       .0    35.0 *  9 JAN 0640 281       0.       .0    35.0
   3 JAN 1800  82       0.       .0    35.0 *  6 JAN 1240 182       0.       .0    35.0 *  9 JAN 0720 282       0.       .0    35.0
   3 JAN 1840  83       0.       .0    35.0 *  6 JAN 1320 183       0.       .0    35.0 *  9 JAN 0800 283       0.       .0    35.0
   3 JAN 1920  84       0.       .0    35.0 *  6 JAN 1400 184       0.       .0    35.0 *  9 JAN 0840 284       0.       .0    35.0
   3 JAN 2000  85       0.       .0    35.0 *  6 JAN 1440 185       0.       .0    35.0 *  9 JAN 0920 285       0.       .0    35.0
   3 JAN 2040  86       0.       .0    35.0 *  6 JAN 1520 186       0.       .0    35.0 *  9 JAN 1000 286       0.       .0    35.0
   3 JAN 2120  87       0.       .0    35.0 *  6 JAN 1600 187       0.       .0    35.0 *  9 JAN 1040 287       0.       .0    35.0
   3 JAN 2200  88       0.       .0    35.0 *  6 JAN 1640 188       0.       .0    35.0 *  9 JAN 1120 288       0.       .0    35.0
   3 JAN 2240  89       0.       .0    35.0 *  6 JAN 1720 189       0.       .0    35.0 *  9 JAN 1200 289       0.       .0    35.0
   3 JAN 2320  90       0.       .0    35.0 *  6 JAN 1800 190       0.       .0    35.0 *  9 JAN 1240 290       0.       .0    35.0
   4 JAN 0000  91       0.       .0    35.0 *  6 JAN 1840 191       0.       .0    35.0 *  9 JAN 1320 291       0.       .0    35.0
   4 JAN 0040  92       0.       .0    35.0 *  6 JAN 1920 192       0.       .0    35.0 *  9 JAN 1400 292       0.       .0    35.0
   4 JAN 0120  93       0.       .0    35.0 *  6 JAN 2000 193       0.       .0    35.0 *  9 JAN 1440 293       0.       .0    35.0
   4 JAN 0200  94       0.       .0    35.0 *  6 JAN 2040 194       0.       .0    35.0 *  9 JAN 1520 294       0.       .0    35.0
   4 JAN 0240  95       0.       .0    35.0 *  6 JAN 2120 195       0.       .0    35.0 *  9 JAN 1600 295       0.       .0    35.0
   4 JAN 0320  96       0.       .0    35.0 *  6 JAN 2200 196       0.       .0    35.0 *  9 JAN 1640 296       0.       .0    35.0
   4 JAN 0400  97       0.       .0    35.0 *  6 JAN 2240 197       0.       .0    35.0 *  9 JAN 1720 297       0.       .0    35.0
   4 JAN 0440  98       0.       .0    35.0 *  6 JAN 2320 198       0.       .0    35.0 *  9 JAN 1800 298       0.       .0    35.0
   4 JAN 0520  99       0.       .0    35.0 *  7 JAN 0000 199       0.       .0    35.0 *  9 JAN 1840 299       0.       .0    35.0
   4 JAN 0600 100       0.       .0    35.0 *  7 JAN 0040 200       0.       .0    35.0 *  9 JAN 1920 300       0.       .0    35.0
                                            *                                           *
 ***********************************************************************************************************************************

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR    199.33-HR
+   (CFS)       (HR)
                           (CFS)
+      28.       .00                    4.          1.          1.           1.
                        (INCHES)      .000        .000        .000         .000
                         (AC-FT)        2.          2.          4.           9.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                      6-HR       24-HR       72-HR    199.33-HR
+  (AC-FT)      (HR)
        2.       .00                    0.          0.          0.           0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                      6-HR       24-HR       72-HR    199.33-HR
+   (FEET)      (HR)
     41.57       .00                 36.38       35.35       35.12        35.04

                         CUMULATIVE AREA =     .00 SQ MI

1                                                          STATION   DETAIN

                          (I) INFLOW,   (O) OUTFLOW
          0.        4.        8.       12.       16.       20.       24.       28.        0.        0.        0.        0.        0.
                                                                                 (S) STORAGE
          .0        .0        .0        .0        .0        .0       -.5        .0        .5       1.0       1.5       2.0        .0
 DAHRMN PER
  11200   1I---------.---------.---------.---------.---------.---------.---------O---------.---------.---------.---S-----.---------.
  11240   2I         .         .         O         .         .         .         .         . S       .         .         .         .
  11320   3I       O .         .         .         .         .         .         .  S      .         .         .         .         .
  11400   4I  O      .         .         .         .         .         .         .S        .         .         .         .         .
  11440   5IO        .         .         .         .         .         .         S         .         .         .         .         .
  11520   6IO        .         .         .         .         .         .         S         .         .         .         .         .
  11600   7IO        .         .         .         .         .         .         S         .         .         .         .         .
  11640   8IO        .         .         .         .         .         .         S         .         .         .         .         .
  11720   9IO        .         .         .         .         .         .         S         .         .         .         .         .
  11800  10IO        .         .         .         .         .         .         S         .         .         .         .         .
  11840  11IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
  11920  12IO        .         .         .         .         .         .         S         .         .         .         .         .
  12000  13IO        .         .         .         .         .         .         S         .         .         .         .         .
  12040  14IO        .         .         .         .         .         .         S         .         .         .         .         .
  12120  15IO        .         .         .         .         .         .         S         .         .         .         .         .
  12200  16IO        .         .         .         .         .         .         S         .         .         .         .         .
  12240  17IO        .         .         .         .         .         .         S         .         .         .         .         .
  12320  18IO        .         .         .         .         .         .         S         .         .         .         .         .
  20000  19IO        .         .         .         .         .         .         S         .         .         .         .         .
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20040  20IO        .         .         .         .         .         .         S         .         .         .         .         .
20120  21IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
20200  22IO        .         .         .         .         .         .         S         .         .         .         .         .
20240  23IO        .         .         .         .         .         .         S         .         .         .         .         .
20320  24IO        .         .         .         .         .         .         S         .         .         .         .         .
20400  25IO        .         .         .         .         .         .         S         .         .         .         .         .
20440  26IO        .         .         .         .         .         .         S         .         .         .         .         .
20520  27IO        .         .         .         .         .         .         S         .         .         .         .         .
20600  28IO        .         .         .         .         .         .         S         .         .         .         .         .
20640  29IO        .         .         .         .         .         .         S         .         .         .         .         .
20720  30IO        .         .         .         .         .         .         S         .         .         .         .         .
20800  31IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
20840  32IO        .         .         .         .         .         .         S         .         .         .         .         .
20920  33IO        .         .         .         .         .         .         S         .         .         .         .         .
21000  34IO        .         .         .         .         .         .         S         .         .         .         .         .
21040  35IO        .         .         .         .         .         .         S         .         .         .         .         .
21120  36IO        .         .         .         .         .         .         S         .         .         .         .         .
21200  37IO        .         .         .         .         .         .         S         .         .         .         .         .
21240  38IO        .         .         .         .         .         .         S         .         .         .         .         .
21320  39IO        .         .         .         .         .         .         S         .         .         .         .         .
21400  40IO        .         .         .         .         .         .         S         .         .         .         .         .
21440  41IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
21520  42IO        .         .         .         .         .         .         S         .         .         .         .         .
21600  43IO        .         .         .         .         .         .         S         .         .         .         .         .
21640  44IO        .         .         .         .         .         .         S         .         .         .         .         .
21720  45IO        .         .         .         .         .         .         S         .         .         .         .         .
21800  46IO        .         .         .         .         .         .         S         .         .         .         .         .
21840  47IO        .         .         .         .         .         .         S         .         .         .         .         .
21920  48IO        .         .         .         .         .         .         S         .         .         .         .         .
22000  49IO        .         .         .         .         .         .         S         .         .         .         .         .
22040  50IO        .         .         .         .         .         .         S         .         .         .         .         .
22120  51IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
22200  52IO        .         .         .         .         .         .         S         .         .         .         .         .
22240  53IO        .         .         .         .         .         .         S         .         .         .         .         .
22320  54IO        .         .         .         .         .         .         S         .         .         .         .         .
30000  55IO        .         .         .         .         .         .         S         .         .         .         .         .
30040  56IO        .         .         .         .         .         .         S         .         .         .         .         .
30120  57IO        .         .         .         .         .         .         S         .         .         .         .         .
30200  58IO        .         .         .         .         .         .         S         .         .         .         .         .
30240  59IO        .         .         .         .         .         .         S         .         .         .         .         .
30320  60IO        .         .         .         .         .         .         S         .         .         .         .         .
30400  61IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
30440  62IO        .         .         .         .         .         .         S         .         .         .         .         .
30520  63IO        .         .         .         .         .         .         S         .         .         .         .         .
30600  64IO        .         .         .         .         .         .         S         .         .         .         .         .
30640  65IO        .         .         .         .         .         .         S         .         .         .         .         .
30720  66IO        .         .         .         .         .         .         S         .         .         .         .         .
30800  67IO        .         .         .         .         .         .         S         .         .         .         .         .
30840  68IO        .         .         .         .         .         .         S         .         .         .         .         .
30920  69IO        .         .         .         .         .         .         S         .         .         .         .         .
31000  70IO        .         .         .         .         .         .         S         .         .         .         .         .
31040  71IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
31120  72IO        .         .         .         .         .         .         S         .         .         .         .         .
31200  73IO        .         .         .         .         .         .         S         .         .         .         .         .
31240  74IO        .         .         .         .         .         .         S         .         .         .         .         .
31320  75IO        .         .         .         .         .         .         S         .         .         .         .         .
31400  76IO        .         .         .         .         .         .         S         .         .         .         .         .
31440  77IO        .         .         .         .         .         .         S         .         .         .         .         .
31520  78IO        .         .         .         .         .         .         S         .         .         .         .         .
31600  79IO        .         .         .         .         .         .         S         .         .         .         .         .
31640  80IO        .         .         .         .         .         .         S         .         .         .         .         .
31720  81IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
31800  82IO        .         .         .         .         .         .         S         .         .         .         .         .
31840  83IO        .         .         .         .         .         .         S         .         .         .         .         .
31920  84IO        .         .         .         .         .         .         S         .         .         .         .         .
32000  85IO        .         .         .         .         .         .         S         .         .         .         .         .
32040  86IO        .         .         .         .         .         .         S         .         .         .         .         .
32120  87IO        .         .         .         .         .         .         S         .         .         .         .         .
32200  88IO        .         .         .         .         .         .         S         .         .         .         .         .
32240  89IO        .         .         .         .         .         .         S         .         .         .         .         .
32320  90IO        .         .         .         .         .         .         S         .         .         .         .         .
40000  91IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
40040  92IO        .         .         .         .         .         .         S         .         .         .         .         .
40120  93IO        .         .         .         .         .         .         S         .         .         .         .         .
40200  94IO        .         .         .         .         .         .         S         .         .         .         .         .
40240  95IO        .         .         .         .         .         .         S         .         .         .         .         .
40320  96IO        .         .         .         .         .         .         S         .         .         .         .         .
40400  97IO        .         .         .         .         .         .         S         .         .         .         .         .
40440  98IO        .         .         .         .         .         .         S         .         .         .         .         .
40520  99IO        .         .         .         .         .         .         S         .         .         .         .         .
40600 100IO        .         .         .         .         .         .         S         .         .         .         .         .
40640 101IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
40720 102IO        .         .         .         .         .         .         S         .         .         .         .         .
40800 103IO        .         .         .         .         .         .         S         .         .         .         .         .
40840 104IO        .         .         .         .         .         .         S         .         .         .         .         .
40920 105IO        .         .         .         .         .         .         S         .         .         .         .         .
41000 106IO        .         .         .         .         .         .         S         .         .         .         .         .
41040 107IO        .         .         .         .         .         .         S         .         .         .         .         .
41120 108IO        .         .         .         .         .         .         S         .         .         .         .         .
41200 109IO        .         .         .         .         .         .         S         .         .         .         .         .
41240 110IO        .         .         .         .         .         .         S         .         .         .         .         .
41320 111IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
41400 112IO        .         .         .         .         .         .         S         .         .         .         .         .
41440 113IO        .         .         .         .         .         .         S         .         .         .         .         .
41520 114IO        .         .         .         .         .         .         S         .         .         .         .         .
41600 115IO        .         .         .         .         .         .         S         .         .         .         .         .
41640 116IO        .         .         .         .         .         .         S         .         .         .         .         .
41720 117IO        .         .         .         .         .         .         S         .         .         .         .         .
41800 118IO        .         .         .         .         .         .         S         .         .         .         .         .
41840 119IO        .         .         .         .         .         .         S         .         .         .         .         .
41920 120IO        .         .         .         .         .         .         S         .         .         .         .         .
42000 121IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
42040 122IO        .         .         .         .         .         .         S         .         .         .         .         .
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42120 123IO        .         .         .         .         .         .         S         .         .         .         .         .
42200 124IO        .         .         .         .         .         .         S         .         .         .         .         .
42240 125IO        .         .         .         .         .         .         S         .         .         .         .         .
42320 126IO        .         .         .         .         .         .         S         .         .         .         .         .
50000 127IO        .         .         .         .         .         .         S         .         .         .         .         .
50040 128IO        .         .         .         .         .         .         S         .         .         .         .         .
50120 129IO        .         .         .         .         .         .         S         .         .         .         .         .
50200 130IO        .         .         .         .         .         .         S         .         .         .         .         .
50240 131IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
50320 132IO        .         .         .         .         .         .         S         .         .         .         .         .
50400 133IO        .         .         .         .         .         .         S         .         .         .         .         .
50440 134IO        .         .         .         .         .         .         S         .         .         .         .         .
50520 135IO        .         .         .         .         .         .         S         .         .         .         .         .
50600 136IO        .         .         .         .         .         .         S         .         .         .         .         .
50640 137IO        .         .         .         .         .         .         S         .         .         .         .         .
50720 138IO        .         .         .         .         .         .         S         .         .         .         .         .
50800 139IO        .         .         .         .         .         .         S         .         .         .         .         .
50840 140IO        .         .         .         .         .         .         S         .         .         .         .         .
50920 141IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
51000 142IO        .         .         .         .         .         .         S         .         .         .         .         .
51040 143IO        .         .         .         .         .         .         S         .         .         .         .         .
51120 144IO        .         .         .         .         .         .         S         .         .         .         .         .
51200 145IO        .         .         .         .         .         .         S         .         .         .         .         .
51240 146IO        .         .         .         .         .         .         S         .         .         .         .         .
51320 147IO        .         .         .         .         .         .         S         .         .         .         .         .
51400 148IO        .         .         .         .         .         .         S         .         .         .         .         .
51440 149IO        .         .         .         .         .         .         S         .         .         .         .         .
51520 150IO        .         .         .         .         .         .         S         .         .         .         .         .
51600 151IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
51640 152IO        .         .         .         .         .         .         S         .         .         .         .         .
51720 153IO        .         .         .         .         .         .         S         .         .         .         .         .
51800 154IO        .         .         .         .         .         .         S         .         .         .         .         .
51840 155IO        .         .         .         .         .         .         S         .         .         .         .         .
51920 156IO        .         .         .         .         .         .         S         .         .         .         .         .
52000 157IO        .         .         .         .         .         .         S         .         .         .         .         .
52040 158IO        .         .         .         .         .         .         S         .         .         .         .         .
52120 159IO        .         .         .         .         .         .         S         .         .         .         .         .
52200 160IO        .         .         .         .         .         .         S         .         .         .         .         .
52240 161IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
52320 162IO        .         .         .         .         .         .         S         .         .         .         .         .
60000 163IO        .         .         .         .         .         .         S         .         .         .         .         .
60040 164IO        .         .         .         .         .         .         S         .         .         .         .         .
60120 165IO        .         .         .         .         .         .         S         .         .         .         .         .
60200 166IO        .         .         .         .         .         .         S         .         .         .         .         .
60240 167IO        .         .         .         .         .         .         S         .         .         .         .         .
60320 168IO        .         .         .         .         .         .         S         .         .         .         .         .
60400 169IO        .         .         .         .         .         .         S         .         .         .         .         .
60440 170IO        .         .         .         .         .         .         S         .         .         .         .         .
60520 171IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
60600 172IO        .         .         .         .         .         .         S         .         .         .         .         .
60640 173IO        .         .         .         .         .         .         S         .         .         .         .         .
60720 174IO        .         .         .         .         .         .         S         .         .         .         .         .
60800 175IO        .         .         .         .         .         .         S         .         .         .         .         .
60840 176IO        .         .         .         .         .         .         S         .         .         .         .         .
60920 177IO        .         .         .         .         .         .         S         .         .         .         .         .
61000 178IO        .         .         .         .         .         .         S         .         .         .         .         .
61040 179IO        .         .         .         .         .         .         S         .         .         .         .         .
61120 180IO        .         .         .         .         .         .         S         .         .         .         .         .
61200 181IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
61240 182IO        .         .         .         .         .         .         S         .         .         .         .         .
61320 183IO        .         .         .         .         .         .         S         .         .         .         .         .
61400 184IO        .         .         .         .         .         .         S         .         .         .         .         .
61440 185IO        .         .         .         .         .         .         S         .         .         .         .         .
61520 186IO        .         .         .         .         .         .         S         .         .         .         .         .
61600 187IO        .         .         .         .         .         .         S         .         .         .         .         .
61640 188IO        .         .         .         .         .         .         S         .         .         .         .         .
61720 189IO        .         .         .         .         .         .         S         .         .         .         .         .
61800 190IO        .         .         .         .         .         .         S         .         .         .         .         .
61840 191IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
61920 192IO        .         .         .         .         .         .         S         .         .         .         .         .
62000 193IO        .         .         .         .         .         .         S         .         .         .         .         .
62040 194IO        .         .         .         .         .         .         S         .         .         .         .         .
62120 195IO        .         .         .         .         .         .         S         .         .         .         .         .
62200 196IO        .         .         .         .         .         .         S         .         .         .         .         .
62240 197IO        .         .         .         .         .         .         S         .         .         .         .         .
62320 198IO        .         .         .         .         .         .         S         .         .         .         .         .
70000 199IO        .         .         .         .         .         .         S         .         .         .         .         .
70040 200IO        .         .         .         .         .         .         S         .         .         .         .         .
70120 201IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
70200 202IO        .         .         .         .         .         .         S         .         .         .         .         .
70240 203IO        .         .         .         .         .         .         S         .         .         .         .         .
70320 204IO        .         .         .         .         .         .         S         .         .         .         .         .
70400 205IO        .         .         .         .         .         .         S         .         .         .         .         .
70440 206IO        .         .         .         .         .         .         S         .         .         .         .         .
70520 207IO        .         .         .         .         .         .         S         .         .         .         .         .
70600 208IO        .         .         .         .         .         .         S         .         .         .         .         .
70640 209IO        .         .         .         .         .         .         S         .         .         .         .         .
70720 210IO        .         .         .         .         .         .         S         .         .         .         .         .
70800 211IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
70840 212IO        .         .         .         .         .         .         S         .         .         .         .         .
70920 213IO        .         .         .         .         .         .         S         .         .         .         .         .
71000 214IO        .         .         .         .         .         .         S         .         .         .         .         .
71040 215IO        .         .         .         .         .         .         S         .         .         .         .         .
71120 216IO        .         .         .         .         .         .         S         .         .         .         .         .
71200 217IO        .         .         .         .         .         .         S         .         .         .         .         .
71240 218IO        .         .         .         .         .         .         S         .         .         .         .         .
71320 219IO        .         .         .         .         .         .         S         .         .         .         .         .
71400 220IO        .         .         .         .         .         .         S         .         .         .         .         .
71440 221IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
71520 222IO        .         .         .         .         .         .         S         .         .         .         .         .
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  72000 229IO        .         .         .         .         .         .         S         .         .         .         .         .
  72040 230IO        .         .         .         .         .         .         S         .         .         .         .         .
  72120 231IO. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . .
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  91840 299IO        .         .         .         .         .         .         S         .         .         .         .         .
  91920 300IO--------.---------.---------.---------.---------.---------.---------S---------.---------.---------.---------.---------.
1
1
                                                           RUNOFF SUMMARY
                                                   FLOW IN CUBIC FEET PER SECOND
                                                TIME IN HOURS,  AREA IN SQUARE MILES

                                       PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
          OPERATION       STATION      FLOW    PEAK                                             AREA      STAGE     MAX STAGE
+                                                          6-HOUR     24-HOUR     72-HOUR

          ROUTED TO
+                          DETAIN        28.     .00           4.          1.          1.        .00
+                                                                                                          41.57          .00


 *** NORMAL END OF HEC-1 ***
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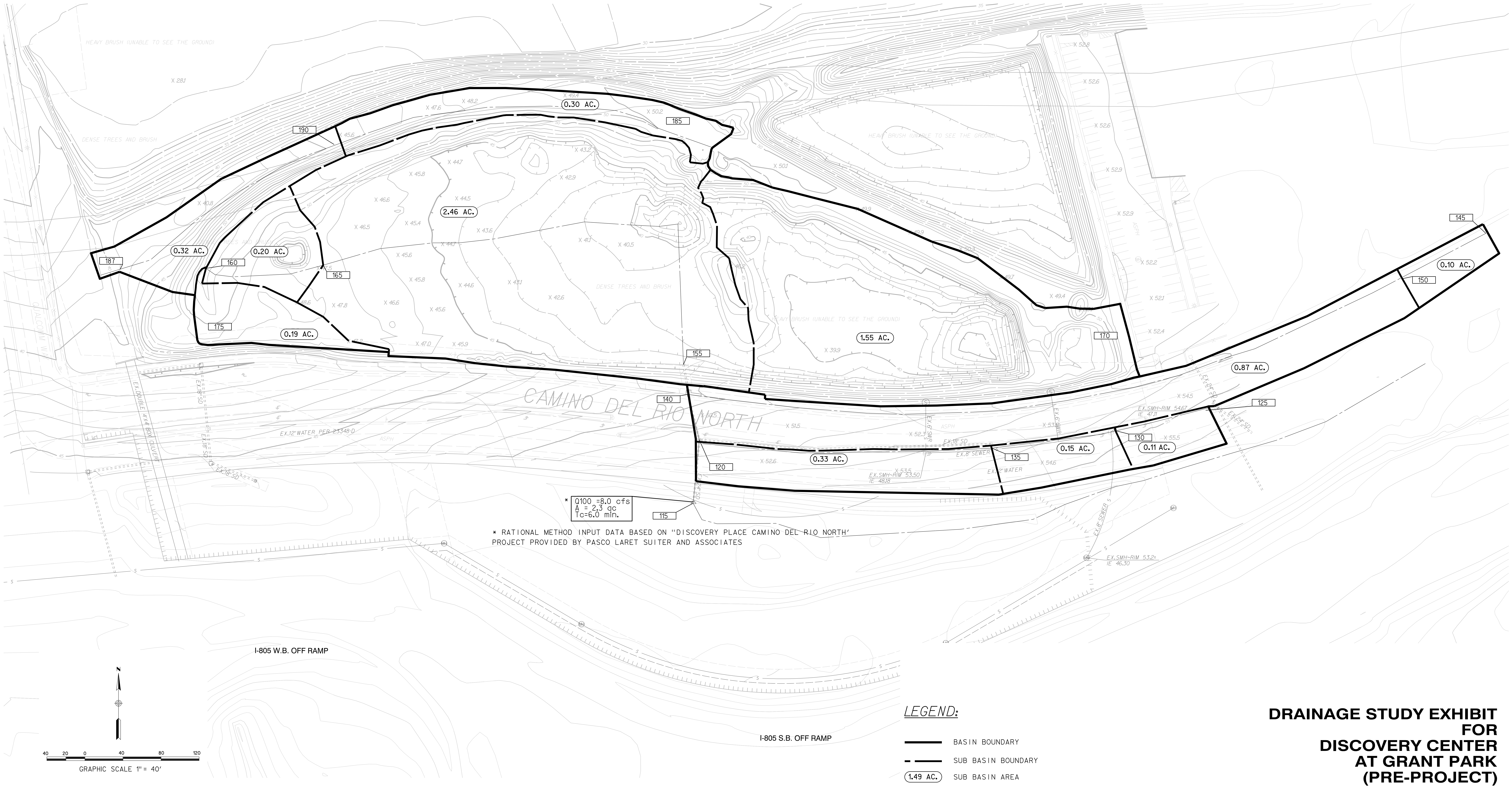
MAP POCKET 1

Drainage Study Map
for
Discovery Center at Grant Park
[Pre-Project]



LEGEND:

▬	BASIN BOUNDARY
— - —	SUB BASIN BOUNDARY
(1.49 AC.)	SUB BASIN AREA
▭ 155	DRAINAGE NODE

DRAINAGE STUDY EXHIBIT
FOR
DISCOVERY CENTER
AT GRANT PARK
(PRE-PROJECT)

J-17010 Date: September 10, 2015

RICK
ENGINEERING COMPANY
5620 FRIARS ROAD
SAN DIEGO, CA 92 0
6 9.29 .0707
(FAX)6 9.29 .4 65
rickengineering.com
San Diego Riverside Sacramento Orange Phoenix Tucson

H:\17010_Discovery_Center\WaterResources\17010drn_pre.dgn
H:\17010_Discovery_Center\WaterResources\SD CorpStds 2005.dscr1pt
10-SEP-2015 15:41

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY REPORT ONLY

MAP POCKET 2

Drainage Study Map
for
Discovery Center at Grant Park
[Post-Project]

* Q100 =8.0 cfs
A = 2.3 ac
Tc=6.0 min.

* RATIONAL METHOD INPUT DATA BASED ON "DISCOVERY PLACE CAMINO DEL RIO NORTH" PROJECT PROVIDED BY PASCO LARET SUITER AND ASSOCIATES

LEGEND:

━━ BASIN BOUNDARY

– – SUB BASIN BOUNDARY

(1.49 AC.) SUB BASIN AREA

☐155 DRAINAGE NODE

DRAINAGE STUDY EXHIBIT FOR DISCOVERY CENTER AT GRANT PARK (POST-PROJECT)

J-17010 Date: September 14, 2015

RICK ENGINEERING COMPANY
5620 FRIARS ROAD
SAN DIEGO, CA 92 0
6 9.29 .0707
(FAX)6 9.29 .4 65
rickengineering.com
San Diego Riverside Sacramento Orange Phoenix Tucson

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY REPORT ONLY

PHASE I
ENVIRONMENTAL ASSESSMENT FOR 21ACRE SITE
LOTS 1,2 & 3
PARCEL MAP NO. 16900
COUNTY OF SAN DIEGO, CALIFORNIA

Prepared For: Mr. James H. Garrett
Olstead, Hughes & Garrett
2320 Fifth Avenue, Suite 300
San Diego, Ca 92101

Prepared By: DUDEK & ASSOCIATES, INC.
605 Third Street
Encinitas, CA 92024

Derek M. Reed
No. 056042
Exp 12/02

Peter T. Quinlan, Principal

Derek M. Reed, P.E. #56042

PHASE I
ENVIRONMENTAL ASSESSMENT

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PHASE I
ENVIRONMENTAL ASSESSMENT

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1.0 EXECUTIVE SUMMARY

A Phase I Environmental Assessment was performed on three parcels located west of the intersection of Camino del Rio South and Stadium Way, San Diego, California. It is further identified as Parcels 1, 2 & 3, Parcel Map No. 16900, County of San Diego, CA. The findings of this investigation are based upon an historical aerial photo review, a records review, a site inspection, and limited soil sampling.

Information gathered for this report indicates the following:

- No major environmental concerns appear to exist on site.
- Hazardous or potentially hazardous materials are not currently stored on site.
- Hazardous or potentially hazardous materials are not currently used on site.
- There has been no prior industrial use of the study area.
- Prior agricultural use appears to be limited to pasture land.
- The potential for contamination of the study area from off-site sources does not appear to exist presently. However, three facilities have been identified as being located within one-half mile from the study area and listed on the State Regional Water Quality Control Board (RWQCB) databases. The RWQCB database includes facilities with underground or aboveground storage tanks.
- A facility located on the southwest corner of Camino del Rio North and Stadium Way has been identified on the state Leaking Underground Storage Tank database. This database identifies facilities which have or had leaking active or inactive storage tanks (Appendix A). The status of this site is "preliminary assessment". This site is located slightly downgradient of the subject property and is not likely to affect its development.

2.0 INTRODUCTION

A Phase I Environmental Assessment was performed at the site (Figures 1 and 2). The purpose of this Phase I report is to identify the potential soil and/or groundwater contamination at the site that may affect future development.

2.1 ASSESSMENT PROCEDURE AND SCOPE OF INVESTIGATION

Phase I Environmental Assessments assist in identifying past and present land use, including identification of possible on-site releases or disposal of manufacturing or other wastes if such information is contained within regulatory reports, files and/or is currently visible on-site. The assessment reviews Local, County, State, and U.S. Environmental Protection Agency lists of known or potentially hazardous waste sites, landfills, and sites currently under investigation for environmental violations that may be of concern to this site.

The scope of this assessment consisted of: 1) a computerized public agency records search of sites within at least 1 mile of the subject property to identify sites that could potentially impact the subject property (Appendix A); 2) a review of historical aerial photographs; 3) a site inspection and limited soil sampling assess current surficial conditions (Appendix B); and 4) the preparation of this draft report documenting findings.

3.0 SITE DESCRIPTION

The site is situated on approximately 21 acres located west of the intersection of Camino del Rio South and Stadium Way, San Diego, California. This site is undeveloped and appears to have accepted fill from various sources. Areas of unclassfied fills were observed on each of the three parcels (Figure 3).

3.1 ENVIRONMENTAL SETTING

The subject property is located in Mission Valley in the City of San Diego. Existing urban land uses in the immediate vicinity of the site include various commercial and residential areas to the east and west. Immediately to the south is the Interstate 8. The San Diego River channel runs through the northern third of Parcels 1 and 2 with the northern riverbank forming the northern boundary of these parcels. The southern two thirds of Parcels 1 and 2 are covered in dense foliage. Parcel 3 is bounded by Camino del Rio North and the Texas Street offramp. This parcel contains the road bed of the former alignment of Camino del Rio North. Lower lying areas in the this parcel are also covered in dense foliage.

3.1.1 HYDROGEOLOGY

The site is located within the Mission San Diego Hydrologic Subarea of the San Diego Hydrologic Unit (HSA 907.11). Existing beneficial uses of groundwater resources in this Subarea include municipal, agricultural, industrial service supply (RWQCB 1994). The overall direction of groundwater flow in the vicinity of the site is estimated to be to the west, locally it is assumed that groundwater moves north towards the San Diego River. Groudwater below the site is estimated to be between 5 and 20 feet below ground surface.

3.2 SITE HISTORY

A limited site history was compiled using the review of aerial photographs dating back to 1945 (Section 3.3) and the 13 March 1998 site inspection (Section 5.0). No interviews with previous owners were conducted. This compilation indicates the site has historically been used for a gravel mining operation. Early aerial photographs suggest that the land may have been used for pasture. No other land uses were identified. A report issued by Groundwater Technology, Inc. to the City of San Diego regarding the Centerside II Development reports that a gas station was located southeast of the site during the 1950's. It was reportedly located between the Texas Street offramp and Interstate 8. Samples collected near the former performed in 1990 reported up to 3040 mg/kg total petroleum hydrocarbon concentrations in soil.

3.3 REVIEW OF HISTORICAL AERIAL PHOTOGRAPHS

Historical aerial photographs were reviewed at the Aerial Photobank, San Diego, California by Dudek & Associates. These photographs provided background information needed to assess the possibility of historical and present environmental concerns. Historical aerial photos for the site were reviewed for the time period 1945 - the present. Although moderate to heavy grading occurred periodically at the site, it appears that the mining operation was the only industrial or commercial land use. In early photographs it appears that the site may have been used as pasture land. Row crops or orchards were not observed in any of the photographs.

TABLE 1
SUMMARY OF AERIAL PHOTOGRAPHY REVIEW

Photo Date	Descriptions of Observations
1945	No structures visible. Site and surrounding areas appear to be used as pasture land. No row crops or orchards were visible.
1953	No structures or other improvments visible. Old highway and Texas Street visible.
1962	Texas Street on ramp and off ramp visible. No structures or other improvments visible.
1964	Gravel mining operation visible in southeast portion of Parcel 2.
1965	Some grading visible on Parcel 1. River intrudes into southern half of Parcel 2.
1967	Grading throughout Parcels 1 and 2 south of the river. Lots of erosion south towards the river.
1970	Parcels 1 and 2 south of the river are cleared of all vegetation.
1975	Vegetation filling in. No activities visible.
1978	Vegetation filling in. No activities visible.
1981	No buildings or other disturbances visible.
1982	Buildings visible at the northwest corner of Texas St. with unpaved lots to the east and southeast. These buildings are not located on the site. Buildings were also visible north of Camino del Rio east the intersection with Texas in Parcel 1. These buildings were located on site and appear to be trailered offices.
1983	Same as previous.
1985	Buildings described above are no longer present. A new building or trailer visible south of Camino del Rio in Parcel 3.
1988	Various "roads" graded into Parcels 1 and 2.
1989	Grading in Parcels 1 and 2. Possible prepation for new alignmente of Camino del Rio.
1990	New alignment of Camino del Rio constructed. No other disturbances visible.
1991	Same as previous. Old road bed less visible.
1992	Same as previous. Old road bed less visible.
1993	Same as previous. Old road bed less visible.
1994	Same as previous. Old road bed less visible.
1995	Same as previous. Old road bed less visible.
1996	Same as previous. Old road bed less visible.
1997	Same as previous. Old road bed less visible.

4.0 PUBLIC AGENCY RECORDS SEARCH REVIEW

The regulatory database lists sites within a one mile radius of the subject property that are known hazardous waste generators or have had recorded releases of hazardous waste. Information such as the depth and gradient of groundwater, the direction and distance from the subject site, and the current status of the listed site are all considered when determining any potential environmental impact to the subject property. The search performed for this assessment was conducted in March 1998 by Vista Information Solutions (Vista) of San Diego, CA. The complete database search document is included in Appendix A.

Three facilities were identified in the overall database search. The following describes; 1) which databases were searched and, 2) the quantity of facilities listed within those databases which are in the vicinity of the site:

4.1 U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) FEDERAL SOURCES

The following computer databases were be included in this search:

ACRONYM	DATABASE	SEARCH DISTANCE
• NPL	National Priority List	1 mile
• CERCLIS	Comprehensive Env. Response, Compensation, and Liability Act	1/2 mile
• RCRA Viol	Resource, Conservation, and Recovery Act violations/enforcement	1/4 mile
• TRIS	Toxic Release Inventory database	1/4 mile
• ERNS	Emergency Response Notification System of spills	1/8 mile
• CORRACTS	RCRA Corrective Actions	1 mile
• TSD	RCRA permitted treatment, storage, disposal facilities	1 mile
• GNRTR	RCRA registered small or large generators of hazardous waste	1/8 mile

The site was not identified in the Federal computerized regulatory database records, nor were any facilities identified in these regulatory records.

4.2 CALIFORNIA STATE SOURCES

The following computer databases were included in this search:

ACRONYM	DATABASE	SEARCH DISTANCE
• SPL	State equivalent priority list	1 mile
• SCL	State equivalent CERCLIS list	1 mile
• CORTESE	State index of properties with hazardous waste	1/2 mile
• LUST	Leaking Underground Storage Tanks	1/2 mile
• SWLF	Permitted solid waste landfills, incinerators, or transfer stations	1/2 mile
• DEED RSTR	Sites with deed restrictions	1/2 mile
• TOXIC PITS	Toxic Pits cleanup facilities	1/2 mile
• UST/AST	Registered underground or aboveground storage tanks	1/4 mile

The site was not identified in the State computerized regulatory database records. One site was identified in the LUST database, one site was identified in the state equivalent CERCLIS list and one site was identified in the CORTESE database.

4.3 REGIONAL SOURCES

The following computer databases were included in this search:

• UNIQUE COUNTY	Databases unique to Los Angeles County	1/8 mile

The site was not identified in any county regulatory database records, nor were any facilities identified in these regulatory records.

4.4 DETAILED REGULATORY DATABASE SEARCH REVIEW

The following table references all sites listed in the regulatory computer database search within one mile of the subject property (Table 2). Each ID number in the left-hand column of the table identifies a site listed in the regulatory data base search (Appendix A).

TABLE 2

SITES WITHIN THE SURROUNDING AREA

Map ID	Site Name and Address	Direction from Site	Listed Agencies	Comments
1	CHEVRON STATION 94991 2290 N. Camino del Rio San Diego, Ca 92108	SW, 0.05mi	LUST	Prelimenary Assessment
2	Mission Valley Disposal Area Texas St./HWY 8 San Diego, CA 92108	S, 0.13mi	SWLF	City of San Diego, reports the location in a canyon near Adams Ave. used in 1930's
3	Calmat Mission Valley 2240 Stadium Way San Diego, CA 92108	N, 0.22mi	LUST	Case Closed, Clean Up Complete
4	Norwich/Van Raaphorst 2635 S Camino del Rio San Diego, CA 92108	SE, 0.24 mi	UST/AST	No reported release as of January 1998

A review of all available documentation in the detailed regulatory database search performed by Vista indicates that there are at least two facilities within the immediate vicinity of the site that have reported releases and have impacted soil and groundwater. Therefore, it appears likely thatpasat environmental contamination existed at the Cheveron Station and Calmat in the past. However, given that these facilities have received regulatory "closure / case closed or no further action" status from the responsible regulatory agency or that they are located downgradient from the subject site, it assumed the site has not been impacted by offsite migration of contaminants. The Mission Valley Disposal Area was an historical disposal area used in the 1930's. It is reported by the City of San Diego to be located in a canyon near Adams Avenue, not at Texas Street and Highway 8. City records indicate that it was used illegally by local residents for disposal of municipal waste, car bodies, and white goods. It is not classfied as a burn site. There are no know releases associated with the facility in the County of San Diego records.

5.0 SITE INSPECTION

On 13 March 1998, a field inspection was performed of the subject property and its vicinity. Five soil samples were collected from surface soils. The March 1998 field inspections revealed the following:

- Parcels 1 and 2 south of the the San Diego River are covered in thick foliage. The San Diego river occupies the northern third of the these parcels.
- At the time of the inspection, there were no signs of illegal dumping of hazardous waste on site. Features which would suggest illegal dumping of hazardous waste include stained soil or pavement, odors, or stressed vegetation. However, there were signs of dumping/placement of uncontrolled fills throughout the site.
- There were no drums or containers observed on site.
- There were no electrical impoundments observed on site to suggest equipment containing PCBs.
- There were no above or below ground storage tanks observed on site.
- Although no existing potable water source for the site was observed during the March 1998 inspection, it is anticipated that potable water for the site will be publicly supplied.

6.0 SOIL SAMPLING AND RESULTS

Soil samples were collected to assess potential soil contamination from on site or off site sources.). Samples were collected in areas where illegal dumping may have occurred or where contamination may have enter the site from an off ite source. Ten samples were collected soils during the site inspection (Figure 3). Trenches were excavated to an approximate 12 feet depth using a backhoe. The side walls of the trenches were visually inspected for indications of contamination. Excavated soil was screened for contamination using an Organic Vapor Analyzer (OVA). Soil samples were collected directly from the backhoe's bucket. These samples ten were analyzed by EPA Method 418.1 for total recoverable petroleum hydrocarbons. Sample A-2 was also analyzed by EPA Method 8020 for benzene, toluene, ethylbenzene and xylenes due to its proximity to the former gas station located southeast of the site. Table 1 presents the results of these analyses. The last number in the Sample ID indicates the approximate depth at which the sample was collected.

TABLE 3 - SOIL SAMPLING RESULTS

Sample ID	TRPH (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
A-1-10	<10	NS	NS	NS	NS
A-2-10	<10	<0.01	<0.01	<0.01	<0.01
B-3-10	<10	NS	NS	NS	NS
B-4-10	<10	NS	NS	NS	NS
C-1-5	<10	NS	NS	NS	NS
C-2-10	<10	NS	NS	NS	NS
D-1-5	95	NS	NS	NS	NS
D-2-10	<10	NS	NS	NS	NS
E-1-5	<10	NS	NS	NS	NS
E-1-10	40	NS	NS	NS	NS

TRPH was detected in samples D-1-5 and E-1-10 at concentrations of 95 and 40 mg/kg respectively. These concentrations are low and do not pose risk to human health. Similar concentrations can be found in under asphaltic concrete pavement. The source of the petroleum hydrocarbons detected in these two samples is most likely asphalt or other construction debris observed in the trenches where these samples were collected.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

Information gathered for this report indicates the following:

- No major environmental concerns appear to exist on site.
- Hazardous or potentially hazardous materials are not currently used on site.
- No underground or aboveground tanks exist, or have existed, on site.

The regulatory database searches indicate the three sites detailed in Section 4.4, may have impacted soil and groundwater from leaking underground storage tanks (Appendix A). The potential is limited that groundwater contamination migrated to the site from downgradient leaking underground storage tanks. Additionally, the Calmat site has been given regulatory "closure / cleanup complete" status by the responsible regulatory agency. Since this facility has been granted this status, it is assumed the site has not been adversely affected by offsite migration of contamination from these facilities. The former solid waste disposal site is not an actively regulated site and there is no documentation of hazardous releases associated with this site. It is located at a greater distance than listed in the environmental records search and does not appear likely to have any impact on the subject property. The Chevron service station is under preliminary assessment and is located slightly downgradient from the site. It is unlikely that contamination originating from the service station would adversely affect the development this property.

7.2 RECOMMENDATIONS

After reviewing the information gathered during preparation of this report, it appears further site investigation for hazardous wastes is not warranted. The site inspection revealed no hazardous, or potentially hazardous wastes presently exist on site, nor are there any aboveground or belowground tanks on site. It is, however, recommended that due to the unknown origin of the fill dirt, grading equipment operators should be watchful for any evidence of hazardous materials or wastes. This may include unusually colored or stained soil, 55-gallon drums or other containers, electrical equipment or any unusual odors.

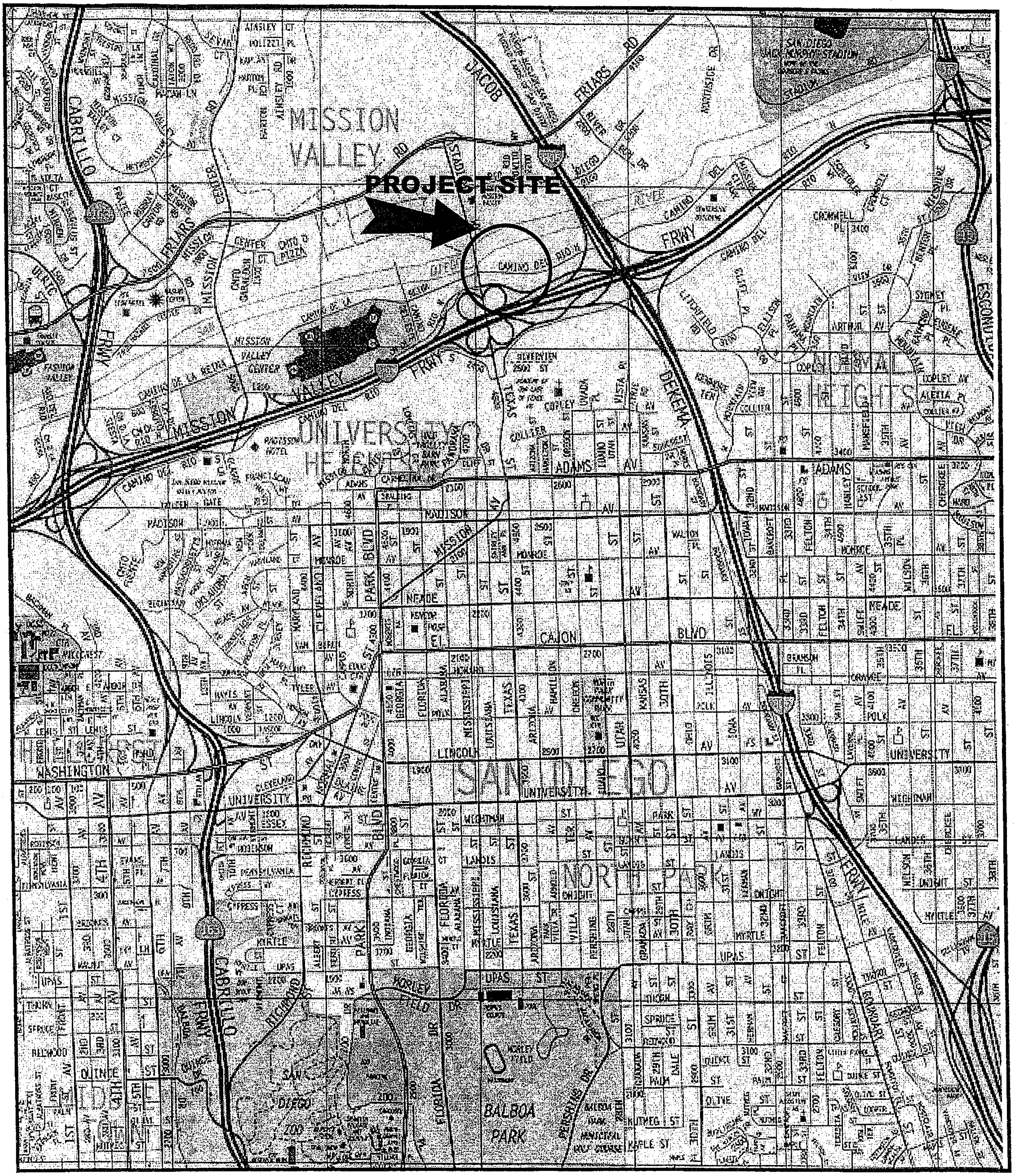
There are no further recommendations regarding additional assessment.

7.3 LIMITATIONS

The conclusions and recommendations herein are based solely on the information Dudek obtained in compiling this report. Dudek makes no warranty as to the accuracy of statements made by others which may be contained in the report. Nor are any other warranties or guarantees, expressed or implied, included or intended by the report except that it has been prepared in accordance with the current generally accepted practices and standards consistent with the level of care and skill exercised under similar circumstances by other professional consultants or firms performing the same or similar services.

8.0 REFERENCES CITED

Regional Water Quality Control Board, 1994. Water Quality Control Plan, San Diego Basin, Region 9. June 13.



450-62

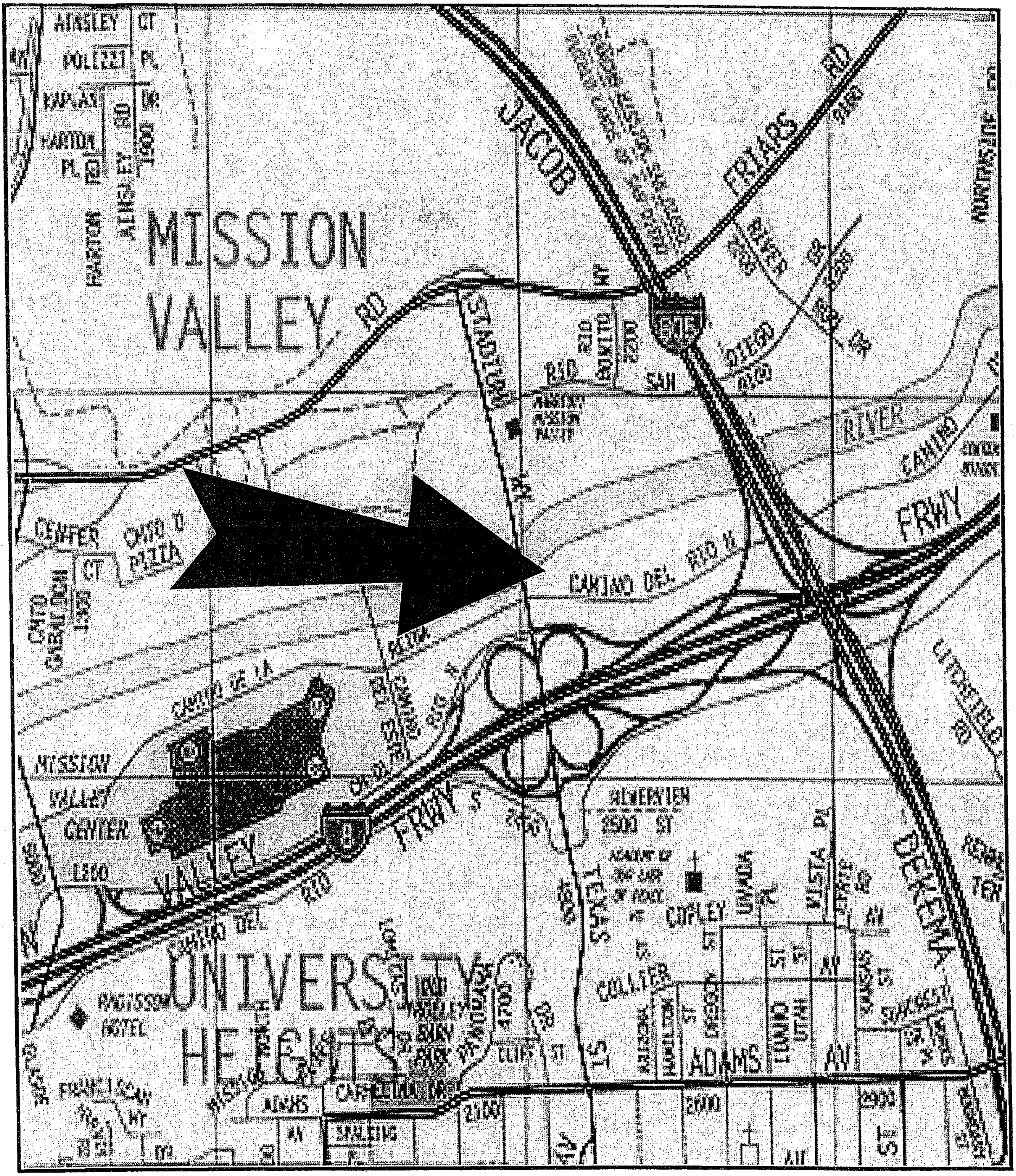
FIGURE

1

DUDEK
& ASSOCIATES, INC.
Professional Teams for Complex Projects

VICINITY MAP

EA for 21-Acre Site Lots 1,2, & 3 Parcel Map Number 16900



450-62

FIGURE

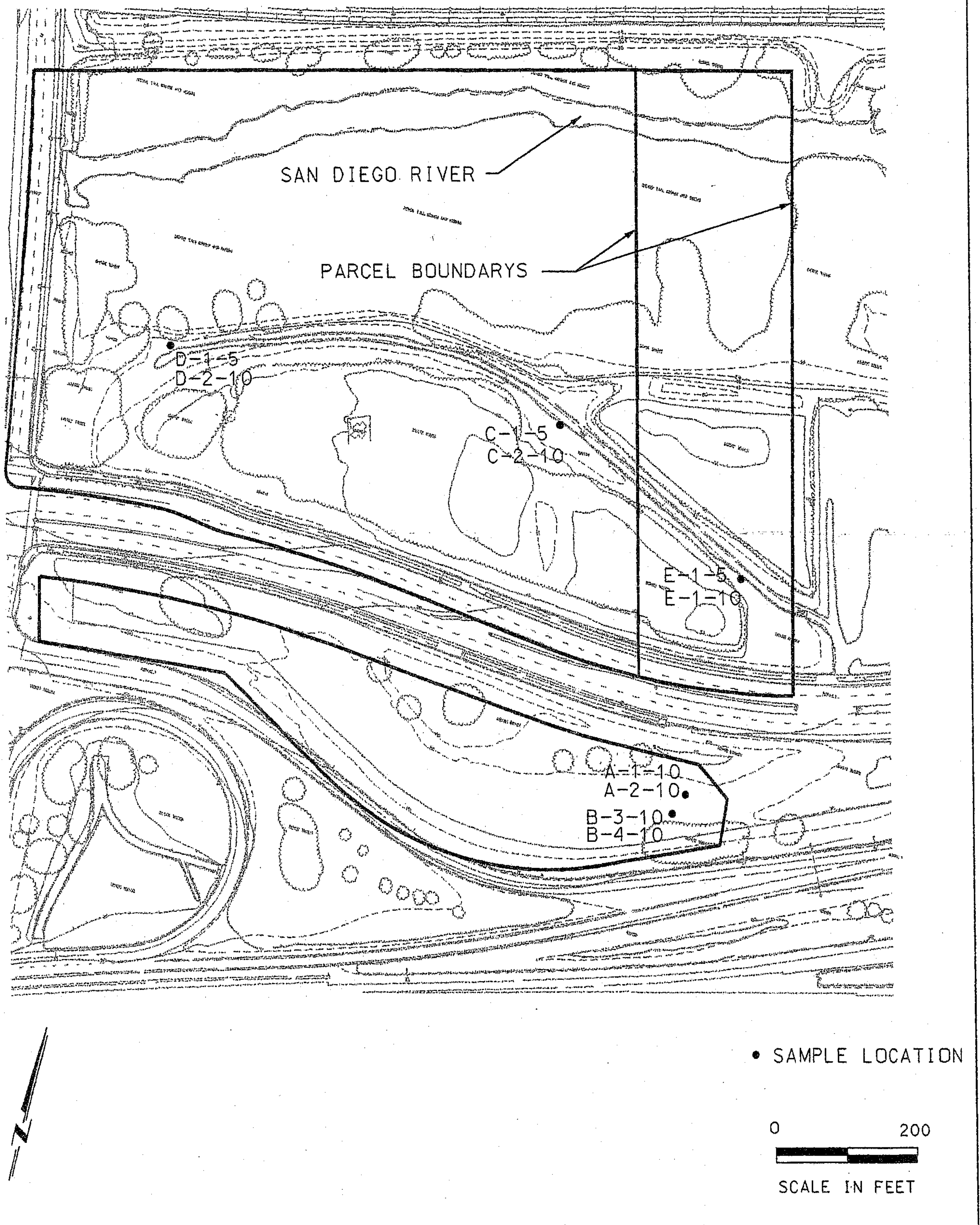
2

DUDEK & ASSOCIATES, INC.

Professional Teams for Complex Projects

LOCATIONS MAP

EA for 21-Acre Site Lots 1,2, & 3 Parcel Map Number 16900



(760) 942-5147

DUDEK & ASSOCIATES, INC.
605 THIRD STREET, ENCINITAS, CALIFORNIA 92024

FIGURE 3
SAMPLE LOCATION MAP

JOB NO. 1740-02
DATE 5/22/98
DRAWN BY
CHECKED BY DMR

APPENDIX A

COMPUTERIZED REGULATORY AGENCY DATABASE

SITE ASSESSMENT PLUS REPORT

PROPERTY INFORMATION	**CLIENT INFORMATION**
Project Name/Ref #: Not Provided APN 438-052-16 Camino Del Rio North San Diego, CA 92108 Cross Street: Stadium Way - NW corner Latitude/Longitude: (32.772579, 117.139740)	Derek Reed Dudek Associates, Inc 605 3rd Street Encinitas, CA 92024

Site Distribution Summary

Agency / Database - Type of Records			*within 1/8 mile*	*1/8 to 1/4 mile*	*1/4 to 1/2 mile*	*1/2 to 1 mile*
A) Databases searched to 1 mile:						
US EPA	NPL	National Priority List	**0**	**0**	**0**	**0**
US EPA	CORRACTS	RCRA Corrective Actions	**0**	**0**	**0**	**0**
US EPA	TSD	RCRA permitted treatment, storage, disposal facilities	**0**	**0**	**0**	**0**
STATE	SPL	State equivalent priority list	**0**	**0**	**0**	**0**
STATE	SCL	State equivalent CERCLIS list	**0**	**0**	**0**	**0**
B) Databases searched to 1/2 mile:						
US EPA	CERCLIS / NFRAP	Sites currently or formerly under review by US EPA	**0**	**0**	**0**	-
STATE REG CO	LUST	Leaking Underground Storage Tanks	**1**	**2**	**0**	-
STATE/ REG/CO	SWLF	Permitted as solid waste landfills, incinerators, or transfer stations	**0**	**1**	**0**	-
STATE	DEED RSTR	Sites with deed restrictions	**0**	**0**	**0**	-
STATE	CORTESE	State index of properties with hazardous waste	**0**	**0**	**0**	-
STATE	TOXIC PITS	Toxic Pits cleanup facilities	**0**	**0**	**0**	-
C) Databases searched to 1/4 mile:						
US EPA	RCRA Viol	RCRA violations/enforcement actions	**0**	**0**	-	-
US EPA	TRIS	Toxic Release Inventory database	**0**	**0**	-	-
STATE	UST/AST	Registered underground or aboveground storage tanks	**1**	**3**	-	-

Site Distribution Summary

Agency / Database - Type of Records			*within 1/8 mile*	*1/8 to 1/4 mile*	*1/4 to 1/2 mile*	*1/2 to 1 mile*
D) Databases searched to 1/8 mile:						
US EPA	ERNS	Emergency Response Notification System of spills	0	-	-	-
US EPA	GNRTR	RCRA registered small or large generators of hazardous waste	1	-	-	-
COUNTY	HE17	SD County Hazardous Materials/Waste/Violations Database	1	-	-	-

This report meets the ASTM standard E-1527 for standard federal and state government database research in a Phase I environmental site assessment. A (-) indicates a distance not searched because it exceeds these ASTM search parameters.

NOTES

SITE ASSESSMENT PLUS REPORT

SITE INVENTORY

MAP ID	PROPERTY AND THE ADJACENT AREA (within 1/8 mile)	VISTA ID DISTANCE DIRECTION	A					B						C			D		
			NPL	CORRACTS	TSD	SPL	SCL	CERCLIS/NFRAP	LUST	SWLF	DEED RSTR	CORTESE	TOXIC PITS	RCRA VIOL	TRIS	UST/AST	ERNS	GNRTR	HE17
1	CHEVRON STATION 94991 2290 N CAMINO DEL RIO SAN DIEGO, CA 92108	*5241033* *0.00 MI* *NA*																X	
1	MISSION VALLEY CHEVRON 2290 CAMINO DEL RIO N SAN DIEGO, CA 92108	*277421* *0.00 MI* *NA*							X							X			X

MAP ID	SITES IN THE SURROUNDING AREA (within 1/8 - 1/4 mile)	VISTA ID DISTANCE DIRECTION	A					B						C			D		
			NPL	CORRACTS	TSD	SPL	SCL	CERCLIS/NFRAP	LUST	SWLF	DEED RSTR	CORTESE	TOXIC PITS	RCRA VIOL	TRIS	UST/AST	ERNS	GNRTR	HE17
2	MISSION VALLEY DISPOSAL AREA TEXAS ST./ HWY 8 SAN DIEGO, CA 92108	*6832526* *0.13 MI* *S*								X									
3	CAL-MAT MISSION VALLEY 2240 STADIUM SAN DIEGO, CA 92103	*67936* *0.22 MI* *N*							X							X			•
3	CALMAT COMPANY 2240 STADIUM WAY SAN DIEGO, CA 92108	*1289742* *0.22 MI* *N*							X										
4	NORWICH/VAN RAAPHORST AT0003 2635 S CAMINO DEL RIO SAN DIEGO, CA 92108	*4022615* *0.24 MI* *SE*														X			
4	MILLER FAMILY CHIROPRACTIC CTR 2635 CAMINO DEL RIO S #301 SAN DIEGO, CA 92108	*4022614* *0.24 MI* *SE*														X			•

MAP ID	SITES IN THE SURROUNDING AREA (within 1/4 - 1/2 mile)	VISTA ID DISTANCE DIRECTION	A					B						C			D		
			NPL	CORRACTS	TSD	SPL	SCL	CERCLIS/NFRAP	LUST	SWLF	DEED RSTR	CORTESE	TOXIC PITS	RCRA VIOL	TRIS	UST/AST	ERNS	GNRTR	HE17
	No Records Found																		

X = search criteria; • = tag-along (beyond search criteria).

MAP ID	SITES IN THE SURROUNDING AREA (within 1/2 - 1 mile) VISTA ID DISTANCE DIRECTION	A NPL	 CORRACTS	 TSD	 SPL	 SCL	B CERCLIS/NFRAP	 LUST	 SWLF	 DEED RSTR	 CORTESE	 TOXIC PITS	C RCRA VIOL	 TRIS	 UST/AST	D ERNS	 GNRTR	 HE17
	No Records Found																	

X = search criteria; • = tag-along (beyond search criteria).
For more information call VISTA Information Solutions, Inc. at **1 - 800 - 767 - 0403.**
Report ID: **003095-801** Date of Report: **March 16, 1998**
Version 2.5

		A					B						C			D		
UNMAPPED SITES	*VISTA ID*	NPL	CORRACTS	TSD	SPL	SCL	CERCLIS/NFRAP	LUST	SWLF	DEED RSTR	CORTESE	TOXIC PITS	RCRA VIOL	TRIS	UST/AST	ERNS	GNRTR	HE17
MURPHY-SHEPARD CANYON (KEARNY NE MURPHY CANYON RD SAN DIEGO, CA 92123	*5441456*								X									
MONTGOMERY DEMOLITION LANDFILL RUFFIN RD, BETWEEN AERO DR. SAN DIEGO, CA 92123	*4825772*								X									
BAYSIDE COGENERATION PROJECT PORT DISTRICT PROPERTY NATIONAL CITY, CA	*6829913*								X									
N STREET LANDFILL BETWEEN 26 28TH ST. NATIONAL CITY, CA	*5432941*								X									
RANCHO CARILLO BURNSITE TB 68-E6 CORONADO CAYS CORONADO, CA	*5813645*								X										X

X = search criteria; • = tag-along (beyond search criteria).

For more information call VISTA Information Solutions, Inc. at **1 - 800 - 767 - 0403.**

SITE ASSESSMENT PLUS REPORT

DETAILS

PROPERTY AND THE ADJACENT AREA (within 1/8 mile)

VISTA Address*:	**CHEVRON STATION 94991**	VISTA ID#:	5241033	Map ID
	2290 N CAMINO DEL RIO	Distance/Direction:	0.00 MI / NA	1
	SAN DIEGO, CA 92108	Plotted as:	Point	
RCRA-SmGen - RCRA-Small Generator / SRC# 4244		EPA ID:	CAD982478984	

Agency Address:	*SAME AS ABOVE*
Generator Class:	*Generates 100 kg./month but less than 1000 kg./month of non-acutely hazardous waste*

VISTA Address*:	**MISSION VALLEY CHEVRON**	VISTA ID#:	277421	Map ID
	2290 CAMINO DEL RIO N	Distance/Direction:	0.00 MI / NA	1
	SAN DIEGO, CA 92108	Plotted as:	Point	
STATE UST - State Underground Storage Tank / SRC# 1612		EPA/Agency ID:	N/A	

Agency Address:	*SAME AS ABOVE*
Underground Tanks:	*4*
Aboveground Tanks:	*NOT REPORTED*
Tanks Removed:	*NOT REPORTED*

Tank ID:	*1U*	**Tank Status:**	*ACTIVE/IN SERVICE*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*10000 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*
Tank ID:	*2U*	**Tank Status:**	*ACTIVE/IN SERVICE*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*9000 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*
Tank ID:	*3U*	**Tank Status:**	*ACTIVE/IN SERVICE*
Tank Contents:	*LEADED GAS*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*4000 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*
Tank ID:	*4U*	**Tank Status:**	*ACTIVE/IN SERVICE*
Tank Contents:	*PETROLEUM*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*550 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*

STATE LUST - State Leaking Underground Storage Tank / SRC# 4324		Agency ID:	9UT2965

Agency Address:	*SAME AS ABOVE*
Tank Status:	*NOT AVAILABLE*
Media Affected:	*AQUIFER*
Substance:	*GASOLINE (UNSPECIFIED)*
Leak Cause:	*UNAVAILABLE*
Leak Source:	*NOT AVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*PRELIMINARY ASSESSMENT*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Discovery Date, Quantity (Units)*

PROPERTY AND THE ADJACENT AREA (within 1/8 mile) CONT.

Regional LUST - Regional Leaking Underground Storage Tank / SRC# 4420		Agency ID:	9UT2965
Agency Address:	SAME AS ABOVE		
Tank Status:	NOT AVAILABLE		
Discovery Date:	SEPTEMBER 23, 1993		
Media Affected:	AQUIFER		
Substance:	GASOLINE (UNSPECIFIED)		
Leak Cause:	UNKNOWN		
Leak Source:	UNKNOWN		
Remedial Action:	NOT AVAILABLE		
Remedial Status 1:	PRELIMINARY ASSESSMENT		
Remedial Status 2:	NOT AVAILABLE		
Fields Not Reported:	Quantity (Units)		
STATE UST - State Underground Storage Tank / SRC# 4444		Agency ID:	H12975
Agency Address:	SAME AS ABOVE		
Underground Tanks:	8		
Aboveground Tanks:	NOT REPORTED		
Tanks Removed:	NOT REPORTED		

Tank ID:	T001U	**Tank Status:**	CLOSED REMOVED
Tank Contents:	UNLEADED GAS	**Leak Monitoring:**	NOT AVAILABLE
Tank Age:	33	**Tank Piping:**	SUCTION
Tank Size (Units):	10000 (GALLONS)	**Tank Material:**	DOUBLE WALLED OR SINGLE WALLED
Tank ID:	T002U	**Tank Status:**	CLOSED REMOVED
Tank Contents:	UNLEADED GAS	**Leak Monitoring:**	NOT AVAILABLE
Tank Age:	33	**Tank Piping:**	SUCTION
Tank Size (Units):	9000 (GALLONS)	**Tank Material:**	DOUBLE WALLED OR SINGLE WALLED
Tank ID:	T003U	**Tank Status:**	CLOSED REMOVED
Tank Contents:	LEADED GAS	**Leak Monitoring:**	NOT AVAILABLE
Tank Age:	33	**Tank Piping:**	SUCTION
Tank Size (Units):	4000 (GALLONS)	**Tank Material:**	DOUBLE WALLED OR SINGLE WALLED
Tank ID:	T004U	**Tank Status:**	CLOSED REMOVED
Tank Contents:	WASTE OIL	**Leak Monitoring:**	NOT AVAILABLE
Tank Age:	33	**Tank Piping:**	NONE
Tank Size (Units):	550 (GALLONS)	**Tank Material:**	DOUBLE WALLED OR SINGLE WALLED
Tank ID:	T005U	**Tank Status:**	ACTIVE/IN SERVICE
Tank Contents:	UNLEADED GAS	**Leak Monitoring:**	NOT AVAILABLE
Tank Age:	5	**Tank Piping:**	PRESSURIZED
Tank Size (Units):	NOT REPORTED (GALLONS)	**Tank Material:**	DOUBLE WALLED OR SINGLE WALLED
Tank ID:	T006U	**Tank Status:**	ACTIVE/IN SERVICE
Tank Contents:	UNLEADED GAS	**Leak Monitoring:**	NOT AVAILABLE
Tank Age:	5	**Tank Piping:**	PRESSURIZED
Tank Size (Units):	NOT REPORTED (GALLONS)	**Tank Material:**	DOUBLE WALLED OR SINGLE WALLED
Tank ID:	T007U	**Tank Status:**	ACTIVE/IN SERVICE
Tank Contents:	SUPER UNLEADED	**Leak Monitoring:**	NOT AVAILABLE
Tank Age:	NOT REPORTED	**Tank Piping:**	PRESSURIZED
Tank Size (Units):	NOT REPORTED (GALLONS)	**Tank Material:**	DOUBLE WALLED OR SINGLE WALLED
Tank ID:	T008U	**Tank Status:**	ACTIVE/IN SERVICE
Tank Contents:	WASTE OIL	**Leak Monitoring:**	NOT AVAILABLE
Tank Age:	NOT REPORTED	**Tank Piping:**	GRAVITY
Tank Size (Units):	NOT REPORTED (GALLONS)	**Tank Material:**	DOUBLE WALLED OR SINGLE WALLED

PROPERTY AND THE ADJACENT AREA (within 1/8 mile) CONT.

County LUST - County Leaking Underground Storage Tank / SRC# 4444		EPA ID: Agency ID:	CAD982478984 H12975
Agency Address:		*MISSION VALLEY CHEVRON 2290 CAMINO DEL RIO N SAN DIEGO, CA 921081510*	
Release #:	*001*	**Case "T" #:**	*NOT REPORTED*
Release Date:	*UNKNOWN*	**Priority:**	*NOT REPORTED*
Substances #:	*0*	**Substance:**	*"Not Available"*
P.A. Start Date:	*NOT REPORTED*	**P.A. End Date:**	*NOT REPORTED*
C & A:		*NO*	
Case Type:		*"Non-Tank/Permitted Site - problem is not tank related (an underground tank may be on site), establishment on site has or had a permit from Hazardous Materials Management Division."*	
Case Status:		*"Case Closed"*	
Status Date:		*OCTOBER 4, 1993*	
R.A. Start:	*NOT REPORTED*	**R.A. End:**	*NOT REPORTED*
Enforcement Action:		*NO*	
R.A. Type:		*NOT REPORTED*	
Release #:	*002*	**Case "T" #:**	*T02667*
Release Date:	*UNKNOWN*	**Priority:**	*2A*
Substances #:	*1*	**Substance:**	*"Gasoline Unknown"*
P.A. Start Date:	*UNKNOWN*	**P.A. End Date:**	*NOT REPORTED*
C & A:		*NO*	
Case Type:		*"Tank/Dissolved Substance Nonbeneficial Use Area (LOP) - tank case, dissolved chemicals in groundwater, groundwater has no beneficial uses, possible soil contamination, in LOP."*	
Case Status:		*"Preliminary Assessment (initial investigation)"*	
Status Date:		*OCTOBER 4, 1993*	
R.A. Start:	*NOT REPORTED*	**R.A. End:**	*NOT REPORTED*
Enforcement Action:		*YES*	
R.A. Type:		*NOT REPORTED*	

County UST - County Underground Storage Tank / SRC# 4444		EPA ID: Agency ID:	CAD982478984 H12975
Agency Address:		*MISSION VALLEY CHEVRON 2290 CAMINO DEL RIO N SAN DIEGO, CA 921081510*	
Fuel Type:	*REGULAR UNLEADED*	**Tank Number:**	*T001*
Size:	*10000*	**Tank Type:**	*SINGLE WALL W/O SECNDRY CNTMNT*
Pipe Type:	*CLOSED BY REMOVAL H1SUCTION*	**Alternate Monitor:**	*"Not Available"*
Tank Id:	*NOT REPORTED*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*1965*
Fuel Type:	*REGULAR UNLEADED*	**Tank Number:**	*T002*
Size:	*9000*	**Tank Type:**	*SINGLE WALL W/O SECNDRY CNTMNT*
Pipe Type:	*CLOSED BY REMOVAL H1SUCTION*	**Alternate Monitor:**	*"Not Available"*
Tank Id:	*NOT REPORTED*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*1965*
Fuel Type:	*LEADED*	**Tank Number:**	*T003*
Size:	*4000*	**Tank Type:**	*SINGLE WALL W/O SECNDRY CNTMNT*
Pipe Type:	*CLOSED BY REMOVAL H1SUCTION*	**Alternate Monitor:**	*"Not Available"*
Tank Id:	*NOT REPORTED*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*1965*

Fuel Type:	*WASTE OIL*	**Tank Number:**	*T004*
Size:	*550*	**Tank Type:**	*SINGLE WALL W/O SECNDRY CNTMNT*
Pipe Type:	*CLOSED BY REMOVAL H1NONE*	**Alternate Monitor:**	*"Not Available"*
Tank Id:	*NOT REPORTED*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*1965*
Fuel Type:	*REGULAR UNLEADED*	**Tank Number:**	*T005*
Size:	*0*	**Tank Type:**	*DOUBLE WALL*
Pipe Type:	*PERMIT TO OPERATE H1PRESSURIZE*	**Alternate Monitor:**	*"Not Available"*
Tank Id:	*D*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*1993*
Fuel Type:	*REGULAR UNLEADED*	**Tank Number:**	*T006*
Size:	*0*	**Tank Type:**	*DOUBLE WALL*
Pipe Type:	*PERMIT TO OPERATE H1PRESSURIZE*	**Alternate Monitor:**	*"Not Available"*
Tank Id:	*D*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*1993*
Fuel Type:	*SUPER UNLEADED*	**Tank Number:**	*T007*
Size:	*0*	**Tank Type:**	*DOUBLE WALL*
Pipe Type:	*PERMIT TO OPERATE H1PRESSURIZE*	**Alternate Monitor:**	*"Not Available"*
Tank Id:	*D*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*NOT REPORTED*
Fuel Type:	*WASTE OIL*	**Tank Number:**	*T008*
Size:	*0*	**Tank Type:**	*DOUBLE WALL*
Pipe Type:	*PERMIT TO OPERATE H1GRAVITY*	**Alternate Monitor:**	*"Not Available"*
Tank Id:	*NOT REPORTED*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*NOT REPORTED*

HE-17 / SRC# 4444		EPA ID: Agency ID:	CAD982478984 H12975

Agency Address:		*MISSION VALLEY CHEVRON* *2290 CAMINO DEL RIO N* *SAN DIEGO, CA 921081510*	
Business Type:		*"Unknown"*	
Status:		*"Active SA/M case, not previous status 30"*	
Notice of Violation Issued:		*NO*	
Inactive:	*NO*	**Permit Exp Date:**	*UNKNOWN*
Inspection Date:	*NOVEMBER 12, 1996*	**Reinspection Date:**	*NOVEMBER 1, 1997*
Chemical Name:		*PROPANE, LIQUIFIED PETROLEUM COMPRESSED GAS:*	
C.A.S. #:	*74-98-6*	**Qty Stored (Units):**	*1000 (GAL)*
Annual Qty (Units):	*2000 (GAL)*	**Carcinogen:**	*NO*
Chemical Name:		*NOT REPORTED*	
Violation Type:	*GENERAL VIOLATION*	**# of Occurrences:**	*1*
Waste Type:	*NOT REPORTED*	**Inspection Date:**	*UNKNOWN*
Violation Description:		*OPERATOR OF THE UNDERGROUND STORAGE TANK HAS NOT ENTERED INTO AWRITTEN CONTRACT WITH TANK OWNER AND NOTIFIED THE HMMD H*	
Violation Description:		*SC 252*	
Violation Type:	*GENERAL VIOLATION*	**# of Occurrences:**	*1*
Waste Type:	*NOT REPORTED*	**Inspection Date:**	*UNKNOWN*

PROPERTY AND THE ADJACENT AREA (within 1/8 mile) CONT.

Violation Description:		WRITTEN ROUTINE MONITORING PROCEDURE FOR THE UNDERGROUND STORAGETANK SYSTEM HAS NOT BEEN PREPARED AND IMPLEMENTED. CCR2632(E)	
Violation Description:		(1),26	
Violation Type:	GENERAL VIOLATION	**# of Occurrences:**	1
Waste Type:	NOT REPORTED	**Inspection Date:**	UNKNOWN
Violation Description:		WRITTEN RESPONSE PLAN FOR RELEASES INTO SECONDARY CONTAINMENT ISNOT AVAILABLE. CCR 2632(E)(2), 26	
Violation Description:		34(C)	

SITES IN THE SURROUNDING AREA (within 1/8 - 1/4 mile)

VISTA Address*:	**MISSION VALLEY DISPOSAL AREA** **TEXAS ST./ HWY 8** **SAN DIEGO, CA 92108**	VISTA ID#: Distance/Direction: Plotted as:	6832526 0.13 MI / S Point	Map ID **2**
STATE SWLF - Solid Waste Landfill / SRC# 4424		Agency ID:	37-CR-0047	

Agency Address:	MISSION VALLEY DISPOSAL AREA TEXAS ST./ HWY 8 SAN DIEGO, CA
Facility Type:	SOLID WASTE DISPOSAL FACILITY
Facility Status:	OTHER
Facility Life:	NOT REPORTED
Permit Status:	UNDER REVIEW
Waste:	NOT REPORTED

VISTA Address*:	**CAL-MAT MISSION VALLEY** **2240 STADIUM** **SAN DIEGO, CA 92103**	VISTA ID#: Distance/Direction: Plotted as:	67936 0.22 MI / N Point	Map ID **3**
STATE UST - State Underground Storage Tank / SRC# 1612		EPA/Agency ID:	N/A	

Agency Address:	CAL-MAT MISSION VALLEY 2240 STADIUM SAN DIEGO, CA 92108
Underground Tanks:	6
Aboveground Tanks:	NOT REPORTED
Tanks Removed:	NOT REPORTED

Tank ID:	1U	**Tank Status:**	CLOSED REMOVED
Tank Contents:	OIL(NOT SPECIFIED)	**Leak Monitoring:**	UNKNOWN
Tank Age:	NOT REPORTED	**Tank Piping:**	UNKNOWN
Tank Size (Units):	550 (GALLONS)	**Tank Material:**	OTHER DESCRIPTIONS
Tank ID:	2U	**Tank Status:**	CLOSED REMOVED
Tank Contents:	UNLEADED GAS	**Leak Monitoring:**	UNKNOWN
Tank Age:	NOT REPORTED	**Tank Piping:**	UNKNOWN
Tank Size (Units):	10000 (GALLONS)	**Tank Material:**	OTHER DESCRIPTIONS
Tank ID:	3U	**Tank Status:**	CLOSED REMOVED
Tank Contents:	UNLEADED GAS	**Leak Monitoring:**	UNKNOWN
Tank Age:	NOT REPORTED	**Tank Piping:**	UNKNOWN
Tank Size (Units):	10000 (GALLONS)	**Tank Material:**	OTHER DESCRIPTIONS
Tank ID:	4U	**Tank Status:**	CLOSED REMOVED
Tank Contents:	UNLEADED GAS	**Leak Monitoring:**	UNKNOWN
Tank Age:	NOT REPORTED	**Tank Piping:**	UNKNOWN
Tank Size (Units):	1000 (GALLONS)	**Tank Material:**	OTHER DESCRIPTIONS

*** VISTA address includes enhanced city and ZIP.**

SITES IN THE SURROUNDING AREA (within 1/8 - 1/4 mile) CONT.

Tank ID:	*5U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*550 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*
Tank ID:	*6U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*1000 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*

STATE UST - State Underground Storage Tank / SRC# 4444 Agency ID: H02471

Agency Address:

CAL-MAT MISSION VALLEY
2240 STADIUM WY
SAN DIEGO, CA 92108

Underground Tanks: *6*
Aboveground Tanks: *NOT REPORTED*
Tanks Removed: *NOT REPORTED*

Tank ID:	*T001U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*GASOLINE AND OIL MIXTURE*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*550 (GALLONS)*	**Tank Material:**	*UNKNOWN*
Tank ID:	*T002U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*10000 (GALLONS)*	**Tank Material:**	*UNKNOWN*
Tank ID:	*T003U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*10000 (GALLONS)*	**Tank Material:**	*UNKNOWN*
Tank ID:	*T004U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*1000 (GALLONS)*	**Tank Material:**	*UNKNOWN*
Tank ID:	*T005U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*550 (GALLONS)*	**Tank Material:**	*UNKNOWN*
Tank ID:	*T006U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*1000 (GALLONS)*	**Tank Material:**	*UNKNOWN*

SITES IN THE SURROUNDING AREA (within 1/8 - 1/4 mile) CONT.

County LUST - County Leaking Underground Storage Tank / SRC# 4444		EPA ID: Agency ID:	CAD981570864 H02471
Agency Address:		*CAL-MAT MISSION VALLEY 2240 STADIUM WY SAN DIEGO, CA 92108*	
Release #:	*001*	**Case "T" #:**	*T01741*
Release Date:	*UNKNOWN*	**Priority:**	*1C*
Substances #:	*1*	**Substance:**	*"Diesel"*
P.A. Start Date:	*UNKNOWN*	**P.A. End Date:**	*DECEMBER 2, 1990*
C & A:		*NO*	
Case Type:		*"Tank/Dissolved Substance Beneficial Use Area (LOP)-tank case, dissolved substances are present in groundwater, groundwater has beneficial uses, possible soil contamination, in LOP."*	
Case Status:		*"Case Closed"*	
Status Date:		*UNKNOWN*	
R.A. Start:	*UNKNOWN*	**R.A. End:**	*UNKNOWN*
Enforcement Action:		*YES*	
R.A. Type 1:		*"Excavate and Treat"*	
R.A. Type 2:		*"Enhance Biodegradation"*	

County UST - County Underground Storage Tank / SRC# 4444		EPA ID: Agency ID:	CAD981570864 H02471
Agency Address:		*CAL-MAT MISSION VALLEY 2240 STADIUM WY SAN DIEGO, CA 92108*	
Fuel Type:	*GASOLINE WASTE OIL*	**Tank Number:**	*T001*
Size:	*550*	**Tank Type:**	*TANK TYPE NOT AVAILABLE*
Pipe Type:	*CLOSED BY REMOVAL HOPIPE TYPE*	**Alternate Monitor:**	*"unknown"*
Tank Id:	*NOT AVAILA*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*NOT REPORTED*
Fuel Type:	*REGULAR UNLEADED*	**Tank Number:**	*T002*
Size:	*10000*	**Tank Type:**	*TANK TYPE NOT AVAILABLE*
Pipe Type:	*CLOSED BY REMOVAL HOPIPE TYPE*	**Alternate Monitor:**	*"unknown"*
Tank Id:	*NOT AVAILA*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*NOT REPORTED*
Fuel Type:	*REGULAR UNLEADED*	**Tank Number:**	*T003*
Size:	*10000*	**Tank Type:**	*TANK TYPE NOT AVAILABLE*
Pipe Type:	*CLOSED BY REMOVAL HOPIPE TYPE*	**Alternate Monitor:**	*"unknown"*
Tank Id:	*NOT AVAILA*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*NOT REPORTED*
Fuel Type:	*REGULAR UNLEADED*	**Tank Number:**	*T004*
Size:	*1000*	**Tank Type:**	*TANK TYPE NOT AVAILABLE*
Pipe Type:	*CLOSED BY REMOVAL HOPIPE TYPE*	**Alternate Monitor:**	*"unknown"*
Tank Id:	*NOT AVAILA*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*NOT REPORTED*
Fuel Type:	*REGULAR UNLEADED*	**Tank Number:**	*T005*
Size:	*550*	**Tank Type:**	*TANK TYPE NOT AVAILABLE*
Pipe Type:	*CLOSED BY REMOVAL HOPIPE TYPE*	**Alternate Monitor:**	*"unknown"*
Tank Id:	*NOT AVAILA*		

Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*NOT REPORTED*
Fuel Type:	*REGULAR UNLEADED*	**Tank Number:**	*T006*
Size:	*1000*	**Tank Type:**	*TANK TYPE NOT AVAILABLE*
Pipe Type:	*CLOSED BY REMOVAL H0PIPE TYPE*	**Alternate Monitor:**	*"unknown"*
Tank Id:	*NOT AVAILA*		
Test Status:	*NOT REPORTED*	**Tank Status Date:**	*NOT REPORTED*
Inspection Status:	*NOT REPORTED*	**Year Installed:**	*NOT REPORTED*

VISTA Address*:	**CALMAT COMPANY** **2240 STADIUM WAY** **SAN DIEGO, CA 92108**	VISTA ID#: Distance/Direction: Plotted as:	1289742 0.22 MI / N Point	Map ID **3**

STATE LUST - State Leaking Underground Storage Tank / SRC# 4324		Agency ID:	9UT1726
Agency Address:	*SAME AS ABOVE*		
Tank Status:	*NOT AVAILABLE*		
Media Affected:	*AQUIFER*		
Substance:	*DIESEL*		
Leak Cause:	*UNAVAILABLE*		
Leak Source:	*NOT AVAILABLE*		
Remedial Action:	*ENHANCED BIODEGRADATION*		
Remedial Status 1:	*CASE CLOSED/CLEANUP COMPLETE*		
Remedial Status 2:	*NOT AVAILABLE*		
Fields Not Reported:	*Discovery Date, Quantity (Units)*		

Regional LUST - Regional Leaking Underground Storage Tank / SRC# 4420		Agency ID:	9UT1726
Agency Address:	*SAME AS ABOVE*		
Tank Status:	*NOT AVAILABLE*		
Discovery Date:	*JUNE 21, 1990*		
Media Affected:	*AQUIFER*		
Substance:	*DIESEL*		
Leak Cause:	*CORROSION*		
Leak Source:	*UNDERGROUND TANK*		
Remedial Action:	*NOT AVAILABLE*		
Remedial Status 1:	*CASE CLOSED/CLEANUP COMPLETE*		
Remedial Status 2:	*NOT AVAILABLE*		
Fields Not Reported:	*Quantity (Units)*		

VISTA Address*:	**NORWICH/VAN RAAPHORST AT0003** **2635 S CAMINO DEL RIO** **SAN DIEGO, CA 92108**	VISTA ID#: Distance/Direction: Plotted as:	4022615 0.24 MI / SE Point	Map ID **4**

STATE UST - State Underground Storage Tank / SRC# 1612		EPA/Agency ID:	N/A
Agency Address:	*SAME AS ABOVE*		
Underground Tanks:	*5*		
Aboveground Tanks:	*NOT REPORTED*		
Tanks Removed:	*NOT REPORTED*		

Tank ID:	*1U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*6000 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*

Tank ID:	*2U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*LEADED GAS*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*6000 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*
Tank ID:	*3U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*10000 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*
Tank ID:	*4U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*PETROLEUM*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*300 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*
Tank ID:	*5U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*PETROLEUM*	**Leak Monitoring:**	*UNKNOWN*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*300 (GALLONS)*	**Tank Material:**	*OTHER DESCRIPTIONS*

VISTA Address*:	**MILLER FAMILY CHIROPRACTIC CTR** **2635 CAMINO DEL RIO S #301** **SAN DIEGO, CA 92108**	VISTA ID#: Distance/Direction: Plotted as:	4022614 0.24 MI / SE Point	Map ID **4**
STATE UST - State Underground Storage Tank / SRC# 4444		Agency ID:	H21127	

Agency Address:	*SAME AS ABOVE*
Underground Tanks:	*5*
Aboveground Tanks:	*NOT REPORTED*
Tanks Removed:	*NOT REPORTED*

Tank ID:	*T001U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*6000 (GALLONS)*	**Tank Material:**	*DOUBLE WALLED OR SINGLE WALLED*
Tank ID:	*T002U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*LEADED GAS*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*6000 (GALLONS)*	**Tank Material:**	*DOUBLE WALLED OR SINGLE WALLED*
Tank ID:	*T003U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*UNLEADED GAS*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*10000 (GALLONS)*	**Tank Material:**	*DOUBLE WALLED OR SINGLE WALLED*
Tank ID:	*T004U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*WASTE OIL*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*300 (GALLONS)*	**Tank Material:**	*DOUBLE WALLED OR SINGLE WALLED*
Tank ID:	*T005U*	**Tank Status:**	*CLOSED REMOVED*
Tank Contents:	*WASTE OIL*	**Leak Monitoring:**	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	**Tank Piping:**	*UNKNOWN*
Tank Size (Units):	*300 (GALLONS)*	**Tank Material:**	*DOUBLE WALLED OR SINGLE WALLED*

*** VISTA address includes enhanced city and ZIP.**

SITES IN THE SURROUNDING AREA (within 1/8 - 1/4 mile) CONT.

County UST - County Underground Storage Tank / SRC# 4444		Agency ID:	H21127
Agency Address:	MILLER FAMILY CHIROPRACTIC CTR 2635 CAMINO DEL RIO S #301 SAN DIEGO, CA 921083726		
Fuel Type:	REGULAR UNLEADED	**Tank Number:**	T001
Size:	6000	**Tank Type:**	SINGLE WALL W/O SECNDRY CNTMNT
Pipe Type:	CLOSED BY REMOVAL H0PIPE TYPE	**Alternate Monitor:**	"unknown"
Tank Id:	NOT AVAILA		
Test Status:	NOT REPORTED	**Tank Status Date:**	NOT REPORTED
Inspection Status:	NOT REPORTED	**Year Installed:**	NOT REPORTED
Fuel Type:	LEADED	**Tank Number:**	T002
Size:	6000	**Tank Type:**	SINGLE WALL W/O SECNDRY CNTMNT
Pipe Type:	CLOSED BY REMOVAL H0PIPE TYPE	**Alternate Monitor:**	"unknown"
Tank Id:	NOT AVAILA		
Test Status:	NOT REPORTED	**Tank Status Date:**	NOT REPORTED
Inspection Status:	NOT REPORTED	**Year Installed:**	NOT REPORTED
Fuel Type:	REGULAR UNLEADED	**Tank Number:**	T003
Size:	10000	**Tank Type:**	SINGLE WALL W/O SECNDRY CNTMNT
Pipe Type:	CLOSED BY REMOVAL H0PIPE TYPE	**Alternate Monitor:**	"unknown"
Tank Id:	NOT AVAILA		
Test Status:	NOT REPORTED	**Tank Status Date:**	NOT REPORTED
Inspection Status:	NOT REPORTED	**Year Installed:**	NOT REPORTED
Fuel Type:	WASTE OIL	**Tank Number:**	T004
Size:	300	**Tank Type:**	SINGLE WALL W/O SECNDRY CNTMNT
Pipe Type:	CLOSED BY REMOVAL H0PIPE TYPE	**Alternate Monitor:**	"unknown"
Tank Id:	NOT AVAILA		
Test Status:	NOT REPORTED	**Tank Status Date:**	NOT REPORTED
Inspection Status:	NOT REPORTED	**Year Installed:**	NOT REPORTED
Fuel Type:	WASTE OIL	**Tank Number:**	T005
Size:	300	**Tank Type:**	SINGLE WALL W/O SECNDRY CNTMNT
Pipe Type:	CLOSED BY REMOVAL H0PIPE TYPE	**Alternate Monitor:**	"unknown"
Tank Id:	NOT AVAILA		
Test Status:	NOT REPORTED	**Tank Status Date:**	NOT REPORTED
Inspection Status:	NOT REPORTED	**Year Installed:**	NOT REPORTED

SITES IN THE SURROUNDING AREA (within 1/4 - 1/2 mile)

No Records Found

SITES IN THE SURROUNDING AREA (within 1/2 - 1 mile)

No Records Found

UNMAPPED SITES

VISTA Address*:	**MURPHY-SHEPARD CANYON (KEARNY NE MURPHY CANYON RD SAN DIEGO, CA 92123**	VISTA ID#:	5441456
WMUDS / SRC# 3938		Agency ID:	9 370052NUR

Agency Address:	*MURPHY-SHEPARD CANYON (KEARNY NE MURPHY CANYON RD SAN DIEGO, CA*
Solid Waste Inventory System ID:	*NOT REPORTED*
Facility Type:	*Not reported*
Facility In State Board Waste Discharger System:	*NO*
Chapter 15 Facility:	*NO*
Solid Waste Assessment Test Facility:	*YES*
Toxic Pits Cleanup Act Facility:	*NO*
RCRA Facility:	*NO*
Department of Defense Facility:	*NO*
Open To Public:	*NO*
Number Of Waste Management Units:	*1*
Rank:	*7*
Enforcements At Facility:	*NO*
Violations At Facility:	*NO*

VISTA Address*:	**MONTGOMERY DEMOLITION LANDFILL RUFFIN RD, BETWEEN AERO DR. SAN DIEGO, CA 92123**	VISTA ID#:	4825772
WMUDS / SRC# 3938		Agency ID:	9 370104NUR

Agency Address:	*SAME AS ABOVE*
Solid Waste Inventory System ID:	*37-SS-0003*
Facility Type:	*Not reported*
Facility In State Board Waste Discharger System:	*NO*
Chapter 15 Facility:	*NO*
Solid Waste Assessment Test Facility:	*YES*
Toxic Pits Cleanup Act Facility:	*NO*
RCRA Facility:	*NO*
Department of Defense Facility:	*NO*
Open To Public:	*NO*
Number Of Waste Management Units:	*1*
Rank:	*12*
Enforcements At Facility:	*NO*
Violations At Facility:	*NO*

VISTA Address*:	**BAYSIDE COGENERATION PROJECT PORT DISTRICT PROPERTY NATIONAL CITY, CA**	VISTA ID#:	6829913
STATE SWLF - Solid Waste Landfill / SRC# 4424		Agency ID:	37-AA-0918

Agency Address:	*SAME AS ABOVE*
Facility Type:	*OTHER*
Facility Status:	*PROPOSED*
Permit Status:	*PROPOSED/PLANNED*

VISTA Address*:	**N STREET LANDFILL** **BETWEEN 26 28TH ST.** **NATIONAL CITY, CA**	VISTA ID#:	5432941
WMUDS / SRC# 3938		Agency ID:	9 370119NUR

Agency Address:	*SAME AS ABOVE*
Solid Waste Inventory System ID:	*NOT REPORTED*
Facility Type:	*Not reported*
Facility In State Board Waste Discharger System:	*NO*
Chapter 15 Facility:	*NO*
Solid Waste Assessment Test Facility:	*YES*
Toxic Pits Cleanup Act Facility:	*NO*
RCRA Facility:	*NO*
Department of Defense Facility:	*NO*
Open To Public:	*NO*
Number Of Waste Management Units:	*1*
Rank:	*14*
Enforcements At Facility:	*NO*
Violations At Facility:	*NO*

VISTA Address*:	**RANCHO CARILLO BURNSITE** **TB 68-E6 CORONADO CAYS** **CORONADO, CA**	VISTA ID#:	5813645
STATE SWLF - Solid Waste Landfill / SRC# 4424		Agency ID:	37-CR-0065

Agency Address:	*SAME AS ABOVE*
Facility Type:	*SOLID WASTE DISPOSAL FACILITY*
Facility Status:	*OTHER*
Permit Status:	*UNDER REVIEW*

DESCRIPTION OF DATABASES SEARCHED

A) DATABASES SEARCHED TO 1 MILE

NPL
SRC#: 3622

VISTA conducts a database search to identify all sites within 1 mile of your property.
The agency release date for NPL was January, 1998.

The National Priorities List (NPL) is the EPA's database of uncontrolled or abandoned hazardous waste sites identified for priority remedial actions under the Superfund program. A site must meet or surpass a predetermined hazard ranking system score, be chosen as a state's top priority site, or meet three specific criteria set jointly by the US Dept of Health and Human Services and the US EPA in order to become an NPL site.

SPL
SRC#: 4233

VISTA conducts a database search to identify all sites within 1 mile of your property.
The agency release date for Calsites Database: Annual Workplan Sites was October, 1997.

This database is provided by the Cal. Environmental Protection Agency, Dept. of Toxic Substances Control. The agency may be contacted at: 916-323-3400.

SCL
SRC#: 4232

VISTA conducts a database search to identify all sites within 1 mile of your property.
The agency release date for Calsites Database: All Sites except Annual Workplan Sites (incl. ASPIS) was October, 1997.

This database is provided by the Department of Toxic Substances Control. The agency may be contacted at: .

The CalSites database includes both known and potential sites. Two- thirds of these sites have been classified, based on available information, as needing "No Further Action" (NFA) by the Department of Toxic Substances Control. The remaining sites are in various stages of review and remediation to determine if a problem exists at the site. Several hundred sites have been remediated and are considered certified. Some of these sites may be in long term operation and maintenance.

CORRACTS
SRC#: 4244

VISTA conducts a database search to identify all sites within 1 mile of your property.
The agency release date for HWDMS/RCRIS was October, 1997.

The EPA maintains this database of RCRA facilities which are undergoing "corrective action". A "corrective action order" is issued pursuant to RCRA Section 3008 (h) when there has been a release of hazardous waste or constituents into the environment from a RCRA facility. Corrective actions may be required beyond the facility's boundary and can be required regardless of when the release occurred, even if it predates RCRA.

RCRA-TSD
SRC#: 4244

VISTA conducts a database search to identify all sites within 1 mile of your property.
The agency release date for HWDMS/RCRIS was October, 1997.

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of facilities which report generation, storage, transportation, treatment or disposal of hazardous waste. RCRA TSDs are facilities which treat, store and/or dispose of hazardous waste.

B) DATABASES SEARCHED TO 1/2 MILE

CERCLIS
SRC#: 4457

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for CERCLIS was January, 1998.

The CERCLIS List contains sites which are either proposed to or on the National Priorities List(NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL. The information on each site includes a history of all pre-remedial, remedial, removal and community relations activiies or events at the site, financial funding information for the events, and unrestricted enforcement activities.

Cal Cerclis
SRC#: 2462

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Ca Cerclis w/Regional Utility Description was June, 1995.

This database is provided by the U.S. Environmental Protection Agency, Region 9. The agency may be contacted at: . These are regional utility descriptions for California CERCLIS sites.

NFRAP
SRC#: 4458

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for CERCLIS-NFRAP was January, 1998.

NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly, or the contamination was not serious enough to require Federal Superfund action or NPL consideration.

SWLF
SRC#: 4424

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Ca Solid Waste Information System (SWIS) was January, 1998.

This database is provided by the Integrated Waste Management Board. The agency may be contacted at: 916-255-4021.

The California Solid Waste Information System (SWIS) database consists of both open as well as closed and inactive solid waste disposal facilities and transfer stations pursuant to the Solid Waste Management and Resource Recovery Act of 1972, Government Code Section 2.66790(b). Generally, the California Integrated Waste Management Board learns of locations of disposal facilities through permit applications and from local enforcement agencies.

WMUDS
SRC#: 3938

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Waste Management Unit Database System (WMUDS) was May, 1997.

This database is provided by the State Water Resources Control Board. The agency may be contacted at: 916-892-0323. This is used for program tracking and inventory of waste management units. This system contains information from the following eight main databases: Facility, Waste Management Unit, SWAT Program Information, SWAT Report Summary Information, Chapter 15 (formerly Subchapter 15), TPCA Program Information, RCRA Program Information, Closure Information; also some information from the WDS (Waste Discharge System). This database con

The WMUDS system also accesses information from the following databases from the Waste Discharger System (WDS): Inspections, Violations, and Enforcements. The sites contained in these databases are subject to the California Code of Regulations - Title 23. Waters.

LUST
SRC#: 3273

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Region #9-SLIC List was March, 1994.

This database is provided by the Regional Water Quality Control Board, Region #9. The agency may be contacted at: 619-467-2975.

LUST
SRC#: 4324

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Lust Information System (LUSTIS) was October, 1997.

This database is provided by the California Environmental Protection Agency. The agency may be contacted at: 916-445-6532.

LUST RG7
SRC#: 4416

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Region #7-Colorado River Basin Leaking Underground Storage Tank Listing was November, 1997.

This database is provided by the Regional Water Quality Control Board, Region #7. The agency may be contacted at: 760-346-7491.

LUST RG9
SRC#: 4420

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Region #9 Leaking Underground Storage Tank List was December, 1997.

This database is provided by the Regional Water Quality Control Board, Region #9. The agency may be contacted at: 619-467-2975.

HE17 LUST
SRC#: 4444

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for San Diego County Environmental Health Services Database-LUST Sites was January, 1998.

This database is provided by the San Diego County Dept. of Health Services. It contains information concerning any sites which fall under the jurisdiction of this agency. Cases classified as Releases appear under "County Lust" in this report regardless of the "Cause" or "Case Type". Sites classified as USTs appear under "County UST" , and Solid Waste facilities appear under "County SWLF". Sites with violation and/or disclosure information are reported under "SDC Site" in this VISTA report.

CORTESE
SRC#: 2298

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Cortese List-Hazardous Waste Substance Site List was February, 1995.

This database is provided by the Office of Environmental Protection, Office of Hazardous Materials. The agency may be contacted at: 916-445-6532.

The California Governor's Office of Planning and Research annually publishes a listing of potential and confirmed hazardous waste sites throughout the State of California under Government Code Section 65962.5. This database (CORTESE) is based on input from the following: (1)CALSITES-Department of Toxic Substances Control, Abandoned Sites Program Information Systems; (2)SARA Title III Section III Toxic Chemicals Release Inventory for 1987, 1988, 1989, and 1990; (3)FINDS; (4)HWIS-Department of Toxic Substances Control, Hazardous Waste Information System. Vista has not included one time generator facilities from Cortese in our database.; (5)SWRCB-State Water Resources Control Board; (6)SWIS-Integrated Waste Management Control Board (solid waste facilities); (7)AGT25-Air Resources Board, dischargers of greater than 25 tons of criteria pollutants to the air; (8)A1025-Air Resources Board, dischargers of greater than 10 and less than 25 tons of criteria pollutants to the air; (9)LTANK-SWRCB Leaking Underground Storage Tanks; (10)UTANK-SWRCB Underground tanks reported to the SWEEPS systems; (11)IUR-Inventory Update Rule (Chemical Manufacturers); (12)WB-LF- Waste Board - Leaking Facility, site has known migration; (13)WDSE-Waste Discharge System - Enforcement Action; (14)DTSCD-Department of Toxic Substance Control Docket.

Deed Restrictions
SRC#: 1703

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Deed Restriction Properties Report was April, 1994.

This database is provided by the Department of Health Services-Land Use and Air Assessment. The agency may be contacted at: 916-323-3376. These are voluntary deed restriction agreements with owners of property who propose building residences, schools, hospitals, or day care centers on property that is "on or within 2,000 feet of a significant disposal of hazardous waste".

California has a statutory and administrative procedure under which the California Department of Health Services (DHS) may designate real property as either a "Hazardous Waste Property" or a "Border Zone Property" pursuant to California Health Safety Code Sections 25220-25241. Hazardous Waste Property is land at which hazardous waste has been deposited, creating a significant existing or potential hazard to public health and safety. A Border Zone Property is one within 2,000 feet of a hazardous waste deposit. Property within either category is restricted in use, unless a written variance is obtained from DHS. A Hazardous Waste Property designation results in a prohibition of new uses, other than a modification or expansion of an industrial or manufacturing facility on land previously owned by the facility prior to January 1, 1981. A Border Zone Property designation results in prohibition of a variety of uses involving human habitation, hospitals, schools and day care center.

Toxic Pits
SRC#: 2229

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Summary of Toxic Pits Cleanup Facilities was February, 1995.

This database is provided by the Water Quality Control Board, Division of Loans Grants. The agency may be contacted at: 916-227-4396.

C) DATABASES SEARCHED TO 1/4 MILE

RCRA-Viols/Enfs
SRC#: 4244

VISTA conducts a database search to identify all sites within 1/4 mile of your property.
The agency release date for HWDMS/RCRIS was October, 1997.

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of facilities which report generation, storage, transportation, treatment or disposal of hazardous waste. RCRA Violators are facilities which have been cited for RCRA Violations at least once since 1980. RCRA Enforcements are enforcement actions taken against RCRA violators.

UST's
SRC#: 573

VISTA conducts a database search to identify all sites within 1/4 mile of your property.
The agency release date for Fullerton Underground Storage Tank List was June, 1992.

This database is provided by the Fullerton Fire Department. The agency may be contacted at: ; Caution-Many states do not require registration of heating oil tanks, especially those used for residential purposes.

UST's
SRC#: 1612

VISTA conducts a database search to identify all sites within 1/4 mile of your property.
The agency release date for Underground Storage Tank Registrations Database was January, 1994.

This database is provided by the State Water Resources Control Board, Office of Underground Storage Tanks. The agency may be contacted at: 916-227-4337; Caution-Many states do not require registration of heating oil tanks, especially those used for residential purposes.

UST's
SRC#: 3945

VISTA conducts a database search to identify all sites within 1/4 mile of your property.
The agency release date for Alameda County UST List was June, 1997.

This database is provided by the Department of Environmental Health. The agency may be contacted at: 510-567-6713; Caution-Many states do not require registration of heating oil tanks, especially those used for residential purposes.

HE17 UST
SRC#: 4444

VISTA conducts a database search to identify all sites within 1/4 mile of your property.
The agency release date for San Diego County Environmental Health Services Database-LUST Sites was January, 1998.

This database is provided by the San Diego County Dept. of Health Services. It contains information concerning any sites which fall under the jurisdiction of this agency. Cases classified as Releases appear under "County Lust" in this report regardless of the "Cause" or "Case Type". Sites classified as USTs appear under "County UST", and Solid Waste facilities appear under "County SWLF". Sites with violation and/or disclosure information are reported under "SDC Site" in this VISTA report.

AST's
SRC#: 4320

VISTA conducts a database search to identify all sites within 1/4 mile of your property.
The agency release date for Aboveground Storage Tank Database was December, 1997.

This database is provided by the State Water Resources Control Board. The agency may be contacted at: 916-227-4364.

TRIS
SRC#: 3716

VISTA conducts a database search to identify all sites within 1/4 mile of your property.
The agency release date for TRIS was December, 1996.

Section 313 of the Emergency Planning and Community Right-to-Know Act (also known as SARA Title III) of 1986 requires the EPA to establish an inventory of Toxic Chemicals emissions from certain facilities(Toxic Release Inventory System). Facilities subject to this reporting are required to complete a Toxic Chemical Release Form(Form R) for specified chemicals.

D) DATABASES SEARCHED TO 1/8 MILE

ERNS
SRC#: 4144

VISTA conducts a database search to identify all sites within 1/8 mile of your property.
The agency release date for was September, 1997.

The Emergency Response Notification System (ERNS) is a national database used to collect information on reported releases of oil and hazardous substances. The database contains information from spill reports made to federal authorities including the EPA, the US Coast Guard, the National Response Center and the Department of transportation. A search of the database records for the period October 1986 through September 1997 revealed information regarding reported spills of oil or hazardous substances in the stated area.

RCRA-LgGen
SRC#: 4244

VISTA conducts a database search to identify all sites within 1/8 mile of your property.
The agency release date for HWDMS/RCRIS was October, 1997.

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of facilities which report generation, storage, transportation, treatment or disposal of hazardous waste. RCRA Large Generators are facilities which generate at least 1000 kg./month of non-acutely hazardous waste (or 1 kg./month of acutely hazardous waste).

RCRA-SmGen
SRC#: 4244

VISTA conducts a database search to identify all sites within 1/8 mile of your property.
The agency release date for HWDMS/RCRIS was October, 1997.

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of facilities which report generation, storage, transportation, treatment or disposal of hazardous waste. RCRA Small and Very Small generators are facilities which generate less than 1000 kg./month of non-acutely hazardous waste.

San Diego HE17 **SRC#: 4444**	VISTA conducts a database search to identify all sites within 1/8 mile of your property. **The agency release date for San Diego County Environmental Health Services Database-LUST Sites was January, 1998.**

This database is provided by the San Diego County Dept. of Health Services. It contains information concerning any sites which fall under the jurisdiction of this agency. Cases classified as Releases appear under "County Lust" in this report regardless of the "Cause" or "Case Type". Sites classified as USTs appear under "County UST" , and Solid Waste facilities appear under "County SWLF". Sites with violation and/or disclosure information are reported under "SDC Site" in this VISTA report.

End of Report

SITE ASSESSMENT PLUS REPORT

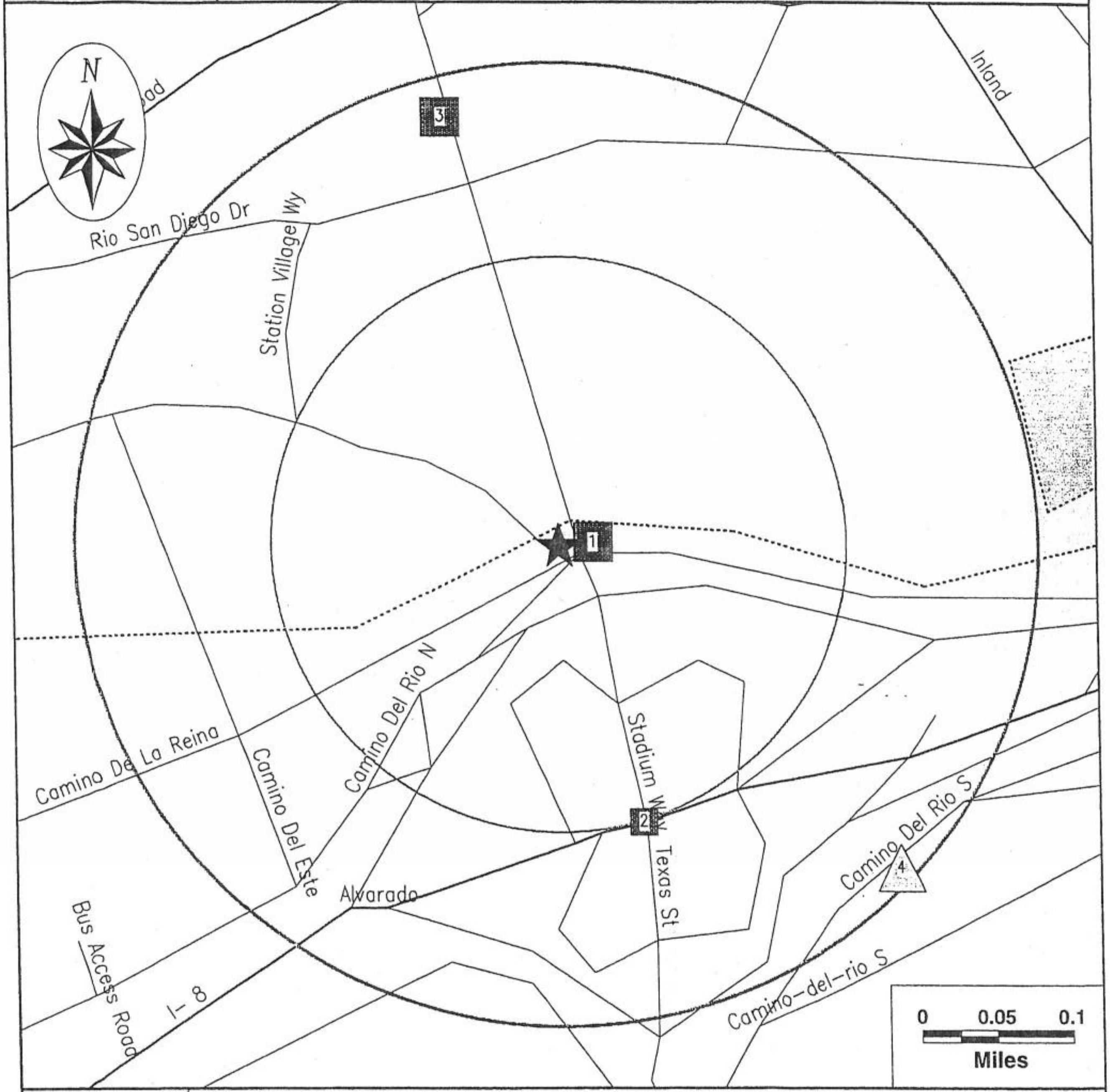
Map of Sites within One Mile

Subject Site	Category:	A	B	C	D
★	Databases Searched to:	1 mi.	1/2 mi.	1/4 mi.	1/8 mi.
	Single Sites	◆	■	△	○
	Multiple Sites	◆	■	△	○
		NPL, SPL, SCL, TSD, CORRACTS	CERCLIS\ NFRAP, LUST, SWLF	RCRA VIOL, TRIS, UST	ERNS, GENERATORS

Highways and Major Roads
Roads
Railroads
Rivers or Water Bodies
Utilities

SITE ASSESSMENT PLUS REPORT

Map of Sites within Quarter Mile

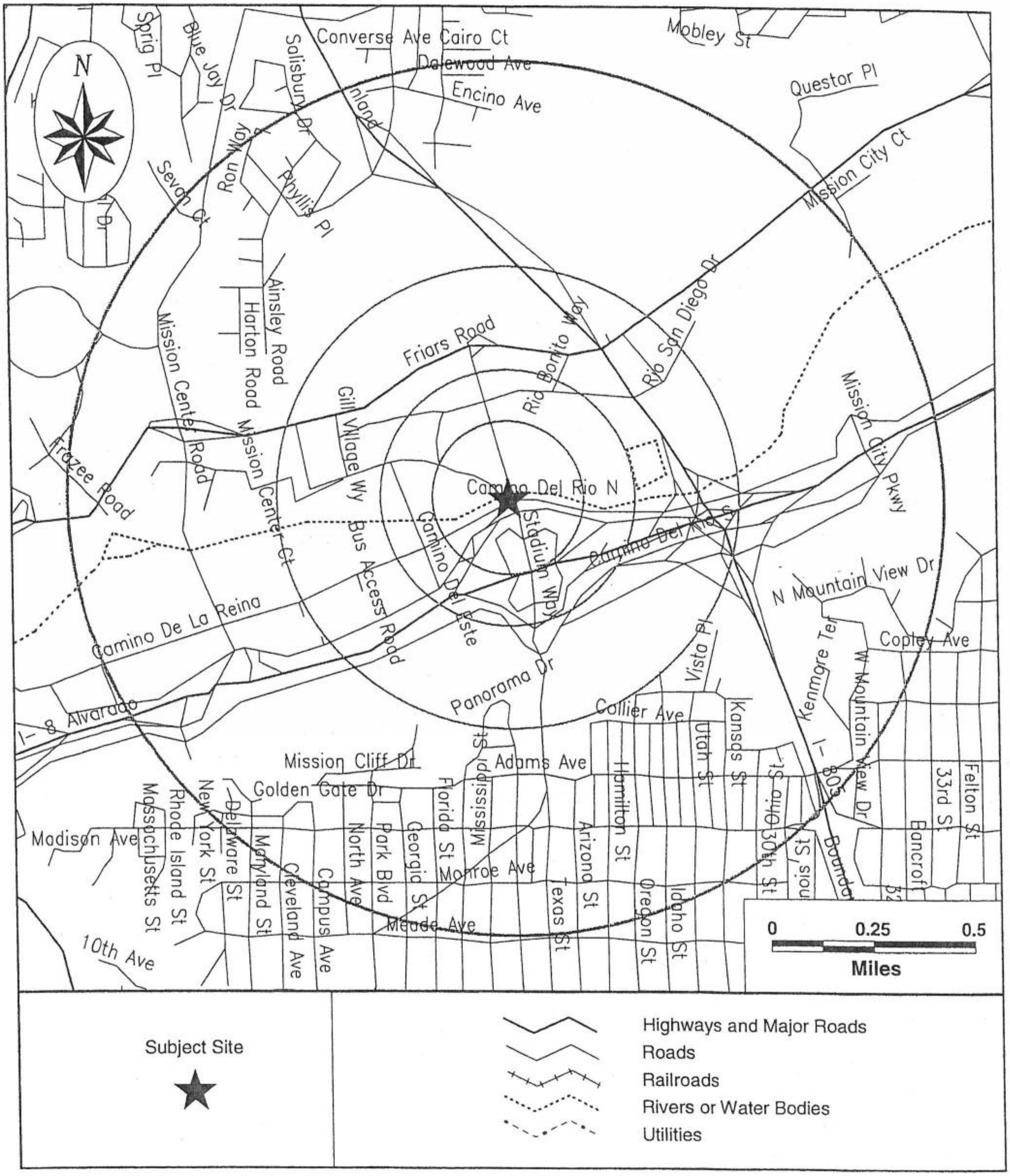


Subject Site	Category:	A	B	C	D
★	Databases Searched to:	1 mi.	1/2 mi.	1/4 mi.	1/8 mi.
	Single Sites	◆	■	△	○
	Multiple Sites	◆	■	△	○
		NPL, SPL, SCL, TSD, CORRACTS	CERCLIS\ NFRAP, LUST, SWLF	RCRA VIOL, TRIS, UST	ERNS, GENERATORS

Highways and Major Roads
Roads
Railroads
Rivers or Water Bodies
Utilities

SITE ASSESSMENT PLUS REPORT

Street Map



APPENDIX B

ANALYTICAL RESULTS

teg

March 26, 1998

Mr. Derek Reed
Dudek & Associates
605 Third Street
Encinitas, CA 92024

RECEIVED
MAR 31 1999
DUDEK & ASSOC.

SUBJECT: DATA REPORT – GRANT PHASE II - DUDEK & ASSOCIATES PROJECT #1740-02

TEG Project # 980316-8

Mr. Reed:

Please find enclosed a data report for the above referenced location. Soil samples were analyzed in TEG's DOHS certified mobile laboratory (CERT #1667).

Project Summary

The following analyses were conducted:

- 10 soils for total recoverable petroleum hydrocarbons (TRPH) by EPA Method 418.1
- 1 soil for volatile aromatic hydrocarbons (BTEX) by Modified EPA Method 8020

The samples were received chilled in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria. No data qualifiers (flags) apply to any of the reported data.

TEG appreciates the opportunity to provide analytical services to Dudek & Associates on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman
Dr. Blayne Hartman

QA/QC REPORT - CALIBRATION DATA

TEG Project #980316-8
DAILY CALIBRATION DATE : 03/17/98

COMPOUND	CALIBRATION RANGE SOIL (ppm)	CALIBRATION RANGE WATER (ppb)	INITIAL CALIB DATE	INITIAL RF	%RSD	OPENING AREA	OPENING RF	OPENING %DIFF	CLOSING / LCS AREA	CLOSING / LCS RF	CLOSING / LCS %DIFF
BENZENE	0.05 - 10	4.95 - 990	3/3/98	0.0089	8.4%	104	0.0096	8.3%	108	0.0092	4.0%
TOLUENE	0.05 - 10	4.95 - 990	3/3/98	0.0101	5.9%	86	0.0116	14.2%	94	0.0106	4.6%
ETHYLBENZENE	0.05 - 10	4.95 - 990	3/3/98	0.0117	3.0%	76	0.0131	12.4%	82	0.0122	4.6%
m&p-XYLENES	0.05 - 10	4.95 - 990	3/3/98	0.0027	3.2%	171	0.0029	9.6%	181	0.0028	3.8%
o-XYLENES	0.05 - 10	4.95 - 990	3/3/98	0.0122	4.7%	73	0.0138	12.4%	77	0.0130	6.0%
TRPH	20 - 1,000	20 - 1,000	10/22/97	582.46	6.6%	0.860	581.40	0.2%	0.862	580.05	0.4%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN TEG'S CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1667)
ANALYSES PERFORMED BY: MR. MARK BURKE
DATA REVIEWED BY: Blayne Hartman
3-27-98

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

Page 1 of 1

PROJECT NAME GRANT PHASE II
PROJECT NO. 1740-02
SAMPLER(S) DEREK REED
SAMPLER'S SIGNATURE

NOTE: All samples are preserved on ice in coolers.

Send Results and Invoice To:
~~Peter Quinlan~~ Derek Reed
Dudek & Associates, Inc.
605 Third Street
Encinitas, CA 92024
Tel: ~~619~~ 760/942-5147
Fax: ~~619~~ 760/632-0164

Laboratory
TEG

Attn:
Shipment Method:

LAB ID	SAMPLE ID	SAMPLE COLLECTION		MATRIX			FILTRATION IN FIELD		SAMPLE CONTAINERS (INCLUDE PRESERVATION)					ANALYSES REQUESTED						SPECIAL INSTRUCTIONS
		Date	Time	Soil	Ground-water	Surface Water	YES	NO	4oz JAR					418.1	8020 BTEX					
	A-1-10	3/13/98	1020	X					1					X						
	A-2-10		1040						1					X	X					
	B-3-10		1100						1					X						
	B-4-10		1115						1					X						
	C-1-5		1150						1					X						
	C-2-10		1210						1					X						
	D-1-5		1240						1					X						
	D-2-10		1255						1					X						
	E-1-5		1315						1					X						
	E-1-10		1335						1					X						

TOTAL NUMBER OF CONTAINERS PER ANALYSIS: 10

TOTAL NUMBER OF CONTAINERS: 10

Relinquished By:
Company: Dudek
Date: 3/16/98
Time: 12:00

Received By:
Company: TEG
Date: 3/16/98
Time: 12:00

Relinquished By:
Company:
Date:
Time:

Received By:
Company:
Date:
Time:

Sample Receipt:
- ☒ No. of containers correct
- ☑ Received good condition/cold
- ☑ Conforms to COC document

Appendix B

WILDLIFE SPECIES

Type	**Order**	**Family**	**Scientific Name**	**Common Name**
Birds	Apodiformes	Apodidae	*Aeronautes saxatalis*	White-throated Swift
		Trochilidae	*Calypte anna*	Anna's Hummingbird
	Columbiformes	Columbidae	*Zenaida macroura*	Mourning Dove
	Passeriformes	Aegithalidae	*Psaltriparus minimus*	Bushtit
		Emberizidae	*Carduelis psaltria*	Lesser Goldfinch
			Carduelis tristis	American Goldfinch
			Carpodacus mexicanus	House Finch
			Dendroica petechia	Yellow Warbler
			Geothlypis trichas	Common Yellowthroat
			Icteria virens	Yellow-breasted Chat
			Icterus cucullatus	Hooded Oriole
			Melospiza melodia	Song Sparrow
			Pipilo crissalis	California Towhee
			Pipilo maculatus	Spotted Towhee
		Troglodytidae	*Troglodytes aedon*	House Wren
		Tyrannidae	*Sayornis nigricans*	Black Phoebe
			Tyrannus vociferans	Cassin's Kingbird
		Vireonidae	*Vireo bellii pusillus*	Least Bell's Vireo
	Piciformes	Picidae	*Picoides nuttallii*	Nuttall's Woodpecker
			Picoides pubescens	Downy Woodpecker
Mammals	Carnivora	Canidae	*Canis latrans*	Coyote
		Procyonidae	*Procyon lotor*	Raccoon
	Lagomorpha	Leporidae	*Sylvilagus sp.*	Rabbit
	Rodentia	Cricetidae	*Neotoma sp.*	Woodrat species
		Sciuridae	*Spermophilis beecheyii*	California ground squirrel
Reptiles	Squamata	Phrynosomatidae	*Sceloporus occidentalis*	Western fence lizard

U.S. DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency
Washington, D.C. 20472

May 10, 2016

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 16-09-0080R
Community Name: City of San Diego, CA
Community No.: 060295

The Honorable Kevin L. Faulconer
Mayor, City of San Diego
City Administration Building
202 C Street, 11th Floor
San Diego, CA 92101

Dear Mayor Faulconer:

We are providing our comments with the enclosed Conditional Letter of Map Revision (CLOMR) on a proposed project within your community that, if constructed as proposed, could revise the effective Flood Insurance Study report and Flood Insurance Rate Map for your community.

If you have any questions regarding the floodplain management regulations for your community, the National Flood Insurance Program (NFIP) in general, or technical questions regarding this CLOMR, please contact the Director, Mitigation Division of the Federal Emergency Management Agency (FEMA) Regional Office in Oakland, California, at (510) 627-7175, or the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Sincerely,

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

List of Enclosures:
Conditional Letter of Map Revision Comment Document

cc: Mr. Jamal Batta, P.E., CFM
Floodplain Manager
City of San Diego

Mr. Brendan Hastie, P.E.
Associate
Rick Engineering Company

U.S. DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency
Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION COMMENT DOCUMENT

COMMUNITY INFORMATION		PROPOSED PROJECT DESCRIPTION	BASIS OF CONDITIONAL REQUEST
COMMUNITY	**City of San Diego** **San Diego County** **California**	FILL RETENTION WALL	HYDRAULIC ANALYSIS UPDATED TOPOGRAPHIC DATA FLOODWAY
	COMMUNITY NO.: 060295		

IDENTIFIER	Discovery Center at Grant Park	**APPROXIMATE LATITUDE & LONGITUDE:** 32.774, -117.138 **SOURCE:** GOOGLE EARTH **DATUM:** NAD 83

AFFECTED MAP PANELS	
TYPE: FIRM* NO.: 06073C1619G DATE: May 16, 2012	* FIRM - Flood Insurance Rate Map

FLOODING SOURCE AND REACH DESCRIPTION

San Diego River - from approximately 400 feet upstream of I-805 to approximately 2,100 feet downstream of I-805

PROPOSED PROJECT DESCRIPTION

Flooding Source	Proposed Project	Location of Proposed Project
San Diego River	Fill Placement	from approximately 400 feet upstream of I-805 to approximately 2,100 feet downstream of I-805
San Diego River	New Retaining wall	from approximately 900 feet downstream of I-805 to approximately 1,000 feet downstream of I-805

SUMMARY OF IMPACTS TO FLOOD HAZARD DATA

Flooding Source	Effective Flooding	Proposed Flooding	Increases	Decreases
San Diego River	Zone AE	Zone AE	Yes	Yes
	Floodway	Floodway	Yes	Yes
	BFEs*	BFEs*	None	None

* BFEs - Base (1-percent-annual-chance) Flood Elevations

COMMENT

This document provides the Federal Emergency Management Agency's (FEMA's) comment regarding a request for a CLOMR for the project described above. This document is not a final determination; it only provides our comment on the proposed project in relation to the flood hazard information shown on the effective National Flood Insurance Program (NFIP) map. We reviewed the submitted data and the data used to prepare the effective flood hazard information for your community and determined that the proposed project meets the minimum floodplain management criteria of the NFIP. Your community is responsible for approving all floodplain development and for ensuring that all permits required by Federal or State law have been received. State, county, and community officials, based on their knowledge of local conditions and in the interest of safety, may set higher standards for construction in the Special Flood Hazard Area (SFHA), the area subject to inundation by the base flood. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304. Additional Information about the NFIP is available on the FEMA website at http://www.fema.gov/nfip.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

To determine the changes in flood hazards that will be caused by the proposed project, we compared the hydraulic modeling reflecting the proposed project (referred to as the proposed conditions model) to the hydraulic modeling used to prepare the Flood Insurance Study (FIS) (referred to as the effective model). If the effective model does not provide enough detail to evaluate the effects of the proposed project, an existing conditions model must be developed to provide this detail. This existing conditions model is then compared to the effective model and the proposed conditions model to differentiate the increases or decreases in flood hazards caused by more detailed modeling from the increases or decreases in flood hazards that will be caused by the proposed project.

The table below shows the changes in the BFEs:

BFE Comparison Table

Flooding Source: San Diego River		BFE Change (feet)	Location of maximum change
Existing vs. Effective	Maximum increase	0.6	approximately 1,000 feet downstream of I-805
	Maximum decrease	0.1	approximately 2,100 feet downstream of I-805
Proposed vs. Existing	Maximum increase	0.0	N/A
	Maximum decrease	0.0	N/A
Proposed vs. Effective	Maximum increase	1.2	approximately 1,950 feet downstream of I-805
	Maximum decrease	0.5	approximately 2,000 feet downstream of I-805

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

CONDITIONAL LETTER OF MAP REVISION COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

DATA REQUIRED FOR FOLLOW-UP LOMR

Upon completion of the project, your community must submit the data listed below and request that we make a final determination on revising the effective FIRM and FIS report. If the project is built as proposed and the data below are received, a revision to the FIRM and FIS report would be warranted.

- Form 1, entitled "Overview & Concurrence Form". Detailed application and certification forms must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1 must be included.

- Form 2, entitled "Riverine Hydrology & Hydraulics Form".

- Form 3, entitled "Riverine Structures Form".

- As-built plans, certified by a registered professional engineer, of all proposed project elements.

- Hydraulic analyses, for as-built conditions, of the base (1-percent-annual-chance) flood and the 10-percent, 2-percent, and 0.2- percent-annual-chance floods and regulatory floodway, together with a topographic work map showing the revised floodplain boundary delineations. Please ensure that the revised information ties into the currently effective information at the downstream and upstream ends of the revised reach.

- An annotated copy of the FIRM, at the scale of the effective FIRM, that shows the revised floodplain and floodway boundary delineations shown on the submitted work map and how they tie into the floodplain and floodway boundary delineations shown on the current effective FIRM at the downstream and upstream ends of the revised reach.

- A copy of the public notice distributed by your community, stating its intent to revise the regulatory floodway, or a signed statement by your community that it has notified all affected property owners and affected adjacent jurisdictions.

- Documentation of the notification to property owners who will be affected by any widening/shifting of the base floodplain and/or any BFE increases along San Diego River.

- A letter stating that your community will adopt and enforce the modified regulatory floodway, OR, if the State has jurisdiction over either the regulatory floodway or its adoption by your community, a copy of your community's letter to the appropriate State agency notifying it of the modification to the regulatory floodway and a copy of the letter from that agency stating its approval of the modification.

- An officially adopted maintenance and operation plan for the retaining walls. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

CONDITIONAL LETTER OF MAP REVISION COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

- FEMA's fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps may be accessed at https://www.fema.gov/forms-documents-and-software/flood-map-related-fees. The fee at the time of the map revision submittal must be received before we can begin processing the request. Payment of this fee can be made through a check or money order, made payable in U.S. funds to the National Flood Insurance Program, or by credit card (Visa or MasterCard only). Please forward the payment, along with the revision application, to the following address:

LOMC Clearinghouse
847 South Pickett Street
Alexandria, VA 22304

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM and FIS report. Because the flood hazard information (i.e., base flood elevations, base flood depths, SFHAs, zone designations, and/or regulatory floodways) will change as a result of the project, a 90-day appeal period will be initiated for the revision, during which community officials and interested persons may appeal the revised flood hazard information based on scientific or technical data.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency
Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION
COMMENT DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

COMMUNITY REMINDERS

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Jeffrey D. Lusk
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

This comment is based on the flood data presently available. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304. Additional Information about the NFIP is available on the FEMA website at http://www.fema.gov/nfip.

Patrick "Rick" F. Sacbibit, P.E., Branch Chief
Engineering Services Branch
Federal Insurance and Mitigation Administration

GEOCON
INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. G1656-42-01
September 22, 2014
Revised October 7, 2014

San Diego River Park Foundation
4891 Pacific Highway, Suite 114
San Diego, California 92110

Attention: Mr. Rob Hutsel

Subject: RESPONSE TO CITY OF SAN DIEGO REVIEW COMMENTS
SAN DIEGO RIVER DISCOVERY CENTER
SAN DIEGO, CALIFORNIA

References:

1. *Cycle Issue DRAFT Preliminary Review,* prepared by City of San Diego, LDR-Geology, Mr. Jim Quinn, dated July 14, 2014.
2. *Geotechnical Investigation, San Diego River Discovery Center, San Diego, California,* prepared by Geocon Incorporated, dated January 31, 2014 (Project No. G1656-42-01).
3. *Discovery Center At Grant Park, The San Diego River Park Foundation, Discovery Center Building, Site Development Permit Submittal,* prepared by Roesling Nakamura Terada Architects Inc., dated October 8, 2014.
4. *Field Hydraulic Conductivity Testing, San Diego River Discovery Center, San Diego, California*, prepared by Geocon Incorporated, dated March 19, 2014 (Project No. G1656-42-01).

Dear Mr. Hutsel:

In accordance with the request of Mr. Martin "Dusty" Ucker, we have prepared this letter in response to City of San Diego Review Comments (Reference 1) for the subject project. The City comments followed by our response are provided below.

Issue No. 2: *Submit and addendum geotechnical report or update letter that specifically addresses the referenced grading plans and the following:*

Response: This response letter represents our addendum to Reference 2. Based on our review of Reference 3, it is our opinion that the geotechnical recommendations presented in Reference 2 remain applicable to the project.

Issue No. 3: *Show the anticipated limits of recommended remedial grading, soil surcharge, and/or ground improvement on the geologic map (Figure 2), if the limits extend beyond the limits of grading shown on the current grading plans.*

Response: All recommended remedial grading, soil surcharge, and/or ground improvement are within the project limits.

Issue No. 4: *Show the location of previous trenches T-4, T-5, and T-6 (Geocon, 1998) on the geologic map (Figure 2).*

Response: The approximate locations of trenches T-4 and T-5 are shown on the appended Geologic Map, Figure 1. Trench T-6 is not within the current project boundary.

Issue No. 5: *Show the location of the hydraulic conductivity test borings on the geologic map (Figure 2) and provide boring logs.*

Response: The approximate location of the hydraulic conductivity test borings are shown on the appended Geologic Map, Figure 1. The hydraulic conductivity tests borings were hand augered and are less than 4 feet deep. These shallow, hand-augered borings were used exclusively for hydraulic conductivity testing and were consequently not sampled or logged.

Issue No. 6: *Page 7 of the referenced geotechnical report dated January 31, 2014* [Reference 2] *indicates that undrained shear strength was evaluated based on the in-situ cone penetration test soundings (CPT). Provide the CPT soundings and show the location of the CPT soundings on the geologic map (Figure 2).*

Response: The reference to the evaluation of undrained shear strength using CPT-derived data is in error. The undrained shear strength of the underlying soils was estimated using data from the borings (specifically B-2 from the Geocon, 1998 report) and laboratory data as shown in Appendix D of the geotechnical investigation (Reference 2). No CPT test soundings were performed for the project.

Issue No. 7: *Show the anticipated soil removal elevations, soil surcharge, and/or ground improvement on the geologic cross section (Figure 3).*

Response: The revised Geologic Cross Section, Figure 2, is appended.

Issue No. 8: *The project's geotechnical consultant could consider revising cross section A-A' to show the information from previous Trench T-4 (Geocon, 1998).*

Response: The revised Geologic Cross Section, Figure 2, is appended.

Issue No. 9: *The USCS symbol does not appear to fit the description of the alluvium in Boring B-1 at a depth of 30 to 44-feet. The consultant could consider revising the log.*

Response: The revised log of Boring B-1 is appended.

Issue No. 10: *If permanent storm water BMP's are proposed that involve active or passive infiltration or percolation, the project's geotechnical consultant must provide input in accordance with Appendix F of the City's "Guidelines for Geotechnical Report."*

Response: We will provide input, as needed, under separated cover.

Should you have any questions regarding this letter, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Garry W. Cannon
CEG 2201
RCE 56468

PROFESSIONAL GEOLOGIST
GARRY WELLS CANNON
No. 2201
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Rodney C. Mikesell
GE 2533

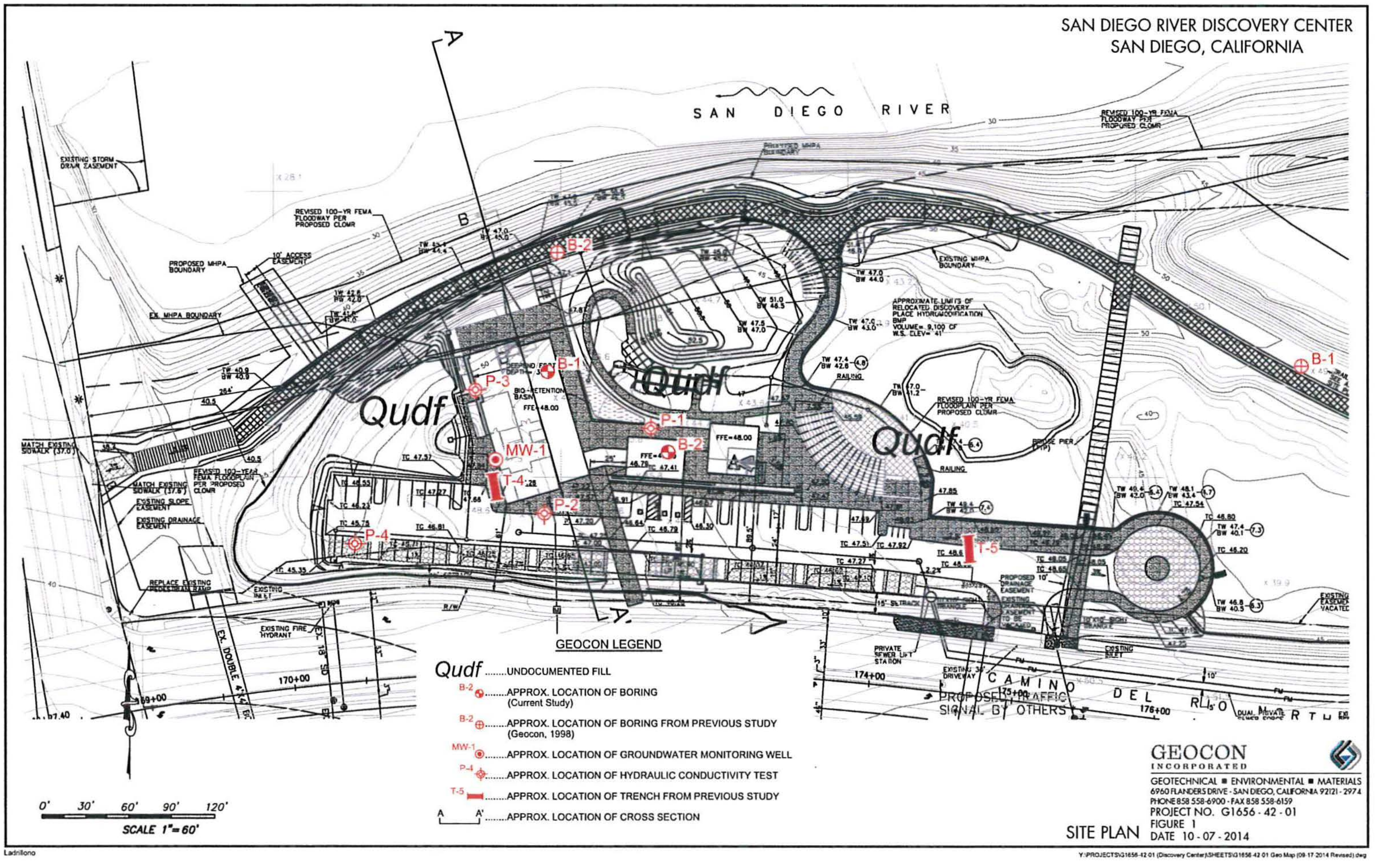
REGISTERED PROFESSIONAL ENGINEER
RODNEY C. MIKESELL
No.2533
GEOTECHNICAL
STATE OF CALIFORNIA

GWC:RCM:dmc

REGISTERED PROFESSIONAL ENGINEER
GARRY WELLS CANNON
No. C 056468
CIVIL
STATE OF CALIFORNIA

(2) Addressee
(e-mail) Roesling Nakamura Tenada Architects, Inc.
Attention: Mr. Rick España

SAN DIEGO RIVER DISCOVERY CENTER
SAN DIEGO, CALIFORNIA



GEOCON LEGEND

Qudf ........UNDOCUMENTED FILL

B-2 ....APPROX. LOCATION OF BORING
(Current Study)

B-2 ⊕........APPROX. LOCATION OF BORING FROM PREVIOUS STUDY
(Geocon, 1998)

MW-1 ◉........APPROX. LOCATION OF GROUNDWATER MONITORING WELL

P-4 ⌖........APPROX. LOCATION OF HYDRAULIC CONDUCTIVITY TEST

T-5 ▬........APPROX. LOCATION OF TRENCH FROM PREVIOUS STUDY

A A'........APPROX. LOCATION OF CROSS SECTION

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INCORPORATED

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6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159

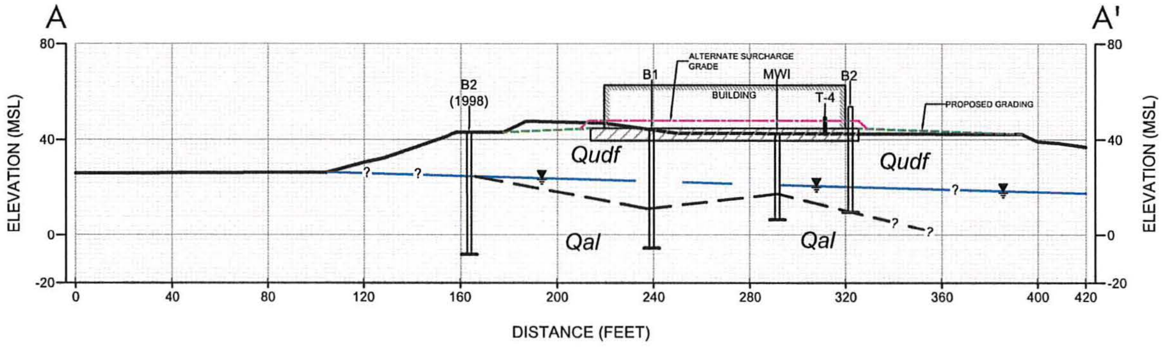
SITE PLAN

PROJECT NO. G1656 - 42 - 01
FIGURE 1
DATE 10 - 07 - 2014

Ladrillono

Y:\PROJECTS\G1656-42-01 (Discovery Center)\SHEETS\G1656-42-01 Geo Map (09-17-2014 Revised).dwg

SAN DIEGO RIVER DISCOVER CENTER
SAN DIEGO, CALIFORNIA



GEOLOGIC CROSS-SECTION A-A'

SCALE: 1" = 40' (Vert. = Horiz.)

GEOCON LEGEND

Qudf ........UNDOCUMENTED FILL
Qal ....ALLUVIUM
▼ ....APPROX. GROUND WATER ELEVATION
▨ ....APPROX. EXTENT OF REMEDIAL GRADING

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6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121 - 2974
PHONE 858 558-6900 - FAX 858 558-6159

CROSS SECTION

PROJECT NO. G1656 - 42 - 01
FIGURE 2
DATE 10 - 07 - 2014

Y:\PROJECTS\G1656-42-01 (Discovery Center)\SOURCE\SECTION\G1656-42-01_X-SEC.dwg

PROJECT NO. G1656-42-01

BORING B 1

ELEV. (MSL.)_______ DATE COMPLETED **10-31-2013**

EQUIPMENT **MARL M-5 (UNIMOG)** BY: **N.G. BORJA**

DEPTH IN FEET	SAMPLE NO.	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B1-1		SM/ML	**UNDOCUMENTED FILL** Loose, dry, light tan brown, Silty, fine SAND to Sandy SILT			
2			ML	Soft, damp, light tan, SILT; fine laminations			
	B1-2				12	88.9	15.5
4							
	B1-3				15	84.8	19.0
6							
8	B1-4				5		
			CL	Soft, wet, mottled light olive and red brown, CLAY			
10	B1-5				10	76.5	34.5
	B1-6						
12							
14			ML	Loose, moist, brown, Sandy SILT; trace clay			
	B1-7				7	77.5	34.0
16							
18							
20	B1-8	▼			4		
22			SM	Loose, saturated, dark gray, fine to medium SAND; little silt			
24							
	B1-9				4	70.3	53.6
26							
28			CL	Soft, saturated, dark gray, Silty CLAY			

Figure A-1,
Log of Boring B 1, Page 1 of 2

G1656-42-01.GPJ

SAMPLE SYMBOLS			
	☐ ... SAMPLING UNSUCCESSFUL	◧ ... STANDARD PENETRATION TEST	■ ... DRIVE SAMPLE (UNDISTURBED)
	▨ ... DISTURBED OR BAG SAMPLE	◩ ... CHUNK SAMPLE	▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. G1656-42-01

BORING B 1

ELEV. (MSL.)________ DATE COMPLETED 10-31-2013

EQUIPMENT MARL M-5 (UNIMOG) BY: N.G. BORJA

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B1-10					4		
				SM	**ALLUVIUM** Loose, saturated, dark gray, fine to coarse SAND; little silt			
32								
34								
	B1-11					6		
36								
38								
40	B1-12					PUSH 18"		
						50/5"		
42					-Hard drilling			
44					REFUSAL AT 44 FEET Groundwater encountered at 21 feet Backfilled with 14.3 ft^3 of bentonite slurry			

Figure A-1,
Log of Boring B 1, Page 2 of 2

G1656-42-01.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL
◧ ... STANDARD PENETRATION TEST
■ ... DRIVE SAMPLE (UNDISTURBED)
☒ ... DISTURBED OR BAG SAMPLE
◣ ... CHUNK SAMPLE
▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942
619.462.1515 tel
619.462.0552 fax
www.helixepi.com

HELIX
Environmental Planning

November 17, 2017 RNT-01

Mr. Kotaro Nakamura
Roesling Nakamura Terada Architects
363 Fifth Avenue, Suite 202
San Diego, CA 92101

Subject: **Update Planning Review for the San Diego River Park Foundation Discovery Center Project—Environmental Processing; Noise Impact Analysis Updated August 5, 2016**

Dear Mr. Nakamura:

This letter documents a review of the following project design updates with reference to the Project Noise Impact Analysis.

Background

HELIX has provided the project noise impact analysis for the **San Diego River Discovery Center at Grant Park,** with the latest version revised and updated on August 5, 2016. Subsequent to that revision, some minor updates and modifications have been made to the project design.

Project Design Changes

Roesling Nakamura Terada Architects (RNT) has provided a new graphic attached to this letter showing the locations of project changes. This letter reflects that HELIX has reviewed the following project design changes identified by RNT, which are described below and shown on the attached project drawing:

1. The Outdoor Classroom was reduced in size and moved approximately 12 feet to the northwest to minimize impacts to existing natural vegetation (required to meet on-site mitigation objectives).

2. The bus drop off east of the main entry driveway was reduced in size and moved to align with the entry driveway. This moves the bus drop off activities to be closer to the main entry / lighted intersection (required to reduce impacts to existing natural vegetation).

3. Grading along the west River Trail was modified to now include low retaining walls (required to reduce grading impacts to the existing natural habitat).

4. A new stormwater bio-filtration basin was added to the project at the west side (required to meet the new City of San Diego stormwater low impact development requirements)

5. The volunteer work area at this location provides a new guard rail to act as a barrier to the bio-filtration basin.

6. Other improvements include civil engineering modifications to site drainage.

No other project drawings or information were reviewed. Specifically excluded from the review provided in this letter are design and/or use changes to the passive park, sound wall, outdoor balconies, outdoor use areas, and concessions or any other changes not documented above, as it is our understanding that no changes have occurred to those features.

Review

Of the design elements changes described above, only item 1 provides the potential for a change which would impact the original noise evaluation. No other element of change has a potential construction or operational noise impact.

Item 1 modifies the outdoor classroom by moving the classroom slightly closer to the northern property edge, with sensitive habitat in the area. However, this area would still have significantly lower impacts than other portions of the project provided it is operated within compliance and as stated in the project-specified design features in the Noise Impact Analysis Updated August 5, 2016. Therefore, this change would not result in a new significant noise impact that would require additional or modified mitigation.

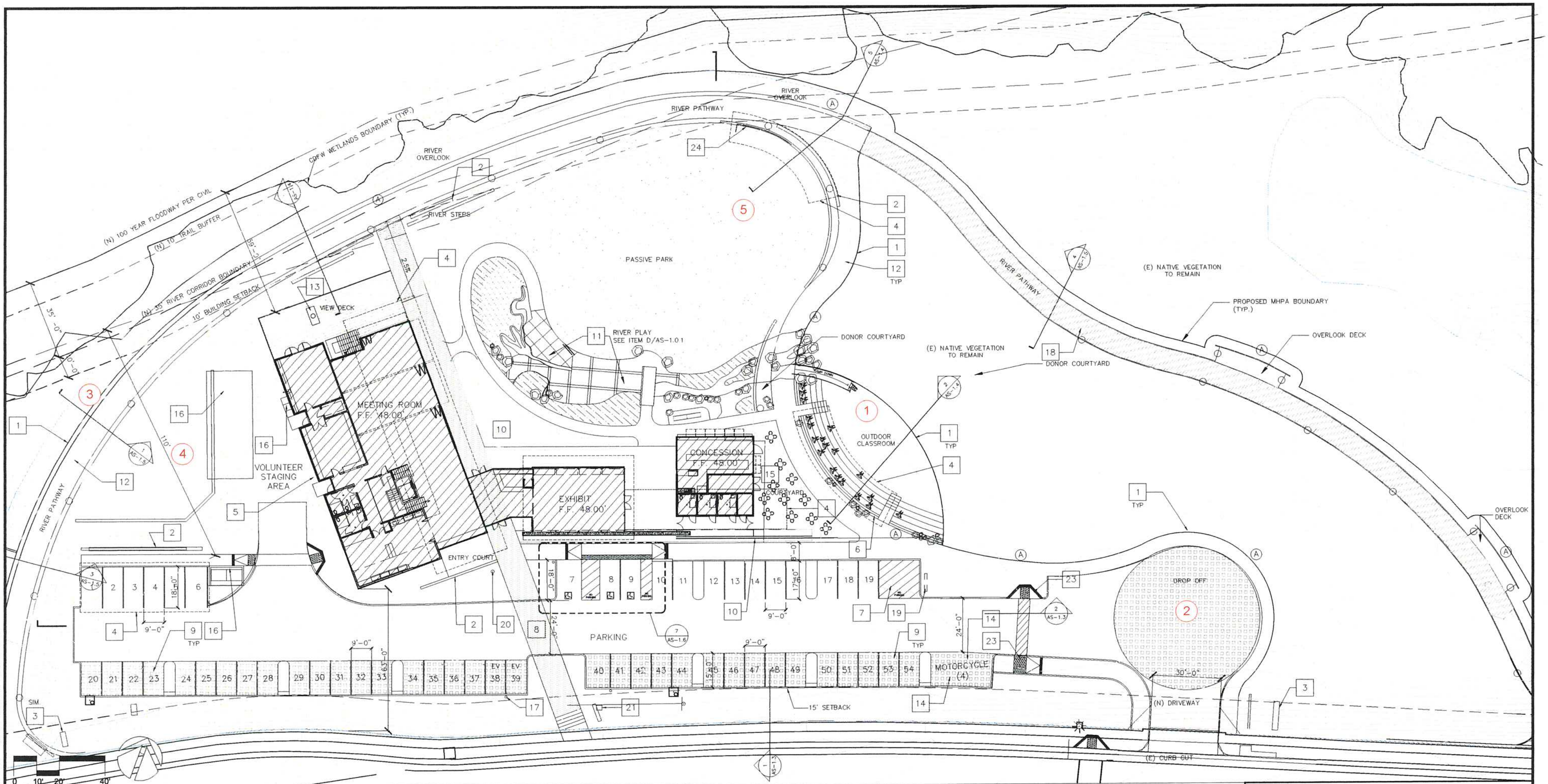
Conclusion

The project modification and design updates described above were reviewed and determined to have no significant impacts or provide any changes to the previously provided Noise Impact Analysis.

Sincerely,

Charles Terry
Consultant in Acoustics and Vibration

Attachment A, Discovery Center SDP Drawings 11_10_17



IF THIS SHEET IS LESS THAN 24"x36", IT IS A REDUCED PRINT - SCALE REDUCED ACCORDINGLY.

GENERAL NOTES

1. SEE SHEETS AS-1.4 THROUGH AS-1.6 FOR SITE DETAILS
2. SEE CIVIL DRAWINGS FOR GRADING AND PAVING ELEVATIONS
3. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EMERGENCY VEHICLE ACCESS DURING CONSTRUCTION.
4. CONTRACTOR SHALL PROTECT EXISTING NATIVE TREES AND VEGETATION FROM DAMAGE DURING CONSTRUCTION.
5. BUS STOPS: NEAREST BUS STOP IS ACCROSS THE STREET AT THE SE CORNER ON CAMINO DEL RIO NORTH NEAR QUALCOMM WAY
6. ALL ITEMS IN THE PROJECT SITE AREA ARE NEW U.O.N.
7. ALL PAVING AND FINISH GRADES SHALL SLOPE AWAY FROM BUILDINGS

SHEET KEY NOTES

1	RETAINING WALL PER CIVIL
2	CIP 15" HIGH SITE WALLS
3	ENTRY ADDRESS SIGN. SEE 4/AS-1.4
4	OVERHEAD SHADE STRUCTURE
5	(E) WELL APPROX. LOCATION
6	DONOR RECOGNITION ART WALL
7	LOADING ZONE W/CURB CUT
8	RIVER BOARDWALK ENHANCED PAVING
9	PERMEABLE SURFACE PER CIVIL
10	EXTERIOR ART LOCATION
11	CHILDRENS PLAY AREA
12	PEDESTRIAN PAVING PER CIVIL
13	CONC. EXTERIOR FIREPLACE
14	MOTORCYCLE PARKING
15	PERMEABLE PAVER COURTYARD/PICNIC AREA
16	TRASH/RECYCLING ENCLOSURE
17	ELECTRIC VEHICLE CHARGING STATION
18	BOARDWALK W/COMPOSITE DECKING
19	BICYCLE RACK (8 BIKES)
20	FLAG POLE
21	MONUMENT SIGN SEE 3/AS-1.4
22	STACKED STONE SITE WALL
23	CURB RAMP. SEE 4/AS-1.6
24	6' HIGH X 20' LONG SEGMENTED GLASS SOUND WALL WITH ACOUSTICAL OVERHEAD COVER AT SPEAKER AREA. COVER TO HAVE A TEMPORARY ACOUSTICAL FLAP BETWEEN CANOPY CEILING AND SOUND WALL

PARKING

PARKING REQUIRED:
DISCOVERY CENTER = 9,950 SF
OUTDOOR CLASSROOM = 4,000 SF

PER TABLE 142-05G:
INTERPRETIVE CENTER
WITHIN A TRANSIT AREA
2.8 PER 1,000 SF = 40 SPACES

PARKING PROVIDED:

STANDARD SPACES:	49
ADA ACCESSIBLE SPACES	2
ADA VAN ACCESSIBLE SPACE	1
ELECTRIC VEHICLE SPACE	2
MOTORCYCLE	4
TOTAL PARKING PROVIDING	58

ROESLING NAKAMURA TERADA ARCHITECTS INC.
363 Fifth Avenue
San Diego, California
P619.233.1023
F619.233.0018
www.rnterchitects.com

LICENSED ARCHITECT
KOTARO NAKAMURA
NO. C 17921
REN. 5-31-19
STATE OF CALIFORNIA

DISCOVERY CENTER AT GRANT PARK

THE SAN DIEGO RIVER PARK FOUNDATION

ENLARGED SITE PLAN

DISCOVERY CENTER

SUBMITTAL
SITE DEVELOPMENT PERMIT SUBMITTAL

DATE
NOVEMBER 20, 2017

DESCRIPTION	DATE	BY
SDP RESUBMITTAL 5	08/17/16	RE
SDP RESUBMITTAL 6	11/20/17	RE

CONTRACTOR ______ DATE STARTED ______
INSPECTOR ______ DATE COMPLETED ______

SHEET
AS-1.1

SHEET 14 OF 23 SHEETS

San Diego River Discovery Center at Grant Park Project

Noise Impact Analysis

November 10, 2016

Prepared for:
The San Diego River Park Foundation
4891 Pacific Highway, Suite 114
San Diego, CA 92110

Prepared by:
HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

Noise Impact Analysis

San Diego River Discovery Center at Grant Park

2450 Camino Del Rio North
Northeast Corner of Qualcomm Way and Camino Del Rio North
City of San Diego

Prepared for:
The San Diego River Park Foundation
4891 Pacific Highway, Suite 114
San Diego, CA 92110

Prepared by:
HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
San Diego, CA 91942

Updated November 10, 2016

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EXECUTIVE SUMMARY

The proposed Project consists of an interpretive center and associated facilities to serve the community. Anticipated project uses include docent-guided (with portable personal battery powered speakers) group walks along the River Pathway with instructive information about biology and river park features and use of the view deck area for educational presentations by the docents, and/or small gatherings of guests/staff, small personal music systems or acoustic live music (non-amplified) or educational presentations including viewing (TV or computer screen). The Project concession would have a small public address (PA) system using a small pair of speakers mounted near the outer edges of the concession stand under the eaves for weather protection, aimed downwards into the local area of the concessions.

In addition to the activities described above, it is anticipated that there would be up to 12 special events. These events would include weddings, fundraisers, and volunteer and donor appreciation and recognition events. To support these events the passive park would be developed with a musician's performance area and acoustic sound control shell, built around and over the musician's performance area (full description and limitations in Section 4.3.2, *Outdoor Musician's Performance Area*). The passive park may also be used for art shows (which may include music) and up to four community movie presentations, scheduled outside of the breeding season.

The proposed attendance at special events is estimated between 120 and a maximum of 385 guests using the full project area at any time or event. Specific site loading considerations assume a typical outdoor maximum use occupancy of 15 square feet (sf) per person (see Figure 3 for details) for the passive park and view deck, and 7 sf per person in the outdoor classroom seating area, based on typical indoor occupancy standards. This provides the following maximum area use constraints:

- View Deck: 80 occupants maximum
- Passive Park: 385 occupants maximum
- Outdoor Classroom: up to 150 occupants maximum

During a special event, there would be no docent led tours scheduled nor would the view deck be used for educational presentations; however, guests (maximum of 385 people) would be assumed to use both areas for an event.

Special events would be controlled and supervised by facility staff including date, time and duration of the event. Specific noise control measures requested during the nesting season would include, but are not limited to, noise monitoring and the implementation of strict rules limiting the type of music or volume of music sources on the premises. Sound generating events would be controlled in compliance with the parameters described in Section 5.2.

In order to ensure that the noise study modeling and assumptions are accurate, the mitigation requires: (1) a pre-event sound test and certification to document that potential noise from events would be kept at acceptable levels; (2) monitoring during a full or nearly full event prior to the breeding season to document that the noise attenuation features of the project are successfully reduced noise to acceptable levels; and (3) monitoring of a minimum of four events during the breeding season to document that noise attenuation features continue to be successful during a variety of event types and sizes. If a failure occurs, additional testing would be required to determine a method to control noise levels to less than 60.5 A-weighted, time-averaged decibels (dBA L_{EQ}), which was identified as the ambient noise level at the edge of the habitat. Between March 15 and September 15, no construction activities shall result in noise levels exceeding 60.5 dBA L_{EQ} at the edge of occupied least Bell's vireo (LBV) habitat. If construction must occur during the breeding season, it is anticipated that a survey would be conducted by a qualified biologist to determine occupied LBV areas, and if necessary, measures (such as temporary noise barriers or reductions in equipment operation) that are verified by a qualified noise specialist and a qualified biologist would be required to ensure that noise does not significantly impact breeding activities.

The text that follows describes one potential method to achieve compliance if construction occurs during the breeding season and adjacent habitat is determined to be occupied. This method would eliminate the need for future bird surveys and noise analysis to identify required temporary attenuation requirements. If Project-related construction is conducted outside of the vireo breeding season, no associated significant noise impacts would occur within the adjacent Multi-habitat Planning Area (MHPA) habitat (or to related sensitive species), and no mitigation would be required.

To attenuate rough grading (horizontal construction) equipment noise levels during the LBV breeding season (if proposed), a temporary 10-foot-tall barrier erected along the top of the slope at the edge of the river corridor would reduce rough grading noise impacts to less than 60.5 dBA L_{EQ}. A 6-foot barrier in the same location would reduce building and grounds (vertical) construction noise to less than ambient.

With the inclusion of the identified project features and mitigation measures, noise impacts would be reduced to less than significant levels.

1.0 INTRODUCTION

This report addresses potential noise impacts associated with construction and operation of the proposed San Diego River Discovery Center at Grant Park (Project or proposed Project). The primary issue of concern relates to the Project's close proximity to the Multi-Habitat Planning Area (MHPA) of the San Diego River Corridor, an area of riparian habitat occupied by the federally listed as endangered least Bell's vireo (*Vireo bellii pusillus*; LBV).

1.1 PROJECT LOCATION

The Project site is located at 2450 Camino Del Rio North, at the northeast corner of Qualcomm Way and Camino Del Rio North in the City of San Diego (Figures 1 and 2, *Regional Location Map* and *Project Vicinity Map [Aerial Photograph]*, respectively). See Appendix A for a City of San Diego zoning map.

1.2 PROJECT DESCRIPTION

The Discovery Center (proposed Project) consists of an interpretive center and associated facilities to serve the community.

The Discovery Center project may be built in two or more phases. The proposed interpretive center would be housed in a two-story 9,950-square foot (sf) meeting/interpretive/event center. It would provide educational, meeting space, and community uses, including educational literature and videos, lecture/meeting rooms, and an interpretive exhibit area. The building would include a one-story, 1,200 sf concession area with restrooms. The maximum building height would be 35 feet.

Proposed outdoor portions of the facility would include the 5,780 sf passive park (and musician's performance area with noise control shell [see following information]), a 1,481-sf covered view deck with an outdoor fireplace, a 1,470-sf outdoor classroom area, volunteer staging areas, picnic areas, an interpretive water feature, and an extension of the San Diego River Pathway through the site. Grading of the project site would require approximately 5,700 cubic yards (cy) of cut and approximately 8,700 cy of fill.

Anticipated project uses include docent-guided (with portable personal battery powered speakers) group walks along the River Pathway with instructive information about biology and river park features and use of the view deck area for educational presentations by the docents, and/or small gatherings of guests/staff, small personal music systems or acoustic live music (non-amplified) or educational presentations including viewing (TV or computer screen). The Project concession would have a small public address (PA) system using a small pair of speakers mounted near the outer edges of the concessions under the eaves for weather protection, aimed downwards into the local area of the concessions.

Up to 12 events, hereafter "special events," are anticipated per year. These special events would include weddings, fundraisers, and volunteer and donor appreciation and recognition events. To support these special events, the passive park will be developed with a musician's performance area and acoustic sound control shell, built around and over the musician's performance area (full description and limitations in Section 4.3.2, *Outdoor Musician's Performance Area*). The passive park may also be used for art shows (which may include music) and up to four community movie presentations per year, scheduled outside of the breeding season.

The proposed attendance at special events is estimated between 120 and a maximum of 385 guests using the full project area at any time or event. Specific site loading considerations assume a typical outdoor maximum use occupancy of 15 sf per person (see Figure 3, *Site Plan*, for details) for the passive park and view deck, and 7 sf per person in the outdoor classroom seating area, based on typical indoor occupancy standards. This provides the following maximum area use constraints:

- View Deck: 80 occupants maximum
- Passive Park: 385 occupants maximum
- Outdoor Classroom: up to 150 occupants maximum

During a special event there would be no docent led tours scheduled nor would the view deck be used for educational presentations; however, guests (maximum of 385 people) would be assumed to use both areas for an event.

Special events would be controlled and supervised by facility staff including date, time and duration of the event. Specific noise control measures required during the nesting season include, but are not limited to, noise monitoring and the implementation of strict rules limiting the type of music or volume of music sources on the premises. Sound generating events would be controlled in compliance with the parameters described in Section 5.2.

The San Diego River Pathway would be located on the south side of the river and would have three distinct segments.

Refer to the site plan shown as Figure 3 and Figure 4, *Cross Sections*, for additional details.

1.3 ANALYZED RECEPTORS

The noise analysis focuses on potential operational noise impacts resulting from the project onto the San Diego River corridor that is within the City's MHPA, located in the northern portion of the Project site.

The proposed Project would not result in a substantial contribution to noise levels at residential receptor locations at the multi-family residential uses to the west across Qualcomm Way (the closest residences), due to distance and an intervening major roadway. Therefore, potential impacts to residential uses are not analyzed in this report.

1.4 NOISE METRICS

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing receptor, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

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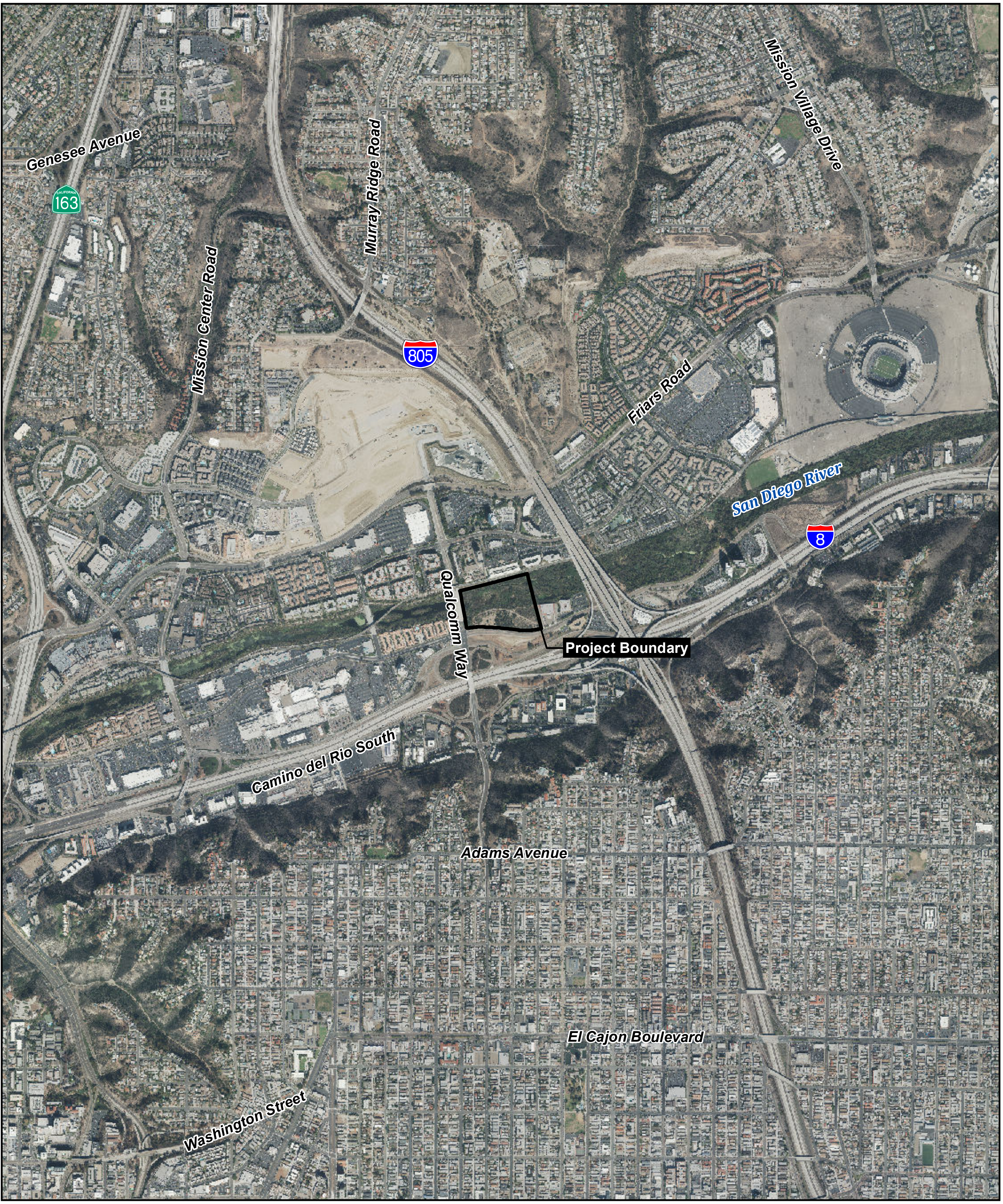
Regional Location Map

SAN DIEGO RIVER DISCOVERY CENTER AT GRANT PARK

HELIX
Environmental Planning

Figure 1



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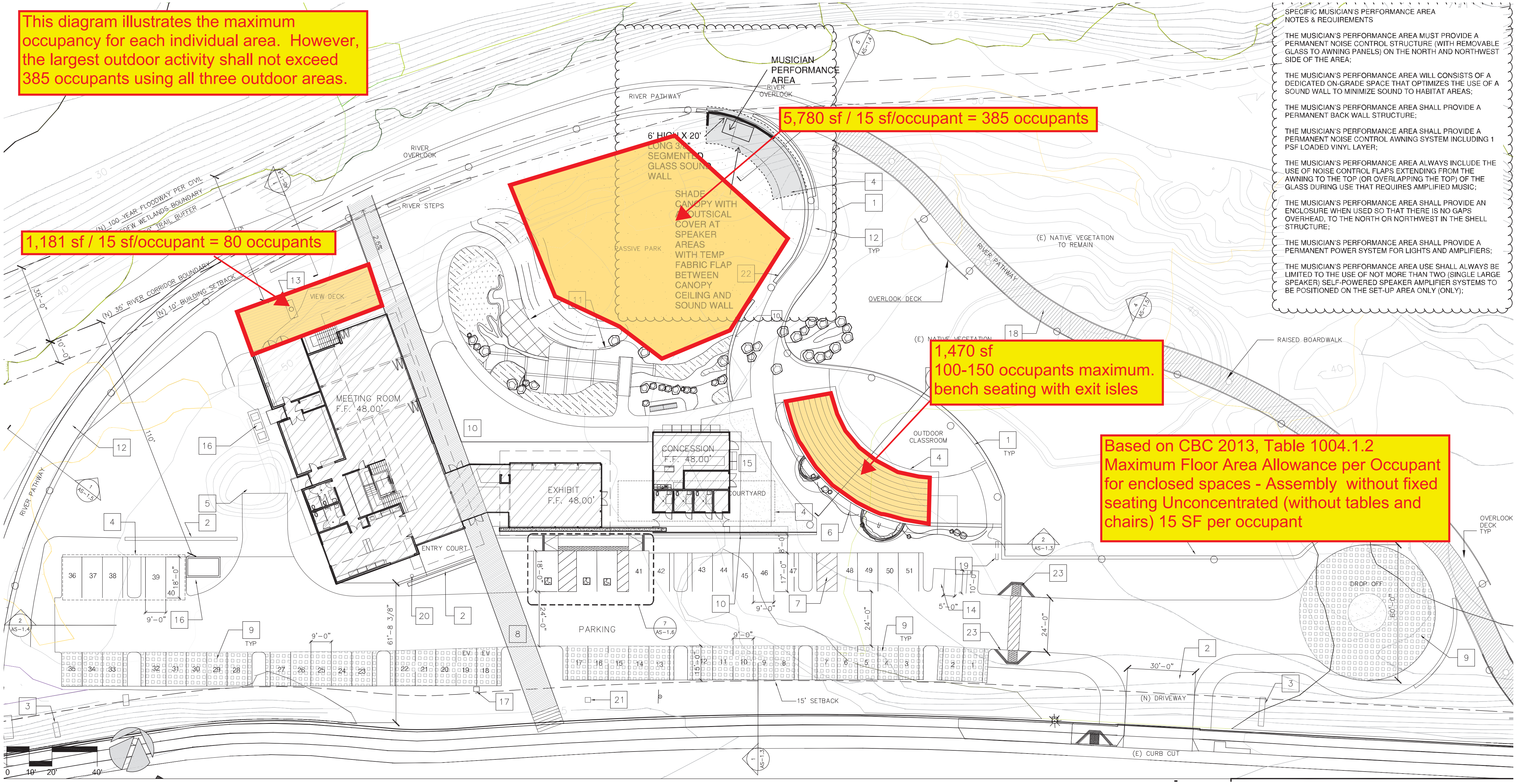
Project Vicinity Map (Aerial Photograph)

SAN DIEGO RIVER DISCOVERY CENTER AT GRANT PARK

HELIX Environmental Planning

N 0 2,000 Feet

Figure 2



This diagram illustrates the maximum occupancy for each individual area. However, the largest outdoor activity shall not exceed 385 occupants using all three outdoor areas.

5,780 sf / 15 sf/occupant = 385 occupants

1,181 sf / 15 sf/occupant = 80 occupants

1,470 sf
100-150 occupants maximum.
bench seating with exit isles

Based on CBC 2013, Table 1004.1.2 Maximum Floor Area Allowance per Occupant for enclosed spaces - Assembly without fixed seating Unconcentrated (without tables and chairs) 15 SF per occupant

SPECIFIC MUSICIAN'S PERFORMANCE AREA NOTES & REQUIREMENTS

THE MUSICIAN'S PERFORMANCE AREA MUST PROVIDE A PERMANENT NOISE CONTROL STRUCTURE (WITH REMOVABLE GLASS TO AWNING PANELS) ON THE NORTH AND NORTHWEST SIDE OF THE AREA;

THE MUSICIAN'S PERFORMANCE AREA WILL CONSISTS OF A DEDICATED ON-GRADE SPACE THAT OPTIMIZES THE USE OF A SOUND WALL TO MINIMIZE SOUND TO HABITAT AREAS;

THE MUSICIAN'S PERFORMANCE AREA SHALL PROVIDE A PERMANENT BACK WALL STRUCTURE;

THE MUSICIAN'S PERFORMANCE AREA SHALL PROVIDE A PERMANENT NOISE CONTROL AWNING SYSTEM INCLUDING 1 PSF LOADED VINYL LAYER;

THE MUSICIAN'S PERFORMANCE AREA ALWAYS INCLUDE THE USE OF NOISE CONTROL FLAPS EXTENDING FROM THE AWNING TO THE TOP (OR OVERLAPPING THE TOP) OF THE GLASS DURING USE THAT REQUIRES AMPLIFIED MUSIC;

THE MUSICIAN'S PERFORMANCE AREA SHALL PROVIDE AN ENCLOSURE WHEN USED SO THAT THERE IS NO GAPS OVERHEAD, TO THE NORTH OR NORTHWEST IN THE SHELL STRUCTURE;

THE MUSICIAN'S PERFORMANCE AREA SHALL PROVIDE A PERMANENT POWER SYSTEM FOR LIGHTS AND AMPLIFIERS;

THE MUSICIAN'S PERFORMANCE AREA USE SHALL ALWAYS BE LIMITED TO THE USE OF NOT MORE THAN TWO (SINGLE LARGE SPEAKER) SELF-POWERED SPEAKER AMPLIFIER SYSTEMS TO BE POSITIONED ON THE SET-UP AREA ONLY (ONLY);

GENERAL NOTES

1. SEE SHEET AS–1.4 FOR SITE DETAILS
2. SEE CIVIL DRAWINGS FOR GRADING AND PAVING ELEVATIONS
3. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EMERGENCY VEHICLE ACCESS DURING CONSTRUCTION.
4. CONTRACTOR SHALL PROTECT EXISTING NATIVE TREES AND VEGETATION FROM DAMAGE DURING CONSTRUCTION.
5. BUS STOPS: NEAREST BUS STOP IS ACCROSS THE STREET AT THE SE CORNER ON CAMINO DEL RIO NORTH NEAR QUALCOMM WAY
6. ALL ITEMS IN THE PROJECT SITE AREA ARE NEW U.O.N.
7. ALL PAVING AND FINISH GRADES SHALL SLOPE AWAY FROM BUILDINGS

SHEET KEY NOTES

1	RETAINING WALL PER CIVIL
2	SITE WALLS
3	ENTRY ADDRESS SIGN, SEE 4/AS–1.4
4	OVERHEAD SHADE STRUCTURE
5	(E) WELL LOCATION
6	DONOR RECOGNITION ART WALL
7	LOADING ZONE W/CURB CUT
8	RIVER BOARDWALK ENHANCED PAVING
9	PERMEABLE SURFACE PER CIVIL
10	EXTERIOR ART LOCATION
11	CHILDRENS PLAY AREA
12	PEDESTRIAN PAVING PER CIVIL
13	CONC. EXTERIOR FIREPLACE
14	MOTORCYCLE PARKING
15	PERMEABLE PAVER COURTYARD/PICNIC AREA
16	TRASH/RECYCLING ENCLOSURE
17	ELECTRIC VEHICLE CHARGING STATION
18	BOARDWALK W/COMPOSITE DECKING
19	BICYCLE RACK (8 BIKES)
20	FLAG POLE
21	MONUMENT SIGN SEE 3/AS–1.4
22	STACKED STONE SITE WALL
23	CURB RAMP. SEE 4/AS–1.6

PARKING

PARKING REQUIRED:
DISCOVERY CENTER = 9,950 SF
OUTDOOR CLASSROOM = 4,000 SF

PER TABLE 142–05G:
INTERPRETIVE CENTER
WITHIN A TRANSIT AREA
2.8 PER 1,000 SF = 40 SPACES

PARKING PROVIDED:

STANDARD SPACES:	49
ADA ACCESSIBLE SPACES	2
ADA VAN ACCESSIBLE SPACE	1
ELECTRIC VEHICLE SPACE	2
MOTORCYCLE	4
TOTAL PARKING PROVIDING	58

Source: Roesling Nakamura Terada, 2016

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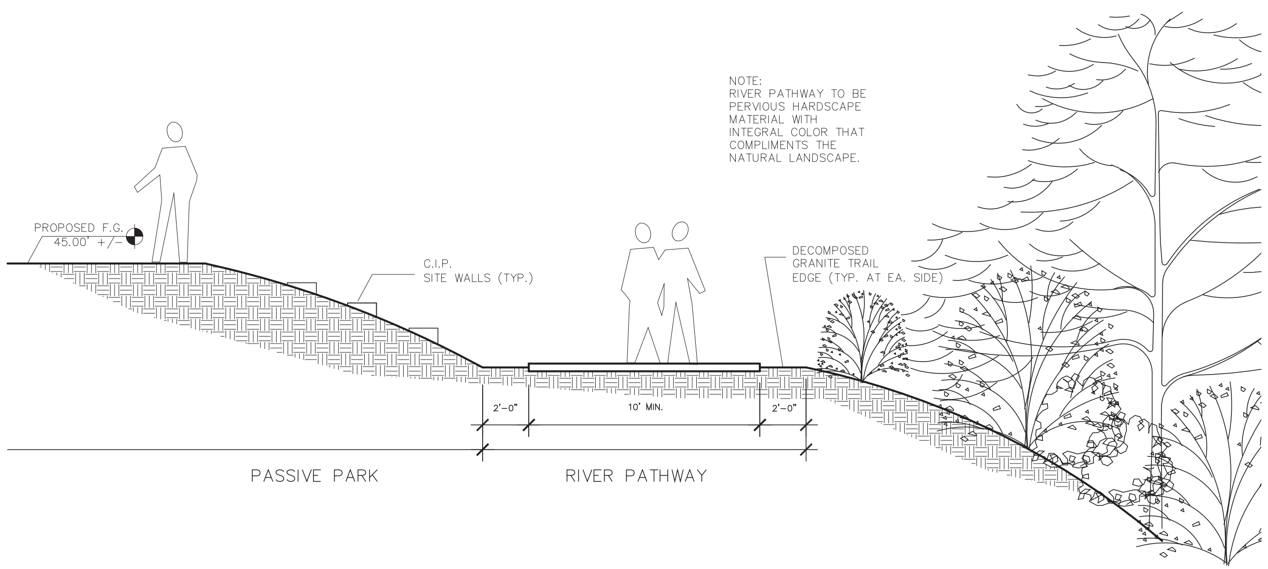
Site Plan

SAN DIEGO DISCOVERY CENTER AT GRANT PARK

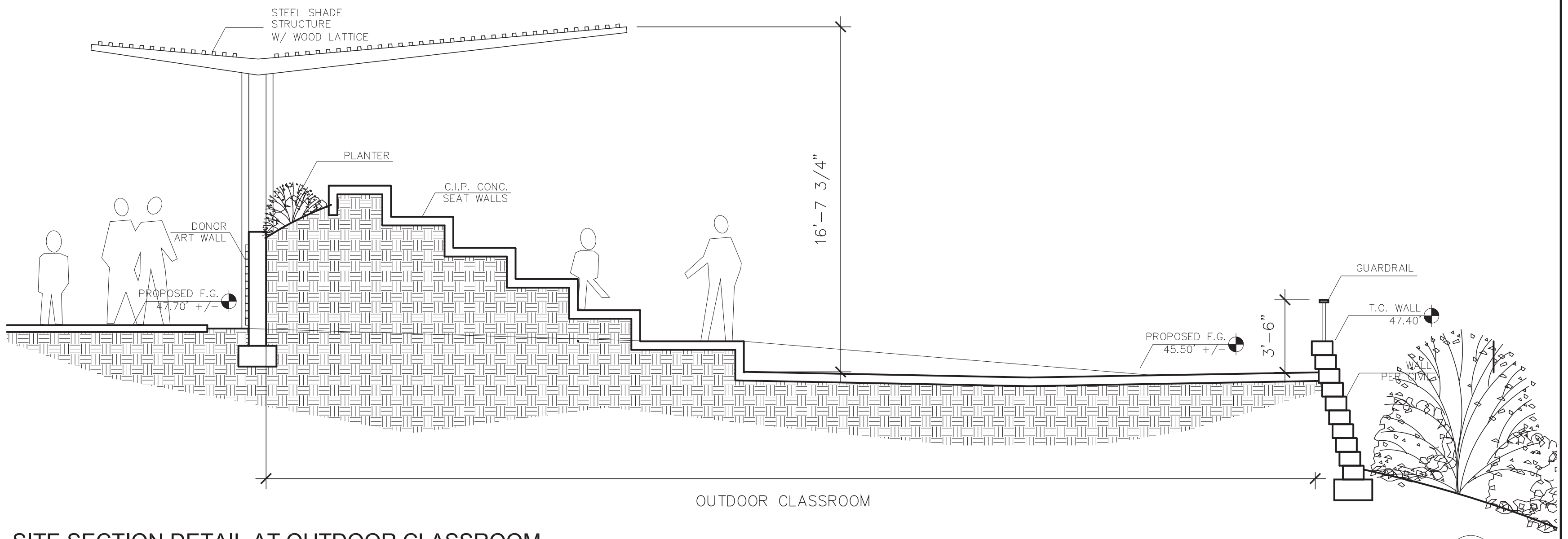
Figure 3

HELIX
Environmental Planning



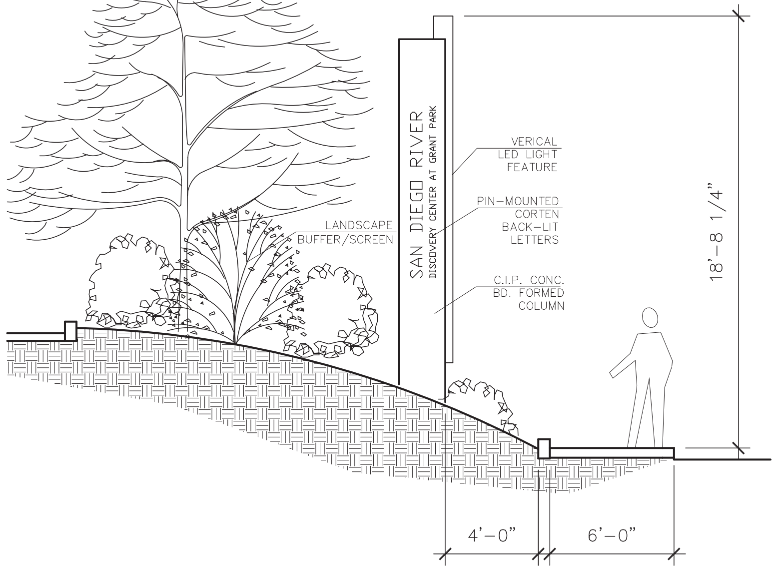
SITE SECTION DETAIL AT RIVER TRAIL ①

SCALE: 1/4" = 1'-0"



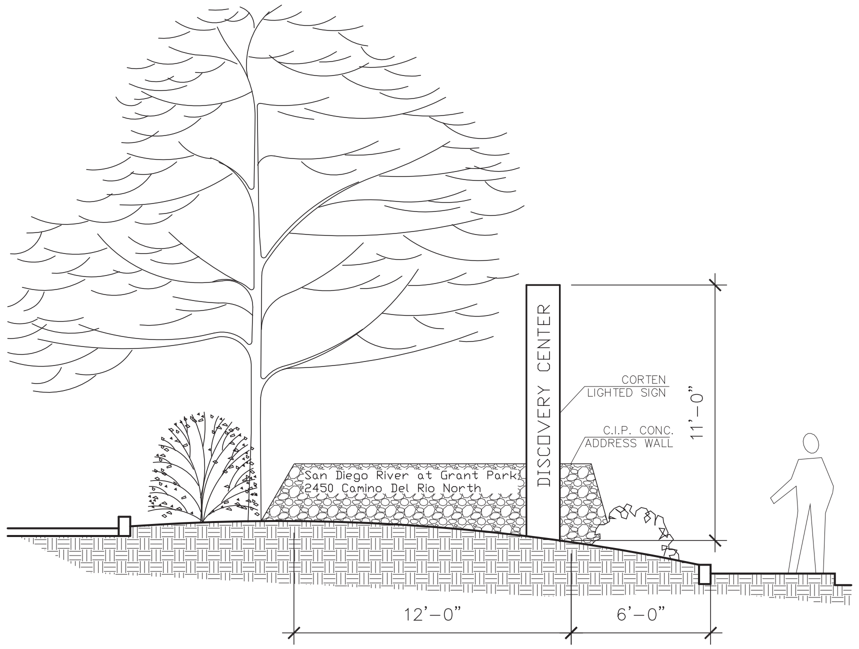
SITE SECTION DETAIL AT OUTDOOR CLASSROOM ②

SCALE: 1/4" = 1'-0"



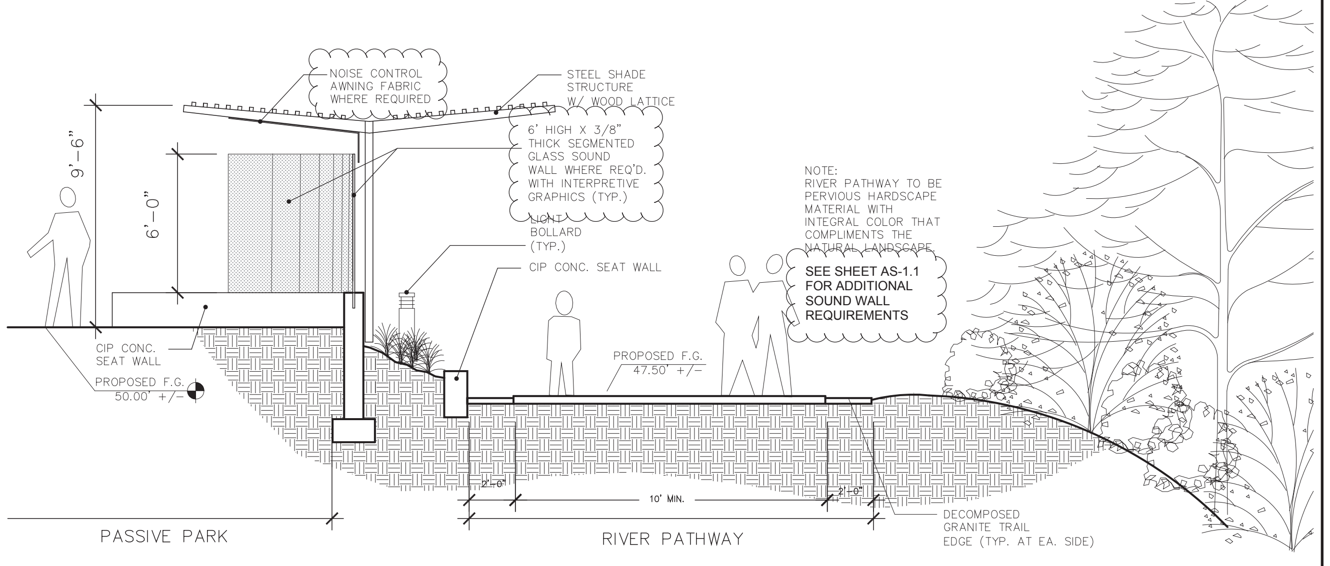
SITE SECTION DETAIL AT SIDEWALK & MONUMENT SIGN ③

SCALE: 1/4" = 1'-0"



SITE SECTION DETAIL AT SIDEWALK & MONUMENT SIGN ④

SCALE: 1/4" = 1'-0"



SITE SECTION DETAIL AT RIVER TRAIL ⑤

SCALE: 1/4" = 1'-0"

Source: Roesling Nakamura Terada, 2016

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Cross Sections

SAN DIEGO DISCOVERY CENTER AT GRANT PARK

Figure 4

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determine the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

1.4.1 Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

1.4.2 Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this huge range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 mPa.

All noise-level or sound-level values presented herein are expressed in terms of decibels with A-weighting, abbreviated “dBA,” to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed as “L_{EQ}.” L_{EQ} represents an average of the sound energy occurring over a specified period. In effect, L_{EQ} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. Unless a different period is specified, “L_{EQ}” implies one hour. Some of the data also may be presented as octave-band-filtered and/or A-octave-band-filtered data, which are a series of sound spectra centered on each stated frequency, with half of the bandwidth above and half of the bandwidth below each stated frequency. These data are typically used for machinery noise analysis and barrier-effectiveness calculations.

Noise emission data are often provided based on the industry standard format of sound power (noted by S_{WL}), which is the total acoustic power radiated from a given sound source as related to a reference power level. Sound power differs from sound pressure (if notation is needed, the abbreviation is SPL), which measures the fluctuations in air pressure caused by the presence of sound waves and is generally the format that describes noise levels as heard by the receiver. Sound pressure is the actual noise experienced by a human or registered by a sound level instrument. When sound pressure is used to describe a noise source, it must specify the distance from the noise source to provide complete information. Sound power is a specialized analytical method to provide information without the distance requirement, but it may be used to calculate the sound pressure at any desired distance.

1.4.3 Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3 dBA increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than one source at the same distance. For example, if one automobile produces an SPL of 70 dBA when it passes an observer, two cars passing simultaneously would not produce 140 dBA; rather, they would combine to produce 73 dBA. In addition, under the decibel scale, three sources of equal loudness together would produce a sound level 5 dBA louder than one source.

Table 1, *Typical A-weighted Noise Levels*, describes typical A-weighted noise levels for various noise sources.

Table 1
TYPICAL A-WEIGHTED NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 miles per hour		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, at 100 feet	**— 70 —**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher next room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing

Source: Caltrans (1998)

1.5 CITY OF SAN DIEGO REGULATIONS

The City of San Diego's Multiple Species Conservation Program (MSCP) and MHPA requirements, as well as associated guidelines produced by the U.S. Fish and Wildlife Service

(USFWS), require that noise be limited to a level not to exceed an hourly limit of 60 dBA L_{EQ} or the average ambient noise level, whichever is greater, at the edge of habitat during the LBV breeding/nesting season (March 15 to September 15).

2.0 ENVIRONMENTAL SETTING

The site is on the southern edge of the San Diego River Corridor, a designated MHPA habitat area that is inhabited by LBV and other migratory birds.

2.1 SITE LAND USE

The Discovery Center project is located in the City of San Diego in the Mission Valley Community Planning Area. The project site is generally bounded by Interstates (I-) 8 and 805, Qualcomm Way, and the San Diego Trolley. It is currently undeveloped, but was heavily disturbed by sand mining prior to 1964. As a result of those past activities, approximately the southern 40 percent of the site is isolated from the river floodplain by artificial berms and undocumented fill in this portion of the site ranges from approximately 15 to 30 feet below existing grade.

2.2 ADJACENT LAND USES

Lands surrounding the Discovery Center project site are currently associated with commercial, residential, government, and transportation uses, except for undeveloped land in reaches of the San Diego River upstream and downstream of the site. A U.S. Post Office is located immediately east of the site, a new hotel is across Camino Del Rio North to the south, multi-family residential development exists across Qualcomm Way to the west, and hotel and office uses occur across the trolley tracks to the north.

The multi-family residential structure is the closest residential use to the proposed new facilities. The residential use is over 200 feet from the proposed Project site across Qualcomm Way. Given the distance and the high level of traffic noise from Qualcomm Way, noise impacts from the site to this residential structure are not considered in this report.

2.3 EXISTING NOISE LEVELS

An on-site inspection was conducted at 9:40 a.m. on Tuesday, December 1, 2015, with two 15-minute ambient noise measurements conducted at the following locations: (1) adjacent to Camino Del Rio North (M1 on Figure 5, *Noise Contour Map with Receiver Locations*); and (2) at the northern edge of proposed development, adjacent to the top of slope at the edge of the drop-off into the river channel area (the edge of the MHPA, refer to M2 on Figure 5). The measured noise levels were 63.0 dBA L_{EQ} at M1 (with some construction noise from projects across the roadway), and 58.8 dBA L_{EQ} at M2. Observed atmospheric conditions during the noted measurements included no measurable breeze, low humidity levels, and a temperature in the upper-60s (degrees Fahrenheit). The primary source of ambient noise was from a trolley passing by to the north, as well as traffic on local roadways including I-805 and associated off-ramps to the east, Camino Del Rio and I-8 to the south, and Qualcomm Way to the west.

Calculated noise levels for daytime hourly average ambient transportation noise are shown in Table 2, *Calculated Ambient Transportation Noise,* with the associated data derived from traffic distribution modeling (see Appendix B for a procedural description).

Table 2
CALCULATED AMBIENT TRANSPORTATION NOISE

Time	dBA L_{EQ}	Time	dBA L_{EQ}
7:00 a.m.	60.0	2:00 p.m.	59.5
8:00 a.m.	59.5	3:00 p.m.	60.0
9:00 a.m.	58.7	4:00 p.m.	60.2
10:00 a.m.	58.6	5:00 p.m.	60.5
11:00 a.m.	58.8	6:00 p.m.	59.3
12:00 p.m.	59.3	7:00 p.m.	57.7
1:00 p.m.	59.4		

The peak hour (ambient) noise is 60.5 dBA L_{EQ} at 5:00 p.m., with this level used as a basis for assessing construction and operational noise impacts to the adjacent habitat areas (LBV).

2.4 FUTURE NOISE ENVIRONMENT SOURCES

The surrounding area is nearly completely developed, other than the MHPA habitat area as previously described (refer to Figure 2). The new indoor skydiving facility and new hotel across Camino Del Rio North if compliant with normal property line noise levels and typical access traffic will create only a very minimal increase in ambient noise in the area. Therefore, no substantial changes to the area's noise levels from traffic and stationary sources (excluding this site) are expected in the foreseeable future.

The expected construction and operational noise impacts from the proposed Project are discussed in the Project Noise section below.

3.0 STUDY METHODS, EQUIPMENT, AND PROCEDURES

3.1 EQUIPMENT AND PROCEDURES

On-site noise levels were recorded using a sound level meter conforming to the American National Standards Institute (ANSI) specifications for sound level meters, ANSI SI.4-1983 (R2001). The meter was field-calibrated immediately prior to the noise measurement to ensure accuracy, with all instruments maintained with National Bureau of Standards traceable calibration, per the manufacturers' standards.

3.2 NOISE MODELING SOFTWARE

Modeling of the non-traffic outdoor noise environment was accomplished using Computer-Aided Noise Abatement (CADNA) Version 3.5. This model predicts noise impacts in a wide variety of conditions. CADNA assists in the calculation, presentation, assessment, and mitigation of noise

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Noise Contour Map with Receiver Locations

SAN DIEGO RIVER DISCOVERY CENTER AT GRANT PARK

HELIX
Environmental Planning

Figure 5

exposure and allows for consideration of effects from a number of variables including noise source(s), intervening structures, and topography, in estimating sound levels at a particular location.

3.3 SUMMARY OF SITE-SPECIFIC FEATURES USED IN CADNA NOISE MODEL

Existing and proposed features at the Project site that were included in the CADNA noise prediction model are listed in Table 3, *Summary of Site Features Included in the CADNA Exterior Model.* These are considered to be the only on-site permanent features that would affect the noise propagation of the existing and proposed noise sources to the adjacent property lines.

Table 3
SUMMARY OF SITE FEATURES INCLUDED IN THE CADNA EXTERIOR MODEL

Description	Height
Topography	Varies from approximately 30 feet (above sea level) (water level east of Qualcomm Way) up to 55 feet (parking area at postal facilities east of site)
Discovery Center Buildings	34 feet (assumed rooftop)

3.4 POTENTIAL IMPACT DISTANCES

The San Diego River corridor MHPA habitat starts at the top edge of the slope. The steep slope creates significant natural noise shielding, with rapidly changing noise levels between the top edge of the slope and the bottom of the slope only 15 to 20 horizontal feet away (where noise levels may be 10 dBA lower). The bottom of the corridor is relatively level and unchanging. Accordingly, the following analysis is focused on the area at the bottom of the slope in the river corridor (i.e., the MHPA habitat).

3.4.1 Construction Impact Distances

Construction would occur up to the edge of the slope into the River Corridor (edge of habitat).

3.4.2 Operation Impact Distances

Outdoor use of the park area (musician’s performance area and sound control shell enclosure) to the northeast of the building may occur as close as 45 feet from the edge of MHPA.

4.0 CONSTRUCTION AND OPERATIONAL NOISE IMPACTS

4.1 SIGNIFICANCE THRESHOLDS

The primary noise impact consideration for the Project is the MHPA requirement that noise be limited to a level not to exceed an hourly limit of 60 dBA L_{EQ} or the average ambient noise level, whichever is greater, at the edge of habitat during the LBV breeding/nesting season.

4.2 CONSTRUCTION NOISE

The detailed construction noise analysis is presented separately in Attachment A, Construction Noise Planning. The conclusions from the analysis are presented herein.

As previously mentioned the construction may be phased; this includes the normal construction phasing of horizontal grading and underground utilities followed by vertical construction of the facilities buildings, park areas, water play areas, and outdoor classrooms. Additional phasing may occur due to project funding bifurcation or other limitations which cannot be fully foreseen at this time. This type of phasing does not modify the following planning. The planning provides the required mitigation for horizontal and vertical construction elements if they occur during the breeding season. No mitigation is required for any construction occurring outside the breeding season. The noise levels for site rough grading, based on the assumed use of equipment including a dozer, loader, and dump truck working near the MHPA Corridor, would generate noise levels as high as 69 dBA L_{EQ} in the nearby habitat. The noise levels for building construction with a cement pumper and cement truck near the northern edge of the planned building would be 62.5 dBA L_{EQ} in the noted habitat.

Because construction noise would potentially exceed the MHPA Corridor limits, construction noise impacts are considered potentially significant.

4.3 OPERATIONAL NOISE SOURCES

This analysis focuses on the use area and the considerations and noise control limitations for the use area and not on the specific type of use in the area (i.e., maximum allowable sound amplification allowed vs. a wedding, an outdoor movie, or an art show). Known and anticipated Project-related operational noise sources analyzed in this report include:

1. The building heating, ventilation, and air conditioning (HVAC) systems
2. The passive park area with presentation area and sound control shell
    a. With maximum group occupancy (human voice only)
    b. Limited amplified sound system (as described later in report)
3. Battery-powered personal speaker which may be used by the docents along the river walk paths

4. The view deck area with fireplace
    a. With maximum group occupancy (human voice only)
    b. Limited amplified sound system (as described later in report)
5. Refreshment stand order announcement speakers

These five site operational noise sources are analyzed separately and cumulatively below.

The following sources were not analyzed:

1. The outdoor classroom area has lesser capacity than the passive park and is at a greater distance from the habitat than the passive park (approximately 110-feet at the closest point vs. 30-feet).
2. The indoor uses are not anticipated to have significant impacts at the habitat.
3. The parking area is more distant from the habitat and would be shielded by the project buildings.

These three sources are not anticipated to have significant habitat impacts.

4.3.1 Building Heating, Ventilation, and Air Conditioning Systems

As specific building HVAC systems information is not available at this time, a typical commercial packaged HVAC unit (e.g., Carrier Centurion Model 50 PG03-12) is used as a basis for analysis. The Carrier units have a sound rating of 80 dBA S_{WL}, with one 10-ton HVAC unit typically required for every 325 to 350 square feet of habitable space (ASHRAE Handbook 2012). It is therefore anticipated that three units would be required. Combined, these units would have a sound power of 85 dBA, which would generate a noise level of 52 dBA at 50 feet (approximately 35 dBA after noise reduction from a mechanical roof screen).

4.3.2 Passive Park

Two separate potential noise sources would occur at the passive park area: limited amplified sound from music or movie presentation and a human occupancy loading from events. Acoustic only music (i.e., music from an acoustic guitar or other acoustic only group, up to and including a group of up to six to eight musicians including brass instruments) produce sound at a significantly lower noise level than is assumed for the limited amplified music described below. Therefore, the analysis focuses on the absolute noise level provided by an amplified sound system and its noise impacts in the habitat, without consideration of the specific instrument being used as a music source into the amplifier system.

4.3.2.1 *Limited Amplified Sound*

A permanent performance and movie area with a sound control shell structure (described below) is planned for the outdoor passive park. This area would be positioned near the northeastern portion of the site away from and facing back toward the building and outdoor use area. The performance area and the sound control shell as described in this section are shown on Figures 3 and 4, and included in the project design set.

The performance area and sound control shell as shown on Figure 3 reference callout 13. The performance area would be at grade with power for lights and amplifiers (with limitations as noted in the following information). The sound control shell would be constructed with a wall, built up from a low, 2- to 3-foot high cast-in-place concrete seat wall and footing with 3/8-inch thick glass (or similar material) panels to a height of 6 feet. Decals or etching would be used on the glass (or other transparent material) to minimize bird strikes. The set-up area would be under a permanent structural shade covering that would include a noise control awning system within the stage covering. The top of the sound control shell would be created by using a portion of the permanent structural shade covering constructed with an (opaque) noise control awning system and side panels connecting to the glass.

The noise control awning would be constructed with outer covering layers of Sunbrella (or similar sun-rot resistant material) fabric covering an inner (middle) layer of 1/8-inch thick 1 pound per square foot (psf) barium loaded vinyl noise barrier. The upper awning would connect to the glass wall on the north side, wrapping around to the northwest terminus of the wall with a removable flap (with construction identical to the upper awning) that would be used whenever the stage has amplified speakers, to complete the shell effect and provide directional control for the sound out into the passive park and help control the impacts into the habitat areas when setup as described below.

Use of the performance area would be strictly limited to a maximum of two self-powered (115-volt AC) speaker systems with a single large speaker (12-inch or less size) per unit. The speakers would be required to be positioned on the stage area below the noise awning (within the coverage area of the awning and glass wall). These requirements would be incorporated into any facility lease agreements.

Based on the two speakers for the performance area at the Discovery Center, the sound volume cannot be distributed over a large area and would become self-limiting. With an approximate 85 dBA L_{EQ}[1] noise level at 25-feet in front of the performance area, event participants within 25 to 35 feet of the stage would not be able to carry on a conversation and would perceive the sound as too loud, which would tend to generate complaints. Sound levels from this source within the open space (far side of the passive park next to the water feature area [Figure 3 area notation 11]) would be at approximately 65 dBA L_{EQ}. This sound level would be clearly audible and at a pleasant to slightly loud background level.

4.3.2.2 *Human Occupancy in Passive Park*

The maximum area occupancy for the passive park is 385 people based on a 15-sf per person occupancy of the 5,780-sf park area. Normal human conversation is in the range of 58 to a maximum of 65 dBA at 3 feet and is limited to one person speaking at a time in a group

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[1] 85 dBA L_{EQ} means that brief peaks may go as loud as 95 to 100 dBA.

minimum of two people. In addition to creating noise, humans provide both noise absorption and noise shielding (when standing). Event attendance will be conditioned to allow the maximum occupancy only if the occupancy does not result in noise levels that exceed 60 dBA or the ambient noise level as verified through event monitoring. The human loading of 385 people are assumed as standing and are modeled as small vertical cylinders (1.1 foot diameter), 5 feet tall with moderate noise absorption (typical human) to provide both noise absorption and shielding and the 75 dBA at 3 feet (loud conversation) just above the top of the cylinder with a distribution based on the 15-sf space requirement. The 75 dBA is analyzed based on 10 minutes of vocalization per person per hour as a worst case noise level for a large group.

4.3.3 Docent Portable Speaker

As previously noted, the docent may use a personal speaker during guided tours to allow them a normal speech level that may be heard by the tour group. Personal speakers are typically limited to a maximum volume of about 75 dBA at 3 to 4 feet from the user; anything louder is unpleasant to the docent and others who may be standing near the docent. Additionally, docent use of speaker would occur while moving around the site, thus further limiting the noise exposure at any one location. A personal amplifier used for a guided tour has a normal usage factor of less than 10 to 15 minutes out of the hour and only 2 to 3 minutes (or less total usage) at any given location.

4.3.4 View Deck Area with Fireplace (Deck)

Similar to the passive park, the deck would have two potential noise sources: limited amplified sound and human occupancy.

4.3.4.1 *Human Occupancy Noise*

The maximum area occupancy for the deck is 80 people based on a 15 sf per person occupancy of the 1,181-sf deck area. For description of noise levels and analysis assumptions, see passive park discussion above.

4.3.4.2 *Limited Amplified Sound*

The deck is not intended for large group entertainment. The limited amplified sound use would be limited to a small portable (battery power only) system (typically Bluetooth wireless speakers for music from a cell phone or I-pod and educational presentations from a TV or computer systems with internal speakers).

This type of sound system is assumed to be directional and facing from the outer edge of the deck into the building and is analyzed at a level of 75 dBA at 5 feet.

4.3.5 Concession Public Address System

The facility would utilize a small local public address system at the concession building to provide patrons with announcements such as when orders are ready. This is typically a small pair of speakers mounted near the outer edges of the concessions under the eaves for weather protection and aimed downwards into the local area of the concessions. Typical brief noise level during an order call-out would be about 10-seconds at 80 to 85 dBA at 5-feet from the speaker with a maximum usage of 30-times per hour (order announcement every two minutes).

4.4 CALCULATED OPERATIONAL NOISE IMPACTS

The calculated noise impacts at five receiver locations with all of the assumed HVAC equipment in operation and amplified music are shown in Table 4, *Calculated Noise Levels from All Individual and Combined Sources.* As can be seen in the table, any of the individual noise sources is well below the allowable levels and when all noise sources are combined the cumulative noise level is also less than significant. The receiver locations are also shown on Figure 5, along with the predicted noise contours for the combined noise source condition.

As previously noted, the Project maximum guest limit is 385 people; however, the exact distribution of people is unknown and the analysis conservatively assumes a full maximum occupant loading for each of the two analyzed areas (465 people for the passive park and view deck).

4.4.1 Operational Impacts to MHPA Area

Receivers R2 and R3 represent the worst case impacts to the MHPA. As shown in Table 4, estimated operational noise levels at these locations would be well below the 60.5 dBA L_{EQ} threshold. Therefore, potential Project-related operational impacts to LBV occupied areas from all noise sources (combined) would be less than significant.

Table 4
CALCULATED NOISE LEVELS FROM ALL INDIVIDUAL AND COMBINED SOURCES

Receiver	Location	HVAC Equipment dBA L_{EQ}	Passive Park Amplified Noise dBA L_{EQ}	Passive Park Human Noise dBA L_{EQ}	Docent Personal Speaker dBA L_{EQ}	Deck Amplified Noise dBA L_{EQ}	Deck Human Noise dBA L_{EQ}	Concession PA dBA L_{EQ}	Combined Noise dBA L_{EQ}
R1	MHPA Area South	29.4	45.9	46.9	48.5	49.7	48.6	38.1	55.3
R2	MHPA Area South Central	29.5	50.2	49.6	42.2	50.1	48.1	40.5	56.0
R3	MHPA Area Central	29.3	48.5	51.2	41.2	48.1	46.3	41.0	55.3
R4	MHPA Area North Central	29.2	46.4	53.3	44.0	44.7	43.4	41.8	55.5
R5	MHPA Area North	28.6	45.8	53.0	50.3	40.8	42.4	40.5	55.9

5.0 MITIGATION

Construction noise mitigation as discussed below is provided in two phases: first for the rough grading and second for the building construction. As will be seen in the following information, if rough grading were to occur during the LBV breeding season, it would require much more substantial mitigation for areas occupied by LBV than would the building construction. If installed during rough grading and left in place during the building construction, this same mitigation would fully mitigate the building construction noise. However, because there are several construction scenarios, which could include rough grading outside the breeding season, the barrier systems are described separately for each phase of the construction as though they were independent from each other.

5.1 CONSTRUCTION NOISE IMPACTS

Between March 15 and September 15, no construction activities shall result in combined noise levels exceeding 60 dBA L_{EQ} or ambient threshold at the edge of occupied LBV habitat. If construction must occur during the breeding season, it is anticipated that a survey would be conducted by a qualified biologist to determine occupied LBV areas, and if necessary, measures (such as temporary noise barriers or reductions in equipment operation) that are verified by a qualified noise specialist and a qualified biologist would be required to ensure that noise does not significantly impact breeding activities.

The text that follows describes one potential method to achieve compliance if construction occurs during the breeding season and adjacent habitat is determined to be occupied. This method would eliminate the need for future bird surveys and noise analysis to identify required temporary attenuation requirements. If Project-related construction is conducted outside of the vireo breeding season, no associated significant noise impacts would occur within the adjacent MHPA habitat (or to related sensitive species), and no mitigation would be required.

To attenuate horizontal grading equipment noise levels during the LBV breeding season (if proposed), a temporary 10-foot-tall barrier erected along the top of the slope at the edge of the river corridor would reduce rough grading noise impacts to less than 60.5 dBA L_{EQ}. A 6-foot barrier in the same location would reduce other construction noise to less than 60.5 dBA L_{EQ} (refer to Figure 6, *Potential Barriers*).

The 10-foot site rough grading noise barrier would need to extend at least 30 feet beyond the extent of the site grading along the habitat, or as a “return” along the site property line, to provide complete control of the rough grading noise.

The noise barrier to attenuate building construction noise would need to be approximately 135 feet long, centered on the edge of the building closest to the habitat (extending approximately 30 feet in each direction beyond where an extension of the north-south corner lines of the building [close to the habitat] would intersect the habitat lines). In addition, the following parameters should be incorporated into the barrier design:

- Sound attenuation barriers should be a single, solid sound wall.

Potential Barriers

SAN DIEGO RIVER DISCOVERY CENTER AT GRANT PARK

Figure 6

HELIX Environmental Planning

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- The sound attenuation barriers should be constructed of masonry, wood, plastic, fiberglass, steel, or a combination of those materials, with no cracks or gaps through or below the wall. Any seams or cracks should be filled or caulked.

- If wood is used, it can be tongue-and-groove design and should be at least one-inch thick or have a surface density of at least 3.5 pounds per square foot. Sheet metal of minimum 18-gauge may also be used, if it meets the other noted criteria and is properly supported and stiffened so that it does not rattle or create noise from vibration or wind.

5.2 OPERATIONAL NOISE IMPACTS

Establish Acceptable Noise Levels

A. During the non-breeding season, prior to the first outdoor event with an anticipated attendance of between 188 and 385 (where on-site parking capacity is exceeded), the Owner/Permittee shall engage a qualified acoustical engineer to perform and certify a sound test with the parameters shown below. The qualified acoustical engineer shall submit a post-test certification report documenting the setup (with pictures as needed) and the results of the testing to the Environmental Designee (ED), Multiple Species Conservation Program (MSCP), and City's Mitigation Monitoring Coordination (MMC) section. MMC, ED, and MSCP shall review the test methods and findings to confirm to their satisfaction that sound attenuation results in a maximum sound level of 60.5 dBA L_{EQ} at the boundary of the MHPA. The test and report parameters shall be as follows:

   1. MMC, ED and MSCP shall be notified in advance of the planned testing date, time, and acoustical engineer qualifications.

   2. The test shall be based on the two installed 12-inch amplified speakers within the Sound Control Shell.

   3. A pink noise source shall be used to generate continuous pink noise through the speakers, which shall total a noise level of 85 dBA at 25 feet in front of the Sound Control Shell, which is anticipated to result in noise levels below or at 60.5 dBA L_{EQ} at the edge of the MHPA.

   4. The noise shall then be measured at four locations at the edge of the MHPA. Monitoring locations shall be recorded on an aerial photograph of the site. Photographs of each monitoring location shall be provided.

   5. If any noise level at the edge of the habitat exceeds 60.5 dBA L_{EQ}, the noise volume shall be reduced until the impact is within compliance. The noise level at a distance of 25 feet in front of the sound control shell shall be noted and the maximum volume level of the speakers shall be identified in Discovery Center standard operating procedures and all event contracts.

Test Noise Levels During Non-breeding Season Event

B. During the first non-breeding season event with anticipated attendance of 188 to 385 attendees, noise monitoring shall be conducted according to similar testing and reporting parameters described above in Item A, with the exception of the pink noise source. Noise levels shall remain at or below 60.5 dBA L_{EQ}, and shall be reduced until compliance is achieved. A post-test monitoring report shall be submitted to the City's ED, MSCP and MMC documenting the setup (with pictures as needed) and testing results within one week following the event. No outdoor events shall be held during the breeding season until acceptance of the report.

Test Noise Levels During Breeding Season Event

C. For any subsequent events held during the breeding season, noise monitoring of each event shall be conducted according to similar testing and reporting parameters described in Item A.

   For these events, the Owner/Permittee shall engage a qualified acoustical engineer to measure, report, and control the event noise levels. The event test parameters are shown below. A post-event monitoring report documenting the number of attendees and setup (with pictures as needed) and results shall be submitted to the ED, MSCP, and MMC within one week following the event. No additional outdoor events shall be held during the breeding season until acceptance of the report.

   1. MMC, ED, and MSCP shall be notified in advance of the planned event, date, time, and acoustical engineer and biologist with qualifications.

   2. An initial sound check (prior to the start of the event) with two 12-inch speaker system not to exceed 60.5 dBA L_{EQ} at the edge of the MHPA.

   3. Monitoring will be conducted at the habitat boundary at the same locations as established during the initial test and at previous successfully monitored events. Monitoring locations shall be identified on a map and verified through photo documentation and shall be performed in accordance with the pre-event noise calibration.

   4. If at any time the noise in the habitat exceeds 60.5 dBA L_{EQ} at any of the monitoring locations, adjustments will be made immediately to control noise levels to less than 60.5 dBA L_{EQ}. The noise level needed to ensure compliance shall be noted and the maximum volume level of the speakers shall be identified in Discovery Center standard operating procedures and future event contracts.

A "successful" event would be defined as an event during which noise monitoring results indicate that appropriate noise levels have been achieved. Following acceptance of five successful monitoring reports by the ED, MSCP, and MMC, indicating that the target 60.5 dBA L_{EQ} is achievable, the attendance level identified in Exhibit A of the Site Development Permit shall be adjusted to reflect the maximum attendance level (up to 385 persons) demonstrated through successful monitoring results.

This minimum of five successful monitoring events where noise does not exceed 60.5 dBA L_{EQ} also would provide justification for the City's ED to allow conclusion of monitoring requirements for outdoor events held during the breeding season (with the maximum capacity determined through monitoring success), provided that the noise measures to ensure avoidance of impacts have been addressed to the satisfaction of the ED and reflected in Exhibit "A" to the Site Development Permit. Specifically, the measures will be incorporated in the standard operating procedures for the Discovery Center, including a description of the allowable noise levels, methods of noise control, and other standard practices necessary to achieve allowable noise levels. The standard operating procedures will require that these measures will also be reflected in all event contracts. Any future revisions to the standard operating procedures must be approved by the ED and may require additional monitoring efforts prior to approval. Thus, these procedures are incorporated in the requirements of the Site Development Permit, whereby violation could result in revocation of the permit.

6.0 CONCLUSION

6.1 CONSTRUCTION

With the inclusion of the required construction noise control mitigation measures (if construction occurs during the described breeding/nesting season and habitat is occupied by LBV), the proposed Project construction would be in compliance with all applicable City of San Diego MHPA noise level limits, and construction noise impacts would be reduced to less than significant levels.

6.2 OPERATIONS

With the planned project design features and the specified operational noise control mitigation measures, the Project operations would be in compliance with the applicable City of San Diego MHPA noise level limits for all operations.

7.0 QUALIFICATIONS

Mr. Terry is a senior acoustical consultant for HELIX Environmental Planning, Inc. with nearly 30 years of experience in engineering and mechanical systems. His specialized experience in acoustical and mechanical engineering includes evaluating noise from various sources including engines, compressors, generators, chillers, pump stations, turbines, presses, manufacturing equipment, and air handling systems, as well as providing recommendations (including design elements) for noise control solutions to achieve satisfactory noise levels. Mr. Terry has analyzed several power plant or public utility projects involving evaluation and control of noise from mechanical equipment. Mr. Terry's responsibilities include research, computer modeling, analysis, and noise monitoring. Other projects have focused on noise control within industrial, commercial, or residential projects, and have ranged from equipment noise reduction to building modification or design enhancement.

Mr. Terry oversees report preparation, noise control design, testing of prototype solutions, project management, and client support. He has served as an Industry Expert in General Acoustics, Nuisance Noise and Vibration Control, and Building Construction Practices at numerous public hearings and workshops, including Planning Commissions, City Councils, and Boards of Supervisors. He has provided court testimony and depositions on many cases in litigation involving noise and vibration issues. Clients have included engineers and architects for various utilities, manufacturers, and water and sewer districts, including Pacific Bell, San Diego Gas & Electric, PG&E Dispersed Generating Systems, Callaway Golf, Verizon, Cingular, Nextel, SBC, AT&T, Sprint, several water districts, and a number of large law firms.

Affiliations

Acoustical Society of America
Institute for Noise Control Engineering
California Association of Environmental Professionals
San Diego Forensic Consultants Association

Education

B.S., Mechanical Engineering, San Diego State University

8.0 PREPARERS

Charles Terry, Senior Acoustical Specialist
Andrea Bitterling, Project Manager

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Attachment A

CONSTRUCTION NOISE PLANNING

ATTACHMENT A

CONSTRUCTION NOISE PLANNING

LOCATION OF HABITAT

The San Diego River corridor Multi-Habitat Planning Area (MHPA) is adjacent to the northern project boundary and is the subject of the following construction noise control planning assessment.

GENERAL PROJECT CONSTRUCTION SCHEDULE AND EXPECTED EQUIPMENT UTILIZATION

This site would not require any demolition, although proposed construction would entail the use of heavy equipment for the full term of construction. Construction activities can be roughly divided into several distinct elements as outlined below, with these elements shown in the order they typically occur (and this discussion is not intended to modify any Project-related plan phasing). The identified construction elements may overlap or occur in a slightly different order, depending on construction and Project requirements.

Mass Grading

Mass grading typically requires the simultaneous use of several pieces of heavy equipment, including large dozers, excavators, compactors, water trucks, and a variety of smaller equipment necessary for the creation of the basic building locations, roads, and outdoor elevations desired. Large equipment used in mass grading may create noise in excess of 95 dBA at 50 feet, and multiple pieces of equipment may work in a single area for extended time periods. As a result, mass grading operations have the potential to exceed applicable noise thresholds.

Foundation Excavation

These activities typically involve the use of one or more pieces of medium-sized equipment, including a small dozer, backhoe or excavator, compactor, water truck, and a variety of smaller equipment to create the finished pad elevations and foundation excavation. Smaller equipment typically may create noise levels of up to (or occasionally higher than) 80 dBA at 50 feet. It is rarely used continuously in a single location for an extended time period, however, and would work at a greater distance from the MHPA.

Foundation Pours

Individual building pads are created by having concrete delivered via truck from an off-site mixing facility, and pumping it with a pumper or reed boom truck throughout the foundation area to create finished building pads. Pumpers and cement trucks can create noise levels of up to (or occasionally higher than) 80 dBA at 50 feet.

On-site Utilities Excavation

Utility excavation typically includes the use of an excavator or backhoe, a trencher, and (potentially) a loader throughout the site to install underground utilities. This type of equipment rarely exceeds 75 dBA at 50 feet, and usually involves continuous movement. As a result, it is unusual for this type of operation to exceed allowable noise limits.

Building Construction

The building framing and exterior is constructed manually with the use of forklifts, light mobile cranes, generators, and other light equipment, with equipment typically not used continuously in one area. There are occasionally small air compressors or portable generators in these types of operations, although associated noise levels are normally below 70 dBA at 50 feet and do not exceed applicable noise limits.

Finish Grading

Typical equipment used for finish grading includes a grader, water truck, compactor and sometimes a small dozer and/or skidsteer, used to prepare the site for paving and landscaping. Finish grading equipment rarely makes noise greater than 70 dBA at 50 feet, and is almost never in one place for any extended time period. Accordingly, this type of operation is not expected to exceed the allowable noise limit.

Paving

Concrete or blacktop is delivered to the site from an off-site mixing facility, spread over the planned hard surface areas, and then either compacted or allowed to cure. Concrete or blacktop equipment rarely generates noise greater than 70 dBA at 50 feet, and is almost never in one place for any extended time period. As a result, this type of operation is not expected to exceed the allowable property line noise limit.

CONSTRUCTION PLANNING ASSUMPTIONS

There are two main work elements of primary concern with respect to property line noise level limits: (1) the initial site rough grading, where the berms near the river corridor would be leveled, the general area would be over-excavated to cleanout non-compactable or biological materials, and the site would be built up (i.e., filled) to finish grade and compacted; and (2) the building vertical construction. Both of the described elements may occur within close proximity to the MHPA corridor.

Most of the other work would be at greater distances and not have a potential for significant impacts.

The San Diego River corridor MHPA habitat starts at the top edge of the previously described slope. Steep slope creates significant natural noise shielding, however, with rapidly changing noise levels between the top edge of the slope (where noise levels might be over 70 dBA) and the bottom of the slope only 15 to 20 horizontal feet away (where noise levels may be less than 60 dBA). The bottom of the corridor is relatively level and unchanging. Accordingly, the analysis is focused on the area at the bottom of the slope in the river corridor (i.e., MHPA habitat).

EQUIPMENT NOISE LEVELS

Data for construction equipment noise planning are extracted from several sources, including manufacturers' data, the Federal Highway Administration (FHWA) Construction Noise Data Base, Department of Food and Rural Affairs (DEFRA) (England) Construction Noise Data Base, and personal construction site noise measurements. Table A-1 provides the octave spectrum of the equipment used in this analysis.

Table A-1
EQUIPMENT NOISE SOURCE DATA

Equipment Source	Noise Levels in Decibels (dB) Measured at Octave Frequencies in Hertz (Hz)								Overall Noise Level in A-weighted Scale (dBA)
	63 Hz	125 Hz	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	
Large Excavator	126.0	119.0	118.0	118.0	114.0	112.0	109.0	104.0	120.0
Bulldozer	113.8	102.8	104.8	101.8	100.8	106.8	90.8	84.8	109.5
Loader	100.7	90.5	85.0	82.6	106.6	92.2	80.0	75.3	106.8
Concrete Pumper	107.4	105.4	102.4	103.4	101.4	98.4	95.4	90.4	106.2
Cement Truck	108.7	106.7	103.7	104.7	102.7	99.7	96.7	91.7	107.5
Bulldozer	113.8	102.8	104.8	101.8	100.8	106.8	90.8	84.8	109.5
Loader	100.7	90.5	85.0	82.6	106.6	92.2	80.0	75.3	106.8
Concrete Pumper	107.4	105.4	102.4	103.4	101.4	98.4	95.4	90.4	106.2
Backup Alarm[2]	108.7	106.7	103.7	104.7	102.7	99.7	96.7	91.7	107.5

[1] Based on sound power levels (S_{WL})
[2] Backup alarms are highly directional but are used in the worst case planning as a non-directional source.

NOISE IMPACTS

The following two scenarios are analyzed for construction-related noise impacts from site rough grading and building foundation:

1. A medium to large dozer pushing up material with a loader and a dump truck moving the material to stock piles or off site.
2. A cement truck and pumper pouring the building footings and slabs.

The noise levels for the first scenario with a dozer and loader and dump truck working near the MHPA corridor would generate maximum noise levels of 69 dBA L_{EQ} in the habitat. The noise levels for the second scenario, with a cement pumper and cement truck near the northern edge of the planned building, would be 62.5 dBA L_{EQ} in the habitat.

To attenuate equipment noise levels during construction, a temporary 10-foot-tall barrier erected along the edge of the top of the slope at the edge of the corridor would reduce rough grading noise impacts to less than 60.5 dBA L_{EQ}. A 6-foot barrier in the same location would reduce building construction and other construction noise to less than 60.5 dBA L_{EQ}. These barriers are expected to reduce the noise in the habitat area to below 60.5 dBA L_{EQ} (existing ambient).

<u>Specific Notes and Limitations</u>:

- All planning of construction noise impacts includes the potential limitation that equipment creating noise louder than anticipated, or working 100 percent of any hour immediately adjacent the habitat, may exceed the predicted noise impacts.

- All equipment must be operated in compliance with applicable safety rules and regulations.

NOISE BARRIER CONSTRUCTION

A temporary sound attenuation wall shall be constructed of plywood or construction noise-control blankets, with no cracks or gaps through or below the wall. Any gate(s) in such a sound attenuation wall must be designed with overlapping closures.

These barriers may be either semi-permanent fencing or hanging blankets with the support system (posts) in holes in the ground, or temporary barriers mounted on K-rail or another movable mounting system.

If the barriers require semi-permanent ground installation, the barrier must be completed prior to March 15 or be continuously and actively monitored during the construction, including the installation of posts, pipes or telephone poles with cable attachments for the support cable.

Plywood barriers shall be made with either a single ¾-inch layer of material with no cracks or gaps, or a double layer of ½-inch plywood mounted in a ships lap configuration.

The safe construction, placement, and use of noise barriers under all applicable conditions (e.g., rain or high winds) are the responsibility of the construction contractor.

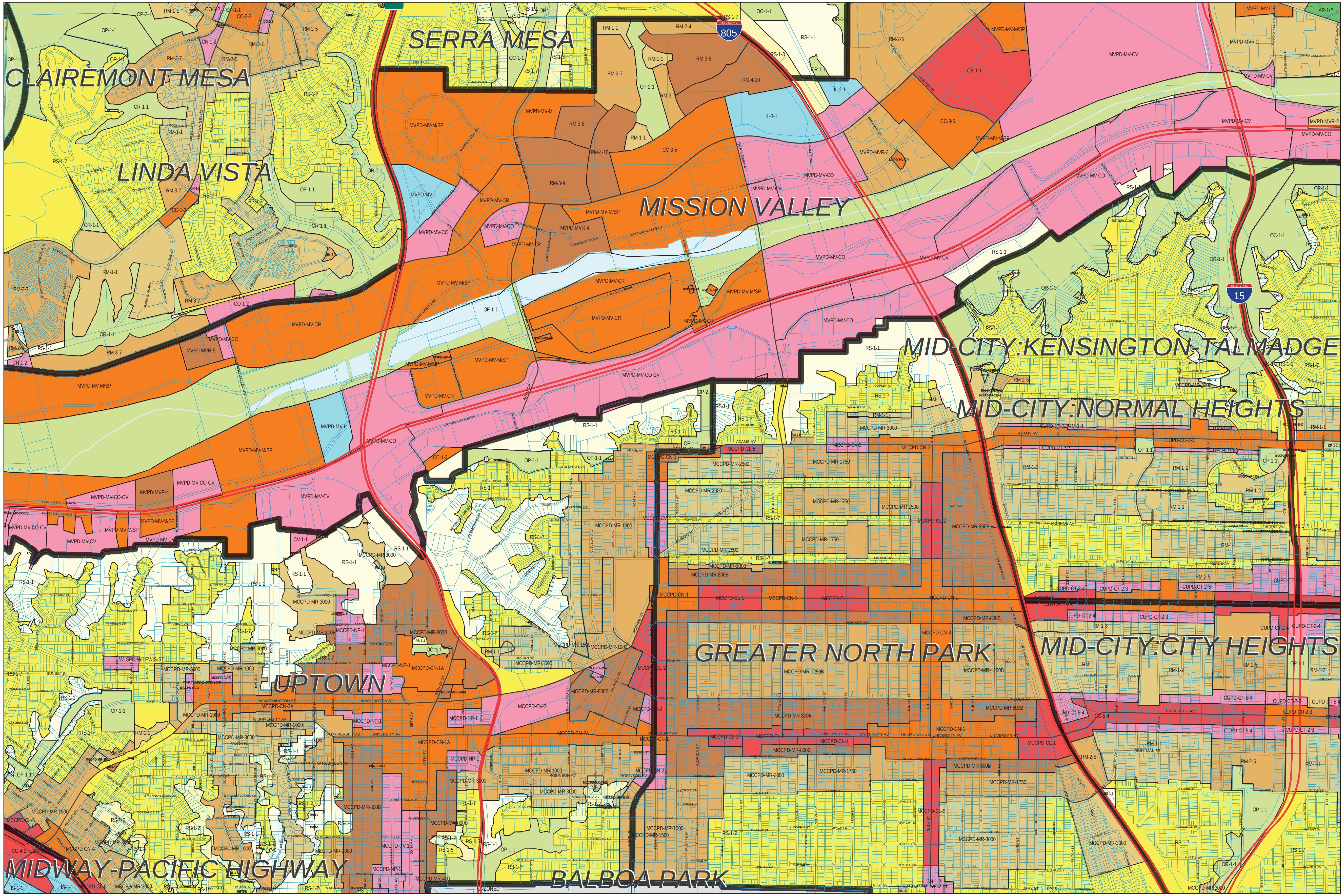
REFERENCES

ASHRAE, ASHRAE Handbook – HVAC Systems and Equipment, 2012.

Appendix A

CITY OF SAN DIEGO ZONING MAP

Official Zoning Map



Legend

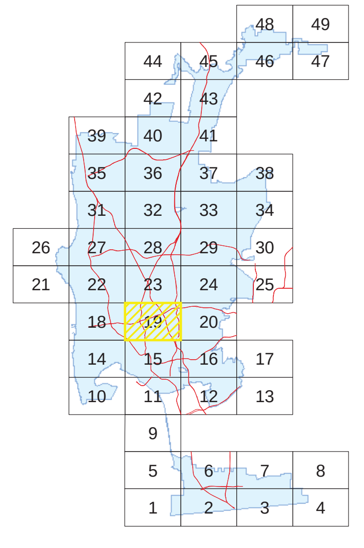
- ☐ City of San Diego Boundary
- ☐ Community Plan Areas
- ☐ Parcels

Zoning

ZONE_NAME

- ■ AR-1-2
- ■ CC-1-3
- ■ CC-2-3
- ■ CC-3-5
- ■ CC-4-2
- ■ CC-4-5
- ■ CC-5-4
- ■ CN-1-2
- ■ CO-1-2
- ■ CR-1-1
- ■ CUPD-CT-2-3
- ■ CUPD-CT-2-4
- ■ CUPD-CT-3-3
- ■ CUPD-CT-5-4
- ■ CUPD-CU-2-3
- ■ CUPD-CU-2-4
- ■ CUPD-CU-3-3
- ■ CV-1-1
- ■ IL-2-1
- ■ IL-3-1
- ■ IS-1-1
- ■ MCCPD-CL-1
- ■ MCCPD-CL-2
- ■ MCCPD-CL-5
- ■ MCCPD-CL-6
- ■ MCCPD-CN-1
- ■ MCCPD-CN-1A
- ■ MCCPD-CN-2
- ■ MCCPD-CN-2A
- ■ MCCPD-CN-3
- ■ MCCPD-CN-4
- ■ MCCPD-CV-1
- ■ MCCPD-CV-2
- ■ MCCPD-CV-3
- ■ MCCPD-MR-1000
- ■ MCCPD-MR-1250B
- ■ MCCPD-MR-1500
- ■ MCCPD-MR-1500B
- ■ MCCPD-MR-1750
- ■ MCCPD-MR-2500
- ■ MCCPD-MR-3000
- ■ MCCPD-MR-400
- ■ MCCPD-MR-800B
- ■ MCCPD-NP-1
- ■ MCCPD-NP-2
- ■ MVPD-MV-CO
- ■ MVPD-MV-CO-CV
- ■ MVPD-MV-CR
- ■ MVPD-MV-CV
- ■ MVPD-MV-I
- ■ MVPD-MV-M
- ■ MVPD-MV-M/SP
- ■ MVPD-MVR-2
- ■ MVPD-MVR-3
- ■ MVPD-MVR-4
- ■ MVPD-MVR-5
- ■ OC-1-1
- ■ OF-1-1
- ■ OP-1-1
- ■ OP-2-1
- ■ OR-1-1
- ■ RM-1-1
- ■ RM-1-2
- ■ RM-1-3
- ■ RM-2-4
- ■ RM-2-5
- ■ RM-3-7
- ■ RM-3-8
- ■ RM-3-9
- ■ RM-4-10
- ■ RS-1-1
- ■ RS-1-2
- ■ RS-1-3
- ■ RS-1-4
- ■ RS-1-5
- ■ RS-1-7
- ■ UNZONED
- ■ WLSPD-W-LEWIS-ST

Index Map



SanGIS Basemap Accuracy

SanGIS Land (Lot) basemap data for the City of San Diego tested 20.7' horizontal accuracy at the 95% confidence level.

This data meets the ASPRS Standard for Class 1 Map Accuracy at a scale of 1:12,000 (1"=1,000').

This assessment assumes utilization of the data on a citywide basis. Localized data may exceed or fail to meet this accuracy with errors in excess of 100' possible.

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City of San Diego
Development Services Department

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Appendix B

METHODOLOGY FOR CALCULATING TYPICAL HOURLY TRAFFIC NOISE LEVELS

APPENDIX B
METHODOLOGY FOR CALCULATING TYPICAL HOURLY TRAFFIC NOISE LEVELS

Normal weekday roadway traffic follows a typical distribution pattern as a percentage of the overall traffic. This observation and typical distribution pattern was noted in the City of San Diego (and other metropolitan areas) originally in a report prepared by Wyle Laboratories, "Development of Ground Transportation Systems Noise Contours for the San Diego Region" (December 1973). Similar traffic distribution patterns were noted in a study prepared by Ogden International, "Road Travel Survey" (1986). This study provided the table of hourly traffic information presented below based on Caltrans freeway hourly traffic count data (Table 1, *San Diego Region Freeway Traffic Information*).

Table 1
SAN DIEGO REGION FREEWAY TRAFFIC INFORMATION

Hour	Percent
12:00 AM to1:00 AM	0.8%
1:00 AM to 2:00 AM	0.6%
2:00 AM to 3:00 AM	0.7%
3:00 AM to 4:00 AM	0.7%
4:00 AM to 5:00 AM	1.8%
5:00 AM to 6:00 AM	3.5%
6:00 AM to 7:00 AM	4.8%
7:00 AM to 8:00 AM	6.8%
8:00 AM to 9:00 AM	6.1%
9:00 AM to 10:00 AM	5.1%
10:00 AM to 11:00 AM	5.0%
11:00 AM to 12:00 PM	5.2%
12:00 PM to 1:00 PM	5.8%
1:00 PM to 2:00 PM	6.0%
2:00 PM to 3:00 PM	6.2%
3:00 PM to 4:00 PM	6.8%
4:00 PM to 5:00 PM	7.2%
5:00 PM to 6:00 PM	7.6%

Table 1 (cont.) SAN DIEGO REGION FREEWAY TRAFFIC INFORMATION	
Hour	**Percent**
6:00 PM to 7:00 PM	5.8%
7:00 PM to 8:00 PM	4.0%
8:00 PM to 9:00 PM	3.3%
9:00 PM to 10:00 PM	2.7%
10:00 PM to 11:00 PM	2.1%
11:00 PM to 12:00 AM	1.5%

Using the above hourly traffic count, any hourly traffic noise level can be used to calculate the approximate noise level at the same location for any other hour. These traffic distribution numbers generally apply to freeways; however, some level of caution must be applied to freeway traffic because of both commuter and truck traffic time-shifting their normal times to avoid congestion.

The accuracy of this methodology can and has been repeatedly tested by using a traffic noise measurement and creating a Traffic Noise Model (TNM) of the roadway using the traffic counts for that hour. When the results from the measurement are compared with a modeled result using the hourly percentage of the current average daily trip (ADT) from any published roadway traffic counts, the values will normally agree within approximately one dBA.

GEOCON
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GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. G1656-42-01
January 8, 2018

San Diego River Park Foundation
4891 Pacific Highway, Suite 114
San Diego, California 92110

Attention: Mr. Dusty Ucker

Subject: STORM WATER BMP RECOMMENDATIONS
SAN DIEGO RIVER DISCOVERY CENTER
SAN DIEGO, CALIFORNIA

References:

1. *Grading and Drainage Plan, Discovery Center*, prepared by Rick Engineering Company, dated November 10, 2017.

2. *Geotechnical Investigation, San Diego River Discovery Center, San Diego, California*, prepared by Geocon Incorporated, dated January 31, 2014 (Project No. G1656-42-01).

Dear Mr. Ucker:

In accordance with your request, we have reviewed referenced grading and drainage plan and have prepared this letter regarding infiltration at the subject project. The plan indicates a storm water basin will be constructed at the west end of the site. In addition, porous concrete pavement will be constructed along the west and northern site perimeter. Permeable pavers are planned at the amphitheater on the east side of the site.

It is our opinion that the majority of the site is unsuitable for infiltration of storm water runoff due to the presence of soft, fine-grain, hydraulically placed fill in the near subsurface. These soils were placed during the area's former land use as a settling pond for nearby aggregate mines and are highly compressive and highly expansive. Infiltration into these soils will likely cause soil settlement and/or soil heave.

Considering the proximity of the basin to proposed improvements, we recommend the proposed bioretention basin on the west side of the site be lined with an impermeable barrier such as a 30 mil HDPE or PVC liner. In addition, the basin should have a drainage system to convey storm water runoff to an approved drainage outlet after treatment. The proposed porous concrete along the perimeter of the site should also include an impermeable liner.

With respect to the planned permeable paver area on the east side of the site adjacent to the amphitheater, no liner is required provided remedial grading is performed as recommended in the referenced geotechnical investigation and the paver area is underlain by at last 5 feet of low expansive compacted fill (Expansion Index less than 50). Additionally, the paver subgrade should be sloped to a low point and a subdrain installed to collect excess infiltration water and transmit it to an approved outlet. The retaining wall adjacent to the paver area should include a drainage system consisting of a 12-inch section of gravel wrapped in filter fabric with a perforated drainage pipe as shown on Figure 6 of the referenced geotechnical investigation report (Reference 2).

Should you have any questions regarding this letter, please contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

Rodney C. Mikesell
GE 2533

REGISTERED PROFESSIONAL ENGINEER
RODNEY C. MIKESELL
No.2533
GEOTECHNICAL
STATE OF CALIFORNIA

RCM:dmc

(e-mail) Addressee
(e-mail) Rick Engineering
Attention: Mr. Tim Gabrielson

RICK
ENGINEERING COMPANY

November 10, 2017
Revised: January 12, 2018

City of San Diego
Department of Development Services
1222 First Avenue
San Diego, California 92101

SUBJECT: ADDENDUM NO.1 TO WATER QUALITY TECHNICAL REPORT (WQTR) FOR DISCOVERY CENTER AT GRANT PARK
PTS # 369379
(RICK ENGINEERING COMPANY JOB NUMBER 17010)

To Whom It May Concern:

This WQTR addendum letter presents a revision to the November 10, 2017 letter pursuant to the cycle 19 review from the City of San Diego, dated 12/21/17. The WQTR exhibit has been updated and a separate HMP exemption exhibit has been included. The BMP sizing calculations spreadsheet in Attachment 2 has been updated to identify the types, square footage and runoff factors of pervious and impervious areas in each DMA as requested. The project does not propose any impermeable liners for the proposed permeable pavers in DMA-3 and the underdrain invert has been placed above the calculated DCV. Please refer Attachment 2 for the water quality calculations of the permeable pavers. The original approved WQTR exhibit dated 09/14/15 has also been removed, as requested.

This letter summarizes the changes in the post-construction storm water requirements and pollutant control BMPs for the Discovery Center at Grant Park project (herein referred to as the "project"). The water quality analysis and final design of the treatment control BMPs (TC-BMPs) subject to 2007 MS4 permit was included in the approved report titled, "Water Quality Technical Report for Discovery Center," last revised September 10, 2015, prepared by Rick Engineering Company (J-17010, City PTS No. 369379) (herein referred to as the "Original WQTR"). The project site is located at the north east corner of the Qualcomm Way and Camino Del Rio North intersection, in the City of San Diego.

Project Compliance with the 2013 MS4 Permit and 2016 City of San Diego SWS Manual:

This addendum letter has been prepared to document the revisions in the project's site plan to ensure compliance with the 2013 MS4 permit and the City of San Diego Storm Water Standards Manual, (herein referred to as the "SWS Manual"), dated January 2016. It is important to note that, prior to permit issuance and during the final engineering phase of the project, a Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) will be prepared in accordance with the City of San Diego SWS Manual.

Per this addendum, the project proposes three (3) drainage management areas (DMAs). The majority of the project is located within DMA 1, and drains to proposed Biofiltration BMP (BMP 1). The provided footprint of BMP 1 is 1780 square feet, while the required footprint of BMP 1 is 1688 square feet per Worksheet B.5-1 of the SWS Manual. DMA 2 is treated for pollutant control by proposed permeable pavement (BMP 2) within the DMA. The footprint of BMP 2 is 1505 square feet. The project proposes no impermeable liner and the underdrain invert has been placed above the calculated DCV. DMA 3 is a self-mitigating DMA pursuant to section 5.2.1 of the SWS Manual. Please refer to Attachment 1 for the DS-560 and Attachment 2 for the revised BMP sizing calculations and Self-Mitigating DMA standards checklist. Additionally, an updated Operation and Maintenance Plan (OMP) table is also included in Attachment 3. A revised WQTR exhibit has also been included in Exhibit 1.

Hydromodification Management Requirement:

Since the project outfalls directly in to the San Diego River, an HMP exempt river system, the project continues to be HMP exempt. The following table compares the flowline of the project outfall to the 10-year WSEL. The 10-year WSEL is used because that is the largest storm event governed by the HMP requirements.

Downstream Outfall Flowline[1]	**San Diego River 10-Year WSEL[2] per FEMA FIS (Flood Profile)**
35.0	36.7-2.1 = 34.6

1. Downstream outfall flowline reflects the end of the stabilized conveyance system for the project outfall. This elevation is based on the NGVD 29 vertical datum.
2. This WSEL comes from the FEMA Flood Insurance Study (FIS) for San Diego, California, Volume 9, with revisions being adopted May 16, 2012. Since the FIS and DFIRM utilize NAVD 88 vertical datum, the 2.1-foot datum shift has been subtracted to these elevations to yield NAVD 29 elevations for comparison purposes.

Please refer Attachment 4 for the flood profile showing the 10-year and 100-year water surface elevations at the project outfall location. A separate HMP exemption exhibit has also been included in Attachment 4. For more information regarding the project's qualification for HMP exemption please refer section 3.4 of the original WQTR.

Conclusion:

This addendum has been prepared to document the project's compliance with the 2013 MS4 permit and the City of San Diego SWS Manual. Relevant water quality BMP sizing calculations and exhibits have been revised and included at the end of this letter report.

Please feel free to contact Shavger Rekani or myself if you have any questions and/or concerns at (619) 291-0707.

Sincerely,

RICK ENGINEERING COMPANY

Brendan Hastie
RCE#65809, Exp. 09/19
Associate Principal

BRENDAN CRAIG HASTIE
NO. 65809
EXP. 9/30/19

BH:ASH:es:k/text/.002

Enclosures

ATTACHMENT 1

DS-560

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

Storm Water Requirements Applicability Checklist

FORM
DS-560
OCTOBER 2016

Project Address: NE Corner of Qualcomm Way and Camino Del Rio N

Project Number *(for City Use Only)*:

SECTION 1. Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1] , which is administered by the State Water Resources Control Board.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with Construction Activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

☒ Yes; SWPPP required, skip questions 2-4 ☐ No; next question

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity resulting in ground disturbance and contact with storm water runoff?

☐ Yes; WPCP required, skip 3-4 ☒ No; next question

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as pipeline/utility replacement)

☐ Yes; WPCP required, skip 4 ☒ No; next question

4. Does the project only include the following Permit types listed below?

- Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
- Individual Right of Way Permits that exclusively include only ONE of the following activities: water service, sewer lateral, or utility service.
- Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, pot holing, curb and gutter replacement, and retaining wall encroachments.

☐ Yes; no document required

Check one of the boxes below, and continue to PART B:

☒ If you checked "Yes" for question 1,
a SWPPP is REQUIRED. Continue to PART B

☐ If you checked "No" for question 1, and checked "Yes" for question 2 or 3,
a WPCP is REQUIRED. If the project proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

☐ If you checked "No" for all questions 1-3, and checked "Yes" for question 4
PART B **does not apply and no document is required. Continue to Section 2.**

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[1] More information on the City's construction BMP requirements as well as CGP requirements can be found at: www.sandiego.gov/stormwater/regulations/index.shtml

Printed on recycled paper. Visit our web site at www.sandiego.gov/development-services.
Upon request, this information is available in alternative formats for persons with disabilities.

Clear Page 1

PART B: Determine Construction Site Priority

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk determination approach of the State Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete PART B and continued to Section 2

1. ☐ **ASBS**

a. Projects located in the ASBS watershed.

2. ☒ **High Priority**

a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.

b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. ☐ **Medium Priority**

a. Projects 1 acre or more but not subject to an ASBS or high priority designation.

b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. ☐ **Low Priority**

a. Projects requiring a Water Pollution Control Plan but not subject to ASBS, high, or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

Additional information for determining the requirements is found in the Storm Water Standards Manual.

PART C: Determine if Not Subject to Permanent Storm Water Requirements.

Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of the numbers in Part C continue to Part D.

1.	Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?	☐ Yes ☒ No
2.	Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?	☐ Yes ☒ No
3.	Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).	☐ Yes ☒ No

Clear Page 2

PART D: PDP Exempt Requirements.

PDP Exempt projects are required to implement site design and source control BMPs.

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."

If "no" was checked for all questions in Part D, continue to Part E.

1. Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:

- **Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;**
- **Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;**
- **Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?**

☐ Yes; PDP exempt requirements apply ☒ No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

☐ Yes; PDP exempt requirements apply ☒ No; project not exempt.

PART E: Determine if Project is a Priority Development Project (PDP).

Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".

If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Development Project".

1. **New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☒ Yes ☐ No

2. **Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☐ Yes ☒ No

3. **New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface. ☐ Yes ☒ No

4. **New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater. ☐ Yes ☒ No

5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).** ☒ Yes ☐ No

6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site). ☐ Yes ☒ No

Clear Page 3

7. **New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). ☐ Yes ☒ No

8. **New development or redevelopment projects of a retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. ☐ Yes ☒ No

9. **New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539. ☐ Yes ☒ No

10. **Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces. ☐ Yes ☒ No

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1. The project is **NOT SUBJECT TO PERMANENT STORM WATER REQUIREMENTS**. ☐
2. The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. ☐
3. The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. ☐
4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires a hydromodification plan management ☒

The San Diego River Park Foundation

Name of Owner or Agent *(Please Print)* Title

Signature Date

Clear Page 4

Clear Form

ATTACHMENT 2

BMP Sizing Calculations

Permeable Pavers – Water Quality Sizing Calculation

Self-Mitigating DMA Standards Checklist

Discovery Center at Grant Park
J-17010
1/11/2018

DMA Table & DCV Calculation

DMA/BMP Name	BMP Type	Drainage Management Area (acres)	Drainage Management Area (ft^{2})	% Impervious	Impervious Area - Roof/Concrete/ Asphalt (ft^{2})	Pervious Area - Landscape/Amended Soil/Mulch (ft^{2})	Pervious Area - Decomposed Granite/Permeable Pavers (ft^{2})	Runoff Factor for Impervious Area	Runoff Factor for Landscape/Amended Soil/Mulch	Runoff Factor for Decomposed Granite/Permeable Pavers	Effective Impervious Area (ft^{2})	Effective Runoff Factor	24-hour 85th Percentile Precipitation (inches)	DCV (ft^{3})	Required BMP Footprint (ft^{2})	Provided BMP Bottom Footprint (ft^{2})
DMA 1	Biofiltration BMP	2.3	98,150	58%	57,252	37,716	3,182	0.9	0.1	0.3	56,253	0.57	0.58	2,719	1688	1,780
DMA 2	Self-Mitigating[1]	0.2	7,904	0%	0	5,570	2,334	0.9	0.1	0.3	1,257	0.16	0.58	61	NA	N/A
DMA 3	Retention by Permeable Pavement	0.1	2,758	45%	1,253	0	1,505	0.9	0.1	0.3	1,579	0.57	0.58	76	NA	1,505

Notes:

1. Please refer to the attached Self-Mitigating DMA Standards Checklist for more information on how DMA 2 and 3 qualify as self-mitigating DMAs.

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	2719	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	0	in/hr.
3	Allowable drawdown time for aggregate storage below the underdrain	36	hours
4	Depth of runoff that can be infiltrated [Line 2 x Line 3]	0	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	3	inches
7	Assumed surface area of the biofiltration BMP	1780	sq-ft
8	Media retained pore storage	0.1	in/in
9	Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7	356	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	2363	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12	inches
12	Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations	24	inches
13	Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area	12	inches
14	Freely drained pore storage	0.2	in/in
15	Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
16	Allowable Routing Time for sizing	6	hours
17	Depth filtered during storm [Line 15 x Line 16]	30	inches
18	Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)]	21.6	inches
19	Total Depth Treated [Line 17 + Line 18]	51.6	inches

Note: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (continued)

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 2 of 2)	
Option 1 – Biofilter 1.5 times the DCV			
20	Required biofiltered volume [1.5 x Line 10]	3545	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	824	sq-ft
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
22	Required Storage (surface + pores) Volume [0.75 x Line 10]	1772	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	984	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	98150	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.57	
26	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11)	0.03	
27	Minimum BMP Footprint [Line 24 x Line 25 x Line 26]	1678	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	1678	sq-ft
Check for Volume Reduction [Not applicable for No Infiltration Condition]			
29	Calculate the fraction of DCV retained in the BMP [Line 9/Line 1]	0.13	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☐ Yes	☑ No

Note:

1. Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)
2. The DCV fraction of 0.375 is based on a 40% average annual percent capture and a 36-hour drawdown time.
3. The increase in footprint for volume reduction can be optimized using the approach presented in Appendix B.5.2. The optimized footprint cannot be smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2.
4. If the proposed biofiltration BMP footprint is smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2, but satisfies Option 1 or Option 2 sizing, it is considered a compact biofiltration BMP and may be allowed at the discretion of the City Engineer, if it meets the requirements in Appendix F.

* 3-inches of dead storage is proposed below the sub-drain invert for partial infiltration.

Self-Mitigating DMA Standards Checklist

DMA 2 meets the self-mitigating DMAs standards pursuant to Section 5.2.1 of the Storm Water Standards Manual, January 2016 edition. The incidental impervious percent is less than 5% for each DMA. The proposed/existing landscape areas do not require regular application of fertilizers and pesticides. The self-mitigating area is hydraulically separate from other DMAs that contain storm water pollutant control BMPs. The impervious areas within the self-mitigating DMA are hydraulically disconnected to other impervious areas. DMA 1 and 2 on the other hand does not meet the standards of a self-mitigating DMA and is treated through a pollutant control BMP.

DMA ID	Self-Mitigating DMA Standards Checklist (per Section 5.2.1)	Comments
DMA 2	☒ Vegetation in the natural or landscaped area is native and/or non-native/non-invasive drought tolerant species that do not require regular application of fertilizers and pesticides. ☒ Soils are undisturbed native topsoil, or disturbed soils that have been amended and aerated to promote water retention characteristics equivalent to undisturbed native topsoil. ☒ The incidental impervious areas are less than 5 percent of the self-mitigating area. ☒ Impervious area within the self-mitigated area should not be hydraulically connected to other impervious areas unless it is a storm water conveyance system (such as brow ditches). ☒ The self-mitigating area is hydraulically separate from DMAs that contain permanent storm water pollutant control BMPs.	Pervious area – 7,904 sq.ft Impervious Area – 282 sq.ft Impervious % - 4%

Date Jan 10, 2018
Job No. 17010
Page 1
Done By Ash
Checked By

DMA -3.

Permeable Pavers Calculation

Required DCV = 76 ft^3 (Please refer DMA Table & DCV calculation spreadsheet in Attachment 2)

Permeable pavers footprint = 1505 ft^2

Aggregate Pore space = 0.4

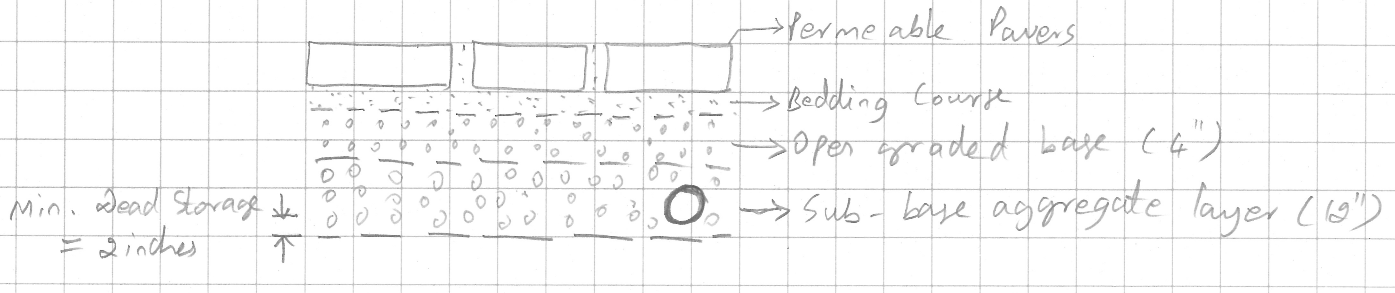
∴ Required aggregate depth to retain DCV $= \dfrac{\frac{76}{1505}}{0.4}$

$= 0.126$ ft

$= 1.5$ in

$\simeq 2$ inch

The project proposes no impermeable liner and 2 inches of aggregate below the under drain invert.



ATTACHMENT 3

Operation and Maintenance Plan

SITE DESIGN, SOURCE CONTROL AND POLLUTANT CONTROL BMP OPERATION & MAINTENANCE PROCEDURE DETAILS

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO.:

O&M RESPONSIBLE PARTY DESIGNEE: THE SAN DIEGO RIVER PARK FOUNDATION

BMP DESCRIPTION		INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	INCLUDED IN O&M MANUAL
SITE DESIGN	LANDSCAPED AREAS	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, ANIMAL BURROWS, HOLDS, MOUNDS, AND TRASH.)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH.	1. FILL AND COMPACT AREAS OF RUTS, RILLS, OR GULLIES; 2. RE-SEED AND/OR PLANT SLOPES AND AREAS OF EXPOSED SOILS; AND 3. ROUTINE MOWING AND TRIMMING AND TRASH REMOVAL.	YES
	OUTLET PROTECTION	1. MONTHLY; 2. WITHIN 24 HOURS AFTER EACH "SIGNIFICANT RAIN EVENT" AND 3. WITHIN 24 HOURS FOLLOWING CONSTRUCTION IN IMMEDIATE AREA OF OUTLET PROTECTION	1. AS DETERMINED BY INSPECTION; 2. WHEN DISTURBED OR MISSING ROCKS (RIP RAP), OR SOIL EROSION BELOW AND/OR ADJACENT TO OUTLET PROTECTION ARE OBSERVED.	1. REMOVE TRASH, DEBRIS AND LEAVES. REPAIR ANY DAMAGE TO ROOF DRAINS; 2. IMMEDIATELY REPOSITION ALL DISPLACED ENERGY DISSIPATER; AND 3. IF SOIL EROSION IS FOUND, EXTEND ENERGY DISSIPATER (I.E. LANDSCAPE ROCKS AND/OR SPLASH PADS); REPOSITION OR INCREASE LIMITS OF ENERGY DISSIPATER TO FULLY COVER ERODED AREA.	YES
SOURCE CONTROL	INTEGRATED PEST MANAGEMENT	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR INDICATIONS OF THE PRESENCE OF PESTS ON-SITE)	WHEN THE PEST OR PESTS, OBSERVED IN GREATEST ABUNDANCE OR CAUSE THE MOST OBSERVED SYMPTOMS, ARE IDENTIFIED.	CHECK FREQUENTLY FOR PESTS, AND TREAT WITH A PESTICIDE ONLY WHEN A PEST IS PRESENT, ETC.	YES
	EFFECTIVE IRRIGATION SYSTEM	MONTHLY	WHEN BROKEN SPRINKLER HEADS, RAIN SHUTOFF DEVICES, AND FLOW REDUCERS ARE OBSERVED; OR RUNNING SPRINKLERS IN RAIN ARE OBSERVED.	REPAIR OR REPLACE THE BROKEN AND/OR MALFUNCTIONING PARTS OF IRRIGATION SYSTEM.	YES
	PREVENTIVE STENCILING AND SIGNAGE	ANNUALLY	WHEN FULLY OR PARTIALLY ERASED SIGNS ARE OBSERVED; WHEN DUMPING OF TRASH ARE OBSERVED AT PUBLIC ACCESS POINTS, BUILDING ENTRANCES, PUBLIC PARKS, ETC.	1. REPLACE OR REPAINT THE STENCILS AND SIGNAGE SO THAT THEY ARE LEGIBLE; AND 2. MAKE SURE THAT THEY ARE PLACED AT ALL REQUIRED LOCATIONS (I.E.- ALL INLETS).	YES

POLLUTANT CONTROL	BIOFILTRATION BASIN (BMP 1)	1. TWICE A YEAR (ON OR BEFORE SEPTEMBER 15TH AND FOLLOWING THE RAINY SEASON AFTER MAY 1ST); AND 2. AFTER EACH "SIGNIFICANT RAIN EVENT" (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INIDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, DEAD VEGETATION, ANIMAL BURROWS, HOLES, MOUNDS, AND TRASH)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH AND FOLLOWING THE RAINY SEASON AFTER MAY 1ST; AND 3. AFTER EACH "SIGNIFICANT RAIN EVENT"[1]	1. REPLACE MULCH IN AREAS OF RUTS, RILLS, OR GULLIES; 2. RE-SEED AND/OR PLANT SLOPES AND AREAS OF EXPOSED SOILS; AND 3. ROUTINE MAINTENANCE TO REMOVE ACCUMULATED MATERIALS SUCH AS TRASH AND DEBRIS. 4. NON-ROUTINE MAINTENANCE WILL BE REQUIRED TO BACKWASH AND CLEAR UNDERDRAINS IF INSPECTION INDICATES UNDERDRAINS ARE CLOGGED. 5. DEPENDING ON POLLUTANT LOADS, SOILS MAY NEED TO BE REPLACED EVERY 5 TO 10 YEARS. 6. THE RISER STRUCTURE SHOULD BE MAINTAINED TO AVOID CLOGGING AND ANY LEAKAGE THROUGH BOLTHOLES.	YES
	PERMEABLE PAVERS	TWICE A YEAR (ON OR BEFORE SEPTEMBER 30TH AND FOLLOWING THE RAINY SEASON AFTER MAY 1ST).	1. AS DETERMINED BY INSPECTION; 2. ON OR BEFORE SEPTEMBER 30TH; 3. WHEN SURFACE INFILTRATION IS SIGNIFICANTLY REDUCED, AND; 4. WHEN SUBDRAINS APPEAR CLOGGED	1. VACUUM SURFACE TO REMOVE ALL SEDIMENT AND DEBRIS IN THE PAVER JOINTS 2. REPLENISH AGGREGATE IN JOINTS IF MORE THAN 1/2 INCH BELOW PAVER SURFACE; 3. INSPECT AND REPAIR ALL PAVER SURFACE DEFORMATIONS EXCEEDING 1/2 INCH; 4. REPLACE CRACKED PAVER UNITS;	YES

NOTES:

1. A SIGNIFICANT RAIN EVENT CONSIDERED WHENEVER THE NATIONAL WEATHER SERVICE REPORTS 0.50" OF RAIN IN 48 HOURS FOR THE LOCAL COMMUNITY.

2. DURING THE FIRST YEAR OF NORMAL OPERATION, ALL BMPS SHOULD BE INSPECTED ONCE BEFORE AUGUST 31 AND THEN MONTHLY FROM SEPTEMBER THROUGH MAY. THE MINIMUM INSPECTION AND MAINTENANCE FREQUENCY SHOULD BE DETERMINED BASED ON THE RESULTS OF THE FIRST YEAR INSPECTIONS.

ATTACHMENT 4

HMP Exemption Backup Materials

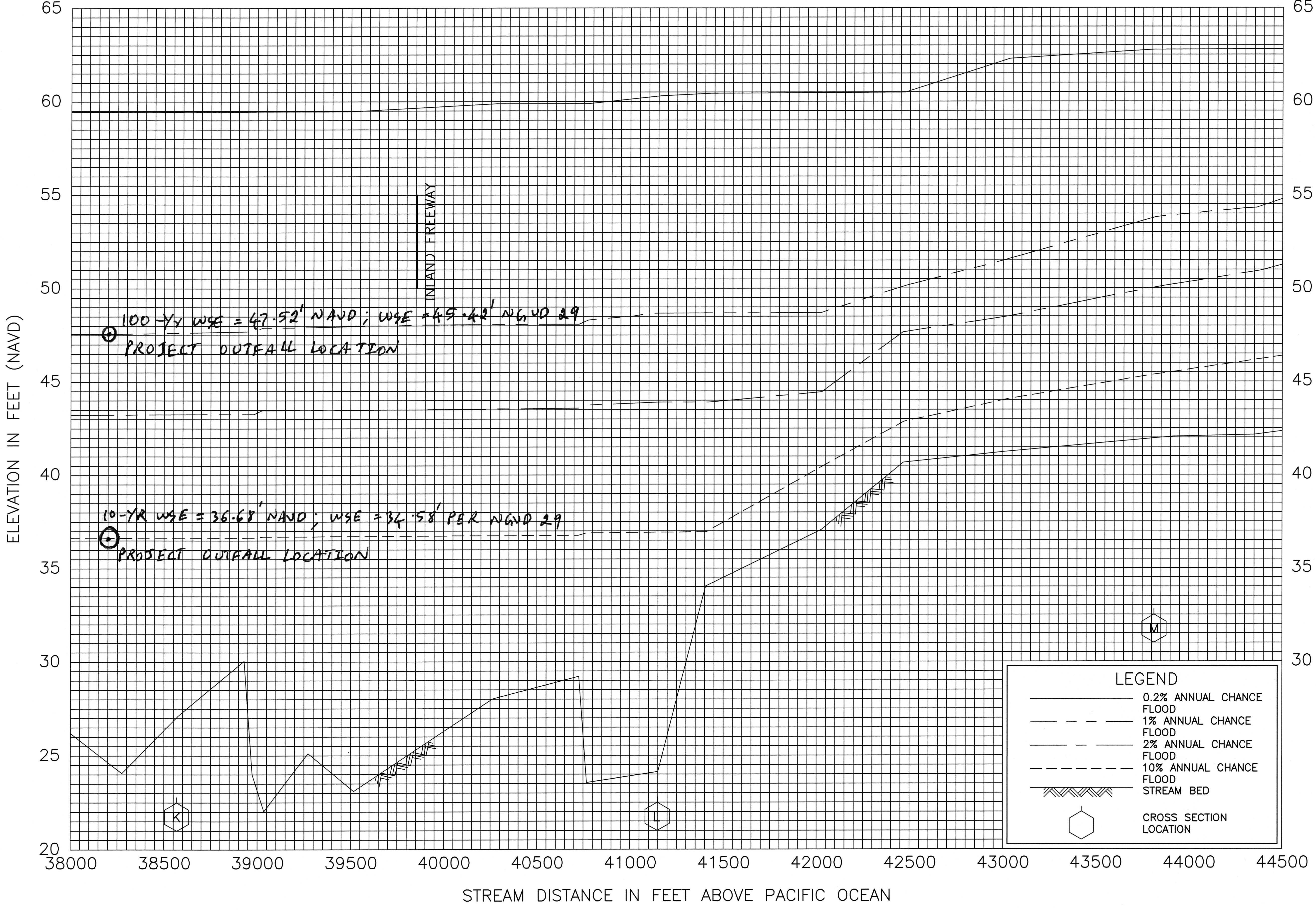
TABLE 8: SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. miles)	Peak Discharges (cubic feet per second) 10% Annual-Chance	2% Annual-Chance	1% Annual-Chance	0.2% Annual-Chance
At San Diego River	14.0	2,700	4,500	5,100	6,500
Beaver Hollow Creek					
Approximately 1,200 Feet Downstream of Beaver Hollow Road	5.0	--	--	4,000	--
Beeler Creek					
At U.S. Geological Survey (USGS) Gage on Downstream Side of Pomerado Road	5.5	700	2,400	3,600	9,200
Borrego Palm Canyon					
At Apex of Alluvial Fan	23.3	3,100	7,700	10,650	14,800
Box Canyon					
At Apex of Alluvial Fan	5.9	850	2,600	3,850	4,950
Broadway Creek					
At Mouth	3.8	500	1,200	1,600	4,200
Buena Creek					
At Mouth	6.3	1,880	3,520	4,100	5,420
At Buena Creek Road	1.5	--	--	1,980	--

-- Data Not Available

FLOOD INSURANCE STUDY VOLUME 9 OF 11, REVISED MAY 16, 2012

PROJECT OUTFALL LOCATION



100-Yr WSE = 47.52' NAVD; WSE = 45.42' NGVD 29

PROJECT OUTFALL LOCATION

10-YR WSE = 36.68' NAVD; WSE = 34.58' PER NGVD 29

PROJECT OUTFALL LOCATION

FLOOD PROFILES

SAN DIEGO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

SAN DIEGO COUNTY, CA
(AND INCORPORATED AREAS)

JN-17010

NOTES:

1. THE PROJECT OUTFALL DISCHARGES DIRECTLY INTO THE SAN DIEGO RIVER, A HMP EXEMPT RIVER SYSTEM. FOR MORE INFORMATION REGARDING THE HMP EXEMPTION PLEASE REFER SECTION 3.4 OF THE ORIGINAL WQTR TITLED, "WATER QUALITY TECHNICAL REPORT FOR DISCOVERY CENTER AT GRANT PARK"; LAST REVISED, SEPTEMBER 10, 2015 (PTS NO. 369379).

LEGEND:

▬ ▬ ▬ PROJECT BOUNDARY

RICK™
ENGINEERING COMPANY
San Diego

5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165

rickengineering.com

Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-17010

HMP EXEMPTION EXHIBIT
FOR
DISCOVERY CENTER AT GRANT PARK

J-17010

Date: January 12, 2018

NOT FOR CONSTRUCTION - EXHIBIT FOR WQTR ONLY

EXHIBIT 1

Water Quality Technical Report Exhibit
For
Discovery Center at Grant Park

[Revised Version for Addendum No. 1]

NOTES:

1. DISCOVERY CENTER AT GRANT PARK CONTAINS THREE (3) DRAINAGE MANAGEMENT AREAS (DMA). IN THE POST-PROJECT CONDITION, DMA 1 HAS AN AREA OF 2.3 ACRES (58% IMPERVIOUS) AND DISCHARGES TO THE BIOFILTRATION SYSTEM, BMP 1. DMA 2 IS A SELF-MITIGATING DMA PURSUANT TO SECTION 5.2.1 OF THE STORM WATER STANDARDS MANUAL, JANUARY 2016 EDITION. PLEASE REFER TO ATTACHMENT 2 FOR THE SELF-MITIGATING DMA STANDARDS CHECKLIST FOR MORE INFORMATION. DMA 2 HAS AN AREA OF 0.2 ACRES (0% IMPERVIOUS). DMA 3 HAS AN AREA OF 0.1 ACRES (45% IMPERVIOUS) AND IS TREATED BY PERMEABLE PAVERS (POLLUTANT CONTROL).
2. THE PROJECT IS SOUTH OF AN EXISTING HYDROLOGIC FEATURE, THE SAN DIEGO RIVER.
3. THE PROJECT OUTFALL DISCHARGES DIRECTLY INTO THE SAN DIEGO RIVER, A HMP EXEMPT RIVER SYSTEM. FOR MORE INFORMATION REGARDING THE HMP EXEMPTION PLEASE REFER SECTION 3.4 OF THE ORIGINAL WQTR TITLED, "WATER QUALITY TECHNICAL REPORT FOR DISCOVERY CENTER AT GRANT PARK"; LAST REVISED, SEPTEMBER 10, 2015 (PTS NO. 369379).
4. UNDERLYING HYDROLGIC SOIL GROUP IS "D".
5. A BIOFILTRATION BMP (BMP 1) HAS BEEN PROPOSED AS A POLLUTANT CONTROL BMP IN DMA 1. THE FOOTPRINT OF THE PROPOSED BMP IS 1780 SF.
6. PERMEABLE PAVEMENT (BMP 2) HAS BEEN PROPOSED AS A POLLUTANT CONTROL BMP IN DMA 3. THE FOOTPRINT OF THE BMP IS 1505 SF. THE PROJECT PROPOSES NO IMPERMEABLE LINER AND THE UNDER DRAIN INVERT HAS BEEN PLACED ABOVE THE CALCUATED DCV. PLEASE REFER ATTACHMENT 2 FOR DCV AND BMP SIZING CALCUATIONS.

LEGEND:

DMA-X	DMA ID
▪▪▪▪	DMA BOUNDARY
XX.X AC	DMA AREA
▨	PROPOSED ASPHALT
☐	PROPOSED CONCRETE WALKWAY
■	PROPOSED BUILDING FOOTPRINT
▩	PROPOSED DG
▦	ENHANCED CONCRETE
≈	PROPOSED BIOFILTRATION BMP
▤	PROPOSED PERMEABLE PAVERS BMP

WATER QUALITY TECHNICAL REPORT FOR DISCOVERY CENTER AT GRANT PARK

J-17010

Date: April 30, 2014
Revised Date: September 14, 2015
Revised Date: November 10, 2017
Revised Date: January 12, 2018

RICK
ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-17010

NOT FOR CONSTRUCTION - EXHIBIT FOR WQTR ONLY

WATER QUALITY TECHNICAL REPORT
FOR
DISCOVERY CENTER AT GRANT PARK
(SITE DEVELOPMENT PERMIT)

Project # 369379
IO # XXXXX

Job Number 17010

April 30, 2014
Revised: October 6, 2014
Revised: September 10, 2015

RICK
ENGINEERING COMPANY

WATER QUALITY TECHNICAL REPORT
FOR
DISCOVERY CENTER AT GRANT PARK

(SITE DEVELOPMENT PERMIT)

Project # 369379
IO # xxxxxxxx

Job Number 17010

REGISTERED PROFESSIONAL ENGINEER
BRENDAN CRAIG HASTIE
NO. 65809
EXP. 9/30/17
CIVIL
STATE OF CALIFORNIA

Brendan Hast

Brendan Hastie, P.E.
R.C.E. #65809
Exp. 09/17

Prepared For:

Mr. Rob Hutsel
San Diego River Park Foundation
4891 Pacific Highway
San Diego, California 92110
(619) 297-7380

Prepared By:

Rick Engineering Company
Water Resources Department
5620 Friars Road
San Diego, California 92110-2596
(619) 291-0707

April 30, 2014
Revised: October 6, 2014
Revised: September 10, 2015

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Appendix D: Hydromodification Exemption Backup Material
Appendix E: Storm Water Management and Discharge Control Maintenance Agreement

Map Pocket

Map Pocket 1: Water Quality Technical Report Exhibit for Discovery Center at Grant Park

WATER QUALITY TECHNICAL REPORT
HYDROMODIFICATION MANAGEMENT PLAN
FOR
DISCOVERY CENTER AT GRANT PARK
(SITE DEVELOPMENT PERMIT)

REVISION PAGE(S)

September 10, 2015

This water quality technical report presents a revision to the October 6, 2014 report pursuant to plan check comments (Cycle 3 Preliminary Review, LDR-Engineering Review) and to address additional modifications throughout the site. The following text identifies the plan check comment along with the response.

16. At the bottom of page 2, please verify if the runoff from the ponding areas spills over onto Camino Del Rio North. Is drainage from this project site drain north? (From Cycle 3)

Runoff will not overtop into Camino Del Rio North during a 100-year storm event, the explanation of flow patterns from the existing sump areas was only intended for general characteristics. However, backup calculations for the storage volume and maximum ponded surface elevation based on infiltration rates obtained by the geotechnical engineer have been included in the drainage study for reference, and the narratives for the pre-project and post-project drainage characteristics have been updated accordingly.

17. On page 3, please include the discussion of the drainage from Discovery Place that will enter the HMP basin located within this project site. Based on the WQTR for Discovery Place, they are still proposed to use a portion of this project as HMP facility. (From Cycle 3)

In Section 1.3, the paragraph for the post-project drainage characteristics has been updated to include a discussion of the drainage from the "Discovery Place Camino Del Rio North" project located south of Camino Del Rio North. This includes acknowledgement that the other project will be using the existing sump area located on-site as an HMP facility.

18. For the source control BMP, trash storage areas, please explain how this BMP will be met? Will there be trash bins or containers proposed? (From Cycle 3)

The project proposes trash storage area but at this design stage of the project, the location is not determined yet. Upon final engineering, the location of the proposed trash area will be determined and designed pursuant to the source control BMP criteria. Section 3.1 has been revised to add this explanation.

19. On the last paragraph of page 21, why six tributary areas will be directed to seven TC-BMP locations? Please verify. (From Cycle 3)

Six tributary areas will be directed to six TC-BMP locations. The text in section 3.3.2 of this report has been revised to state "six (6) TC BMP locations."

20. Since this project will accept the off-site drainage from the Discovery Place project and the existing storm drain pipe is being relocated, how the off-site drainage will comply with the HMP requirements? (From Cycle 3)

The existing storm drain proposed by the project to be extended and relocated will outlet at the same existing sump area. Based on the existing condition topography prepared for the project and the provided location and volume of the proposed hydromodification (HMP) basin proposed by the "Discovery Place Camino Del Rio North" (refer to Exhibit "A" letter of permission for offsite grading/improvements I.O. 24004423, PTS No.358394 and DWG. 37906-D), the hydromodification management basin was re-delineated at the proper location based on the project existing condition topography (refer to exhibit titled "Water Quality Technical Report Exhibit for Discovery Center at Grant Park," located in Map Pocket 1 for the location of the relocated HMP basin). Also, it is important to mention that the relocated storm drain will continue to direct runoff into the existing ponding area/sump that is within the San Diego River floodplain limits. San Diego River is an exempt river system as explained in Section 3.4.1 of the report; therefore, the off-site drainage complies with the HMP requirements.

WATER QUALITY TECHNICAL REPORT
HYDROMODIFICATION MANAGEMENT PLAN
FOR
DISCOVERY CENTER AT GRANT PARK
(SITE DEVELOPMENT PERMIT)

REVISION PAGE(S)

October 6, 2014

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1.0 INTRODUCTION

1.1 Project Description

This water quality technical report (WQTR) summarizes storm water protection requirements for the proposed Discovery Center at Grant Park project in support of Site Development Permit (herein referred to as the "project"). The project is located within the City of San Diego, at the north-east corner of the Qualcomm Way and Camino Del Rio North intersection. For the location of the project see Figure 1, Vicinity Map, located at the end of Section 1.0. The proposed development consists of a multi-purpose building, exhibit building, small amphitheater, festival lawn, regional trail, and surface parking.

This WQTR describes the permanent storm water Best Management Practices (BMPs) that will be incorporated into the project in order to mitigate the impacts of pollutants in storm water runoff from the proposed project. For the purposes of post-construction storm water quality management, the project will follow the guidelines and requirements set forth in the City of San Diego's "Storm Water Standards," dated January 20, 2012 (herein "Storm Water Standards") adopted by the City of San Diego.

1.2 Determination for Permanent BMP Requirements

Requirements for permanent BMPs are determined based on criteria set forth in the City of San Diego's Storm Water Requirements Applicability Checklist. Projects are identified by three categories:

- Priority Development Project
- Standard Development Project
- Exempted Project

The project is a “Priority Development Project,” based on the Storm Water Standards. The project applies to the following priority development project categories based on the City of San Diego’s Storm Water Requirements Applicability Checklist: Commercial development and similar non-residential development greater than one acre, Water Quality Sensitive Area, and Parking lot with a minimum area of 5,000 square feet or a minimum of 15 parking spaces. A copy of the Storm Water Requirements Applicability Checklist for the project is located in Appendix A of this WQTR.

1.3 Drainage Characteristics

The project site consists of undeveloped area consisted of multiple ponding/sump areas with different low points and conveyance capacity, and with established vegetation. The project site is bounded by the regional trail that is adjacent to the San Diego River to the north, Qualcomm Way to the west and Camino Del Rio North to the south.

Pre-Project Condition

In the pre-project condition, runoff from the project site including the offsite runoff from currently undeveloped area south of Camino Del Rio North, (area bounded by the I-805 south bound off-ramp and Camino Del Rio North), that will be ultimately developed by the proposed “Discovery Place Camino Del Rio North” project prepared by Pasco Laret Suiter and Associates, and the surface runoff from portion of Camino Del Rio North ultimately will discharge to San Diego River. The runoff from the area located south of the Camino Del Rio North is captured by the existing 24-inch Reinforced Concrete Pipe (RCP) that conveys flows in northern direction. The street runoff from the southern portion of Camino Del Rio North is captured by four existing median inlets and conveyed by the existing 18” RCP to the above mentioned existing 24” RCP. The combined flows from the surface runoff of these two areas are further conveyed by the existing 24” RCP in northern direction to the northern side of Camino Del Rio North where the flows intercepted by the existing curb inlet from the surface runoff of the northern portion of Camino Del Rio are combined and conveyed by the existing 24” RCP in northern direction into the project site. The project site is an undeveloped area consisted of multiple ponding/sump areas. The combined runoffs from the project site and the offsite runoff will then pond in the multiple ponding/sump areas that have different conveyance capacity and the runoff will spill over from one to another until it gets to the maximum available ponding elevation and then hypothetically would spill over onto Camino Del Rio North at some potential large storm event (larger than 100-year storm event). From there the runoff will flow in west direction towards Qualcomm Way to the existing curb inlet into the existing storm drain pipe located along the street that discharges into the existing 4’Hx4’W double culvert box and ultimately discharges to San Diego River. However, based on the performed geotechnical investigation it was determined that the existing sump areas have a high infiltration rate that will allow the sump areas to infiltrate prior to overtopping. See below for further discussion, including backup calculations for the 100-year storm event.

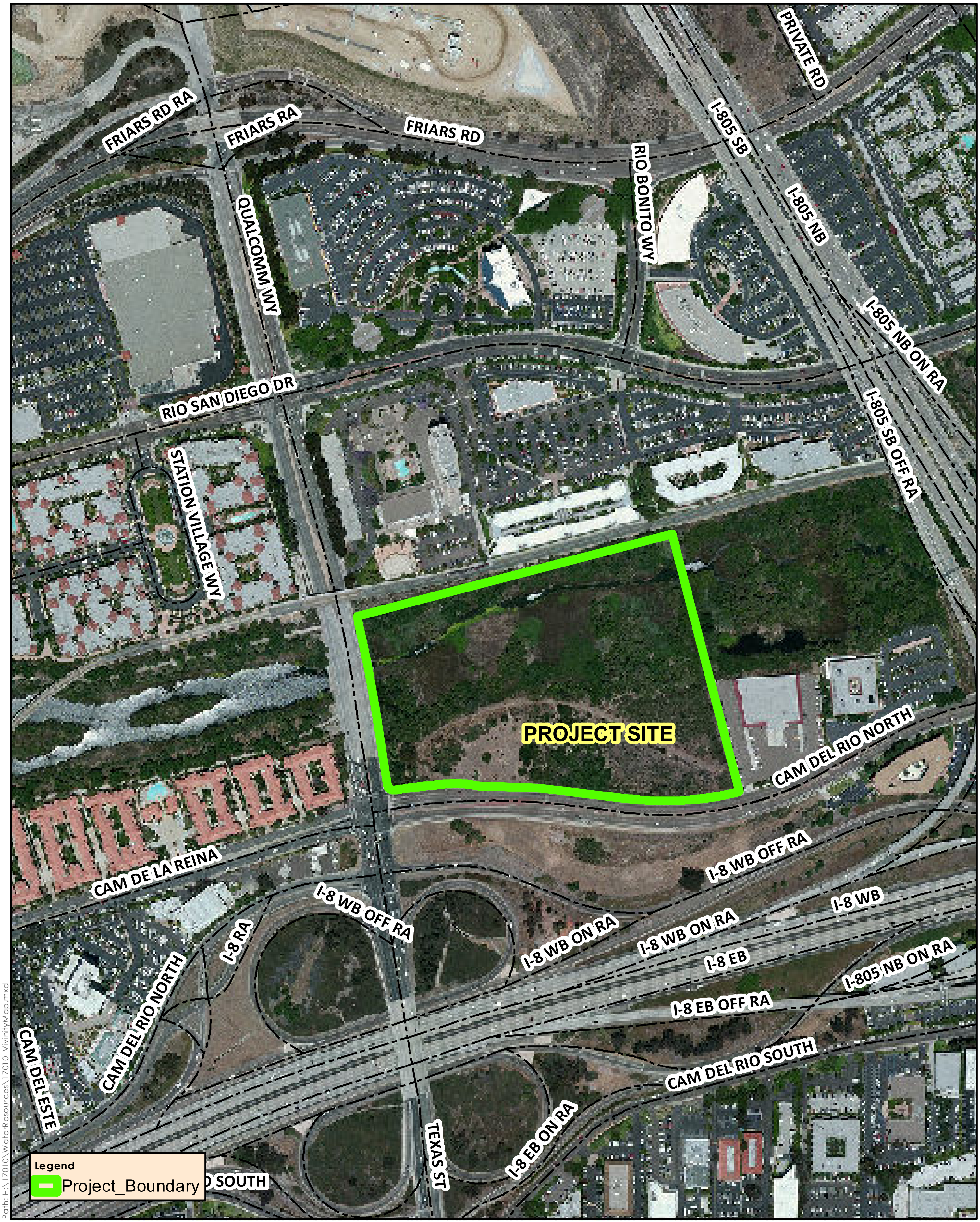
Post-Project Condition

In the post-project condition, the drainage characteristics will remain similar to the pre-project condition. Runoff from the project site including the offsite runoff from the undeveloped area south of Camino Del Rio North, (area bounded by the I-805 south bound off-ramp and Camino Del Rio North), that will be ultimately developed by the proposed “Discovery Place Camino Del Rio North” project prepared by Pasco Laret Suiter and Associates, and the runoff from portion of Camino Del Rio North ultimately will also discharge to San Diego River. The runoff generated by the “Discovery Place Camino Del Rio North” project combined with the runoff generated by the portion of Camino Del Rio North is conveyed by the existing 24” RCP under Camino Del Rio North that ultimately discharges into the existing ponding/sump area within the project site area. The existing ponding/sump area per “Discovery Place Camino Del Rio North” project is proposed to serve as hydromodification management BMP facility and meet the hydromodification management requirements for their project.

Based on the project improvements, the project proposes improvements to the most northern portion of the existing 24” RCP storm drain system that directly outlets in the project site area. The improvements to that portion of the existing 24” RCP consist of extending the pipe under the proposed entrance area to a point where the flows will be discharged in the same ponding/sump area as proposed by the “Discovery Place Camino Del Rio North” project. Based on the existing condition topography prepared for the project and the provided location and volume of the proposed hydromodification basin proposed by the “Discovery Place Camino Del Rio North” (refer to Exhibit “A” letter of permission for offsite grading/improvements I.O. 24004423, PTS No.358394 and DWG. 37906-D), the hydromodification basin was re-delineated based on more accurate on-site existing topography. Refer to exhibit titled “Water Quality Technical Report Exhibit for Discovery Center at Grant Park,” located in Map Pocket 1 for the location of the relocated HMP basin.

More details regarding drainage characteristics and detailed hydraulic calculations are discussed in the drainage study, titled “Drainage Study for Discovery Center at Grant Park,” dated September 10, 2015, prepared by Rick Engineering Company (Job Number 17010). As shown in the Drainage Study, the remaining sump area does not overflow during a 100-year storm event due to the high infiltration rates.

The following sections of this WQTR describe the pollutants and conditions of concern for the project (Section 2.0), the permanent BMPs to be implemented for the project as well as hydromodification management requirements (Section 3.0), and the operation and maintenance plan for permanent BMPs (Section 4.0).



Path: H:\17010\WaterResources\17010_VicinityMap.mxd

Date of Exhibit: 02.28.2014
Eagle Aerial Image: 05.2012

RICK
ENGINEERING COMPANY

Scale in Feet
0 200 400

North

Figure 1: Vicinity Map

Discovery Center at Grant Park

J-17010

2.0 IDENTIFICATION OF POLLUTANTS OF CONCERN

The project is a “Priority Development Project,” based on the Storm Water Standards. Section 4 of the Storm Water Standards outlines the procedure for the selection of permanent storm water BMPs. The procedure begins with identification of pollutants of concern, a two-step process described in Section 4.1.5 and 4.1.6 of the Storm Water Standards. This section of the WQTR addresses each step to identify pollutants and of concern.

2.1 Identification of Anticipated Project Pollutants

Table 4-1 of the Storm Water Standards, “Anticipated and Potential Pollutants Generated by Land Use Type,” identifies general pollutant categories that are either anticipated or potential pollutants for general project categories. The following general project categories listed in Table 4-1 apply to the project: “Commercial Development” and “Parking lots”. Table 4-1 of the Storm Water Standards is renamed as Table 2.1 and reproduced on the following page, with the Priority Development Project categories applicable to the project highlighted.

Table 2.1: Anticipated and Potential Pollutants Generated by Land Use Type

	General Pollutant Categories								
General Project Categories	**Sediments**	**Nutrients**	**Heavy Metals**	**Organic Compounds**	**Trash & Debris**	**Oxygen Demanding Substances**	**Oil & Grease**	**Bacteria & Viruses**	**Pesticides**
Detached Residential Housing Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(1)	P(2)	P(1)	X
Commercial Development	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Industrial Development	X		X	X	X	X	X		
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	P(1)
Steep Hillside Developments	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X	X	P(1)
Retail Gasoline Outlets (RGO)			X	X	X	X	X		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

Source: City of San Diego "Storm Water Standards," dated January 20, 2012.

Based on the highlighted rows, the project can be expected to generate: sediment, nutrients, heavy metals, organic compounds, trash and debris, oxygen demanding substances, oil and grease, pesticides, and bacteria & virus.

2.2 Identification of Pollutants of Concern for the Receiving Water

Based on Section 4.1.5 and 4.1.6 of the Storm Water Standards, to identify pollutants of concern in receiving waters, the following analysis shall be conducted and reported in the project's WQTR: (1) for each of the proposed project discharge points, identify the receiving water(s), including hydrologic unit basin number(s), as identified in the most recent version of the "Water Quality Control Plan for the San Diego Basin," prepared by the SDRWQCB; (2) identify any receiving waters included in the 2010 CWA Section 303(d) List of Water Quality Limited Segments, approved by the State Water Resources Control Board on November 12, 2010; and (3) identify any receiving waters for which Total Maximum Daily Loads (TMDL) have been developed. List all pollutants for which the TMDL was developed.

2.2.1 Identification of Receiving Waters

According to the "Water Quality Control Plan for the San Diego Basin (9)," adopted by the California Regional Water Quality Control Board San Diego Region on September 8, 1994 approved by the SWRCB on December 13, 1994 (Basin Plan), the proposed project is located in the following hydrologic basin planning area:

Hydrologic Unit – San Diego (907)
Hydrologic Area – Lower San Diego (.1)
Hydrologic Subarea – Mission San Diego (.11)

The corresponding number designation is 907.11 (Region '9', Hydrologic Unit '07', Hydrologic Area '1', Hydrologic Subarea '1'). An exhibit has been provided in Appendix B of this report titled "Hydrologic Unit for Discovery Center at Grant Park" which shows the project location in reference to the hydrologic basin.

2.2.2 Identification of Receiving Water Impairments

On October 11, 2010, the SWRCB approved the 2010 CWA Section 303(d) List of Water Quality Limited Segments (303(d) List). Subsequently on November 12, 2010, the United States Environmental Protection Agency (USEPA) approved the SWRCB's inclusion of all waters and pollutants identified for the San Diego region in its 2010 List of Water Quality Limited Segments. Runoff from the project will discharge into San Diego River. San Diego River from Hydrologic Unit 907.11 is listed on CWA 303(d) list as impaired for: enterococcus (pathogens), fecal coliform (pathogens), low dissolved oxygen (nutrients), manganese (metals/metalloids), nitrogen (nutrients), phosphorous (nutrients), total dissolved solids (salinity), and toxicity (toxicity).

2.2.3 Pollutants of Concern for the Project

Based on the Anticipated Project Pollutants and those of the Receiving Waters, the most significant pollutants of concern for the project are those that both are anticipated, and are a concern for the receiving water (as described by Section 4.4.1 of the Storm Water Standards). Based on Table 2.1 and the 2010 CWA Section 303(d) List of Water Quality Limited Segments, the following are the project's pollutants of concern: sediment, nutrients, heavy metals, organic compounds, trash and debris, oxygen demanding substances, oil and grease, pesticides, and bacteria & virus. This information will be utilized in the selection procedure for Treatment BMPs, described in the following section of this WQTR.

3.0 PERMANENT STORM WATER BEST MANAGEMENT PRACTICES (BMPS)

The project is the Priority Development Project. The following discussion addresses requirements of Section 4 of the Storm Water Standards, to establish permanent BMPs. Projects subject to Priority Development Project requirements shall implement all applicable source control BMPs and low impact development (LID) design practices described in Sections 4.2 and 4.3, respectively, of the Storm Water Standards

Sections 3.1 through 3.4 of this WQTR will discuss the permanent storm water BMPs proposed for the project.

3.1 Source Control BMPs

The term “source control BMP” refers to land use or site planning practices, or structures that aim to prevent urban runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff. The following text discusses the source control BMPs from Section 4.2 of the Storm Water Standards with respect to the project. Italicized text is taken directly from the Storm Water Standards, and reproduced for this report. Portions of the italicized text are condensed from the Storm Water Standards. Immediately following and written in regular text, will be the response as it applies to the project.

a. Maintenance Bays

- *Maintenance bays shall include at least one of the following:*
    1. *Repair/maintenance bays shall be indoors; or,*
    2. *Drainage system designed to preclude urban run-on and runoff.*

Maintenance bays shall include a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Drains shall be connected to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm water conveyance system is prohibited

The project does not propose any Maintenance Bays.

b. Vehicle and Equipment Wash Areas

- *Areas for washing/steam cleaning of vehicles and areas for outdoor equipment/accessory washing and steam cleaning shall be:*
  1. *Self-contained to preclude run-on and run-off, covered with a roof or overhang, and equipped with a clarifier or other pretreatment facility; and*
  2. *Properly connected to a sanitary sewer.*

The project does not propose any Vehicle and Equipment Wash Areas.

c. Outdoor Processing Areas

- *Outdoor processing areas shall:*
  1. *Cover and enclose areas that would be the most significant source of pollutants;*
  2. *Slope the area toward a dead-end sump; or*
  3. *Discharge to the sanitary sewer system*

Berms or site grading shall be utilized to prevent run-on from surrounding areas. Installation of storm drains in areas of equipment repair is prohibited.

The project does not propose any Outdoor Processing Areas.

d. Retail and Non-Retail Fueling Areas

- *Retail and non-retail fueling areas shall be:*
  1. *Paved with Portland cement concrete or equivalent smooth impervious surface (asphalt concrete is prohibited);*
  2. *Designed to extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less;*
  3. *Sloped to prevent ponding*

4. *Separated from the rest of the site by a grade break that prevents run-on of adjacent urban runoff; and*
5. *Designed to drain to the project's treatment control BMP(s) prior to discharging to the storm water conveyance system.*

- *The overhanging roof structure or canopy shall be:*
  1. *Equal to or greater than the area within the fuel dispensing area's grade break; and*
  2. *Designed to drain away from the fuel dispensing area.*

The project does not propose any Retail and Non-Retail Fueling Areas.

e. Steep Hillside Landscaping

- *Steep hillside areas disturbed by project development shall be landscaped with deep-rooted, drought tolerant and/or native plans species selected for erosion control, in accordance with the Landscape Technical Manual.*

The project does not propose to disturb any steep hillside areas.

f. Use Efficient Irrigation Systems and Landscape Design

- *Implement rain shutoff devices to prevent irrigation during and after precipitation events in accordance with section 2.3-4 of the City of San Diego's Landscape Standards (See Suggested Resources in Appendix A)*
- *Reduce irrigation contribution to dry-weather runoff by avoiding spray irrigation patterns where overspray to paved surfaces or drain inlets will occur.*
- *To avoid overwatering and potential irrigation runoff, design the irrigation systems to each landscape area's specific water requirement*
- *Implement flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines*

- *Avoid locating drain inlets in lawn areas, since such inlets tend to be sources of irrigation runoff and the transport mechanism for lawn care products. Design the grading and drainage systems such that drain inlets can be located outside of the lawn area or include a non-turf buffer around the inlet.*

Irrigation system for the project, if applicable, will be designed pursuant to the guidelines shown above.

g. Design Trash Storage Areas to Reduce Pollution Contribution

- *Trash storage areas shall:*
  1. *Be paved with an impervious surface designed to prevent run-on from adjoining areas and screened or walled to prevent off-site transport of trash.*
  2. *Contain attached lids on all trash containers to prevent rainfall intrusion.*
  3. *Contain a roof or awning, at the discretion of the City, for high usage trash areas such as those for fast food establishments, convenience stores, and high density residential developments.*

The project proposes trash storage area, but the location of the proposed project trash storage areas is not known at this design stage of the project. Upon final engineering the proposed trash storage area will be designed pursuant to the guidelines shown above.

h. Design Outdoor Material Storage Areas to Reduce Pollution Contribution

- *Materials with the potential to contaminate urban runoff shall be:*
  1. *Placed in an enclosure such as a cabinet, shed, or other structure that prevents contact with rainfall or runoff and prevents spillage to the storm water conveyance system, and*
  2. *Protected by secondary containment structures such as berms, dikes or curbs when the material storage area includes hazardous materials. The storage areas shall be paved and sufficiently impervious to contain leaks and spills and to be*

covered by a roof or awning to minimize direct precipitation within the secondary containment area.

The project does not propose any outdoor materials storage areas. If these conditions change it is the responsibility of the project site owner/operator to ensure that outdoor materials storage will be designed pursuant to the guidelines shown above.

i. Design Loading Docks to Reduce Pollution Contribution

- *Loading dock areas shall:*
  1. *Provide overhead cover where appropriate to prevent precipitation contact with debris and potential spills, and*
  2. *Isolate drainage in the loading dock areas through the use of paved berms and/or grade breaks to prevent adjacent runoff from entering the loading area and to prevent liquid spills from discharging from the loading area.*
  3. *Include an acceptable method of spill containment such as a shut-off valve and containment areas.*

The project does not propose Loading Docks.

j. Employ Integrated Pest Management Principles

- *Integrated pest management (IPM) is an ecosystem-based pollution prevention strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as:*
  1. *Biological Control*
  2. *Habitat Manipulation*
  3. *Use of resistant plant varieties*

Pesticides are used only after monitoring indicates they are needed according to established guidelines. Pest control materials are selected and applied in a manner that *minimizes risks to human health, beneficial and non-target organisms, and the surrounding environment. More information regarding pesticide application may be obtained at the following University of California-Davis website:* *http://www.ipm.cdavis.edu/WATER/U/index.html*.

- *To eliminate or reduce the need for pesticide use, the following strategies can be used:*
  1. *Plant pest-resistant or well-adapted plant varieties*
  2. *Discourage pests by modifying the site and landscape design*

- *IPM educational materials should be distributed to future site residents and tenants. These materials should address the following:*
  1. *Use of barriers, screens, and caulking to keep pests out of buildings and landscaping*
  2. *Physical pest elimination techniques, such as weeding, washing, or trapping pests*
  3. *Relying on natural enemies to eliminate pests*
  4. *Proper use of pesticides as a last line of defense*

The project will include landscaping in accordance with the City of San Diego's Landscape requirements. The party responsible to ensure implementation and funding of maintenance of permanent BMPs will be responsible to require IPM to be implemented in the landscape maintenance procedures.

k. Provide Storm Water Conveyance System Stamping and Signage

- *Concrete stamping, or approved equivalent method, shall be provided for all storm water conveyance system inlets and catch basins within the project area.*
- *Language associated with the stamping (e.g., "No Dumping- I Live in San Diego Bay") must be satisfactory to the City Engineer. Stamping may also be required in Spanish.*

- *Post signs and prohibitive language (with graphical icons) which prohibit illegal dumping at trailheads, parks, building entrances and public access points along channels and creeks within the project area.*

Concrete stamping, or equivalent, with prohibitive language will be provided for curb inlets, catch basins, and any Brooks Box inlets located within the project site pursuant to the guidelines shown above.

l. Manage Fire Sprinkler System Discharges

- *For new buildings with fire sprinkler systems, design fire sprinkler system as follows:*
  1. *Contain discharged from sprinkler systems' operational maintenance and testing and convey discharges to the sanitary sewer system*

The fire sprinkler systems, if installed, will be designed pursuant to the guidelines shown above.

m. Manage Air Conditioning Condensate

- *Air conditioning condensate is a source of dry-weather runoff and elevated copper levels. Include design features to manage this pollutant source, including the following:*
  1. *Direct air conditioning condensate to the sanitary sewer system*
  2. *Direct air conditioning condensate to landscaping areas*

The air conditioning system will be designed pursuant to the guidelines shown above.

n. Use Non-Toxic Roofing Materials Where Feasible

- *Avoid the use of galvanized steel or copper for roofs, gutters, and downspouts*
- *If using such materials, reduce the potential for leaching of metals by applying a coating or patina*

- *Avoid composite roofing materials that contain copper*

The roofing materials will be designed pursuant to the guidelines shown above.

o. Other Source Control Requirements

- *Require implementation of post-construction soil stabilization practices, such as the re-vegetation of construction sites, in conformance with the approved Landscaping Plan and Grading Plans*
- *Provide for pet waste and collection dispensers where applicable*
- *Restrict the use of galvanized and copper roofing materials*

The project will meet all applicable Source Control guidelines above.

3.2 Low Impact Development (LID) BMPs

The term low impact development (LID) means a storm water management and land development strategy that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely reflect pre-development hydrologic functions. The following text discusses the low impact development BMPs from Section 4.3 of the Storm Water Standards with respect to the project. Italicized text is taken directly from the Storm Water Standards, and reproduced for this report. Portions of the italicized text are condensed from the Storm Water Standards. Immediately following and written in regular text, will be the response as it applies to the project.

3.2.1 Suitable Facilities

Suitable LID facilities are those facilities that retain, reuse or promote evapotranspiration of storm water. This project proposes the use of new bioretention areas.

3.2.2 Additional Guidance on Low-Impact Development Design

1. *Optimize the site layout.*

The existing site is currently vacant in its natural condition. The majority of the project site will still remain in its natural condition.

2. *Minimize Impervious Footprint*

Landscape areas will be provided throughout the project to help minimize overall impervious footprint. Impervious surfaces will be directed to pervious areas such as landscaped areas, permeable pavers and decomposed granite to the maximum extent practicable (MEP) to help reduce the "effective" percent imperviousness for the project.

3. *Disperse Runoff to Adjacent Landscaping and IMPs*

The project proposes landscaped and vegetated areas to be incorporated throughout the project site, which will reduce the directly connected impervious areas. Rooftop runoff will also be discharged through vegetated areas and/or Treatment Control (TC) BMPs prior to entering the storm drain system. Runoff from impervious surfaces will be directed, where feasible, to adjacent landscaping areas and/or treatment control best management practice (TC-BMP) prior to discharging into the storm drain system.

4. *Design and Implementation of Pervious Surfaces*

Pervious surfaces will be implemented in various areas throughout the project site, including landscaping and vegetated areas.

5. *Construction Considerations*

The project will incorporate specific construction considerations such as incorporating soil amendments for landscape areas, where applicable.

6. *Additional Consideration*

The site will be stabilized and landscaped in accordance with the City's Landscape Technical Manual. Runoff will be conveyed safely away from the top of slopes via swales and/or area drains. Energy dissipaters area proposed at all storm drain outlet/outfall locations, and splash pads and/or landscape rocks will be provided for roof drain outlets and concentrated outlets into landscaped areas to help minimize potential erosion.

3.3 Treatment Control BMPs

Pursuant to Section 4.4 of the Storm Water Standards, after source control BMPs and LID have been incorporated into the project, applicants of Priority Development Projects shall design a single or combination of treatment control BMPs designed to infiltrate, filter, and/or treat runoff from the project footprint. The required LID BMPs may be applied towards the numeric sizing treatment standards satisfactory to the City Engineer.

Pursuant to Section 4.4.1, *selection of treatment control BMPs shall be based on the following criteria, in conjunction with the performance ratings provided in Table 4-3:*

- *For the anticipated project pollutants identified in section 4.1.5, the highest performing BMPs available shall be considered. Site constraints that limit the selection shall be described in the WQTR*
- *The most significant pollutants of concern for the project are those that both are anticipated, according to section 4.1.5, and are a concern for the receiving water, according to section 4.1.6. The minimum performance for the most significant pollutants of concern is "medium removal efficiency."*

Priority Development Projects shall select a single or combination of treatment BMPs from the categories in Table 4-3 of the Storm Water Standards that maximize pollutant removal for the particular pollutants of concern. This means that the selected treatment control BMPs must collectively provide minimum pollutant removal efficiencies of “medium” or “high” for all pollutants of concern.

Table 4-3 of the Storm Water Standards, “Structural Treatment Control BMP Selection Matrix,” provides a guide for treatment control BMP selection. Table 4-3 is renamed as Table 3.1 and reproduced below. The anticipated pollutants applicable to the project are highlighted.

Table 3.1: Structural BMP Treatment Control Selection Matrix

BMP	LID	HMP Control	Sediment	Nutrients	Trash	Metals	Bacteria	Oils and Grease	Organics
Infiltration Basin	Y	Y	H	H	H	H	H	H	H
Bioretention Basin	Y	Y	H	M	H	H	H	H	H
Cistern Plus Bioretention	Y	Y	H	M	H	H	H	H	H
Vault plus Bioretention	Y	Y	H	M	H	H	H	H	H
Self-retaining Area	Y	Y	H	H	H	H	H	H	H
Dry Wells	Y	Y	H	H	H	H	H	H	H
Constructed Wetlands	Y	Y	H	M	H	H	H	H	H
Extended Detention Basin	Y	N	M	L	H	M	M	M	M
Vegetated Swale	Y	N	M	L	L	M	L	M	M
Vegetated Buffer Strips	Y	N	H	L	M	H	L	H	M
Flow-Through Planter Boxes	Y	Y	H	M	H	H	H	H	H
Vortex Seperator or Wet Vault	N	N	M	L	M	L	L	L	L
Media Filter	N	N	H	L	H	H	M	H	H

H High removal efficiency
M Medium removal efficiency
L Low removal efficiency

The following discussion identifies the treatment control BMPs proposed for the project.

As discussed in Section 2, the project can be expected to generate the following pollutants: sediment, nutrients, heavy metals, organic compounds, oxygen demanding substances, pesticides, trash and debris, oil and grease, and bacteria & virus. As discussed in Section 2.0, the most significant pollutants of concern for the project are those that both are anticipated, and are a concern for the receiving water (as described by Section 4.4.1 of the Storm Water Standards). The Storm Water Standards states that the minimum performance for the most significant pollutants of concern is “medium removal efficiency.”

All of the BMPs listed in the Storm Water Standards – Table 4-3 were evaluated. It was determined that the most practicable treatment BMP would be:

- One (1) Bioretention Basin (DMA 4)
- Four (4) Permeable Pavers (DMA 1, DMA 2, DMA 3, and DMA 6)

Bioretention basins and permeable pavers were selected primarily based on the following considerations:

- By the end of grading the site will be underlain by compacted fill. Compacted fill is not suitable for infiltration; therefore, a use of infiltration basin is not feasible.
- A bioretention basin will treat for sediments, trash & debris, heavy metals, bacteria & viruses, oil & grease, and organics at a high level of removal efficiency and treat for nutrients at a medium level of efficiency.
- A bioretention basin provides a higher level of treatment for several pollutants of concern in comparison to alternative treatment control BMPs.
- A bioretention basin were utilized for DMA 4 to meet the water quality requirements only.
- Permeable pavers will treat for sediments, trash, metals, oil & grease, and organics at a high level of removal efficiency, bacteria at a medium level of efficiency, and treat for nutrients at a low level of efficiency.
- Permeable pavers were utilized for DMA 1, DMA 2, DMA 3, and DMA 6 to provide adequate water quality volume only.

Self-treating Areas

In addition to the TC-BMPs, there are four (4) self-treating areas throughout the project. Pursuant to Section 4.5 of the Storm Water Standards, the self-treating areas are landscaped or turn areas that do no drain to the TC-BMPs, but rather drain directly off-site or to the storm drain systems. The self-treating areas include no impervious areas, unless the impervious area is very small (5 percent or less) and "self-treat" by promoting incidental infiltration, evaporation, and evapotranspiration.

3.3.1 Numeric Sizing Requirements for Treatment Control BMPs

For flow-based treatment control BMPs (Bioretention Basins), the water quality volumes were calculated based on the rational method equation. The rational method equation was used to determine the treatment flow rates, based on the following equation:

For Basins DMA 4:

- Rational method equation: $Q = RfIA$
- 'Q' is the treatment flow rate in cubic feet per second (cfs),
- 'Rf' is the weighted runoff factor for the drainage area,
- 'I' is the rainfall intensity in inches per hour (in/hr) [0.2 in/hr per flow-based numeric sizing criteria], and
- 'A' is the drainage area in acres (ac).

For volume-based treatment control BMPs (Permeable Pavers), the water quality volumes were calculated based on the following equation:

For Basins DMA 1, DMA 2, DMA 3, and DMA 6:

- Rational method equation: $V = R_F PA$
- 'V' is the treatment volume in acre-feet (ac-ft),
- 'R_F' is the weighted runoff factor for the drainage area,

- ‘P’ is the 85th percentile precipitation in inches (in) [85th percentile storm event per volume based numeric sizing criteria], converted to feet (ft) and
- ‘A’ is the drainage area is acres (ac).

3.3.2 Results for Treatment Control BMPs

Two (2) bioretention basins and four (4) drainage management areas w/ permeable pavers will be provided to meet the water quality requirements for the project.

In order to meet the water quality requirements, five (5) tributary areas will be directed to five (5) TC-BMP locations: DMA 1, DMA 2, DMA 3, DMA 4, and DMA 6. Information regarding how the project complies with the hydromodification management requirements is discussed in Section 3.4 below.

The water quality treatment calculations are included in Appendix C of this report. Typical details of the selected Treatment Control BMPs are also included in Appendix C. The locations of all storm water management features are shown on the exhibit titled “Water Quality Technical Report Exhibit for Discovery Center at Grant Park,” located in Map Pocket 1.

3.4 Hydromodification Management Requirements

3.4.1 Background

The intent of this section is to meet requirements of Provision D.1.g of the California Regional Water Quality Control Board San Diego Region Order R9-2007-0001, which requires the San Diego Stormwater Copermittees to implement a Hydromodification Management Plan (HMP). Hydromodification refers to changes in a watershed’s runoff characteristics resulting from development, together with associated morphological changes to channels receiving the runoff, such as changes in sediment transport characteristics and the hydraulic geometry (width, depth, and slope) of channels. These changes can result in stream bank erosion and sedimentation, leading to habitat degradation due to loss of overhead cover and loss of in-stream habitat structures. As required by Permit Order No. R9-2007-0001, each Copermittees was required to incorporate the approved Hydromodification Management Plan (HMP) into its local Standard Urban Storm Water Mitigation Plan (SUSMP) and implement the HMP for all applicable Priority Development Projects (PDP) by January 20, 2012.

Pursuant to Section 4.5 of the Storm Water Standards, Priority Development Projects must be designed so that runoff rates and durations are controlled to maintain or reduce pre-project downstream erosion conditions and protect stream habitat. Pursuant to Section 4.5.1, to determine if a proposed project must implement hydromodification controls, refer to the HMP Decision Matrix in Figure 4-1. As noted in Figure 4-1, projects may be exempt from HMP criteria under several specific conditions, including the following condition that applies to the Discovery Center at Grant Park project:

- If the proposed project discharges directly to a stabilized conveyance system that extends to exempt receiving waters , such as the Pacific Ocean, San Diego Bay, an exempt river system (detailed in Table 4-2), or and exempt reservoir system (detailed in Table 4-3).

This project is exempt from hydromodification management requirements since the project two (2) discharge points outfall to exempt receiving water, San Diego River, which meets the criteria above as identified in Table 4-2 of the Storm Water Standards.

HMP Applicability Determination

Figure 4-1, *HMP Applicability Determination,* from the SWS is a flow chart with various nodes showing potential avenues for exemptions. Using this chart, the Discovery Center at Grant Park project can show exemption from HMP requirements pursuant to Node 5, which gives exemption for projects that directly discharge to an exempt system. The applicable discharge location of the Discovery Center at Grant Park project is located directly in the southerly side of the San Diego River's floodplain, which according to the SWS Table 4-2, *Summary of Exempt River Reaches in San Diego County,* is an exempt river reach. Therefore, exemption from HMP requirements for the project would exist if it can be shown that the project's ultimate outfalls discharge directly to the San Diego River.

The project has two (2) ultimate outfall locations. The surface runoff from minor project area is discharging into Outfall # 1 location. The Outfall # 1 discharges in the existing ponding/sump area located southeast of the proposed project boundary and into the San Diego River floodplain. Due to the fact that the proposed pipe outfalls in the existing sump with established vegetation and high infiltration rates, located within the San Diego River floodplain at location where the sump slopes are flat, no erosion shall occur; therefore, hydromodification management is not required at outfall #1 location (i.e. – direct discharge to exempt receiving water). Since the outlet area is a sump within the San Diego River floodplain, which infiltrates the 100-year storm event, checking the flow line elevation in comparison with the 10-year water surface elevation for the River is not relevant (see below for discussion on Outfall #2).

The majority of the project site discharges into the proposed system and then flows are conveyed by the proposed on-site storm drain system, and ultimately discharging to the San Diego River at Outfall #2 location. To show that the proposed storm drain system Outfall #2 discharges directly into the San Diego River, a comparison is made between the flow line of the downstream discharge locations and the 10-year water surface elevation (WSEL) of the San Diego River. The 10-year WSEL is used because that is the largest storm event governed by the HMP requirements. The following table, Table 3.4.1, compares the flowline of the Outfall #2 to the 10-year WSEL.

Table 3.4.1: Comparison of Outfall Flowlines vs. San Diego River 100-year WSEL

Discharge Location Downstream of Outfall #	**Downstream Outfall Flowline**[1]	**San Diego River 10-year WSEL**[2] **Elevation, per FEMA FIS (Flood Profile)**
2	34.5	36.7 - 2.1 = 34.6

1. Downstream outfall flowline reflects the end of the stabilized conveyance system for Outfall #1. This elevation is based on the NGVD 29 vertical datum.
2. This WSEL comes from the FEMA Flood Insurance Study (FIS) for San Diego, California, Volume 9, with revisions being adopted May 16, 2012. Since the FIS and DFIRM utilize NAVD 88 vertical datum, the 2.1-foot datum shift has been subtracted to these elevations to yield NGVD 29 elevations for comparison purposes.

The San Diego River's 10-year WSEL in the vicinity of Outfall location #2 was taken from the reports, "Federal Emergency Management Agency's (FEMA) Flood Insurance Study (FIS) for San Diego County, California," which was adopted on May 16, 2012.

Refer to the exhibit titled "Water Quality Technical Report for Discovery Center at Grant Park" located in Map Pocket 1 for the location of the proposed project outfall locations in relation to the San Diego River. Also, excerpts from Section 4.5 of the SWS are provided in Appendix D, including Figure 4-1 for HMP Applicability Determination, identifying the applicable exemption for the one outfall location.

4.0 OPERATION AND MAINTENANCE PLAN (OMP)

The owner will enter into a Storm Water Management and Discharge Control Maintenance Agreement (SWMDCMA) with the City of San Diego to ensure maintenance of permanent BMPs for the project. A SWMDCMA will be prepared upon final design of this project (final engineering).

4.1 Maintenance Responsibility

The owner of the site is the operator and will be the party responsible to ensure implementation and funding of maintenance of permanent BMPs.

Throughout this section, the owner of the site is the "party responsible to ensure implementation and funding of maintenance of permanent BMPs." The party who actually performs the activities is the "inspector," "maintenance contractor," or "maintenance operator."

4.2 Inspection and Maintenance Activities

4.2.1 Inspection and Maintenance Activities for LID and Source Control BMPs

The following LID and source control BMPs for the project requires permanent maintenance: landscaped areas, and irrigation systems within the landscaped areas. The discussions below provide inspection criteria, maintenance indicators, and maintenance activities for the above-listed LID and source control BMPs that require permanent maintenance.

Landscaped Areas

Inspection and maintenance of the vegetated areas may be performed by the landscape maintenance contractor. The inspection and maintenance activities described herein for landscaped areas are inclusive of the LID vegetated areas provided for the project.

During inspection, the inspector shall check for the maintenance indicators given below:

- Erosion in the form of rills or gullies
- Ponding water
- Bare areas or less than 70% vegetation cover
- Animal burrows, holes, or mounds
- Trash
- Sediment or debris accumulation in swales

Routine maintenance of vegetated areas shall include mowing and trimming vegetation, and removal and proper disposal of trash.

If erosion, ponding water, bare areas, poor vegetation establishment, or disturbance by animals are identified during the inspection, additional (non-routine) maintenance will be required to correct the problem. For ponding water or erosion, see also inspection and maintenance measures for irrigation systems. In the event that any non-routine maintenance issues are persistently encountered such as poor vegetation establishment, erosion in the form of rills or gullies, or ponding water, the party responsible to ensure that maintenance is performed in perpetuity shall consult a licensed landscape architect or engineer as applicable.

As applicable, IPM procedures must be incorporated in any corrective measures that are implemented in response to damage by pests. This may include using physical barriers to keep pests out of landscaping; physical pest elimination techniques, such as, weeding, squashing, trapping, washing, or pruning out pests; relying on natural enemies to eat pests; or proper use of pesticides as a last line of defense. More information can be obtained at the UC Davis website (http://www.ipm.ucdavis.edu/WATER/U/index.html).

Outlet Protection

Routine maintenance of outlet protection shall include removing trash, debris, and leaves. For outlet protection, immediately reposition all displaced energy dissipaters. If soil erosion is found, extend energy dissipater (i.e. landscape rocks and/or splash pads); reposition or increase limits of energy dissipater to fully cover eroded area.

Concrete Stamping

Inspection/maintenance of the concrete stamping may be performed by the building/facilities maintenance contractor or other employees of the owner, as applicable. In addition, there may be storm drain maintenance contractors who will perform this service for a fee.

During inspection, the inspector(s) shall check for the maintenance indicators given below:

- Faded, vandalized, or otherwise unreadable concrete stamping

There are no routine maintenance activities for the concrete stamping. If inspection indicates the concrete stamping is intact, no action is required. If inspection indicates the concrete stamping is not legible, the concrete stamping shall be repaired or replaced as applicable.

Irrigation Systems

Inspection and maintenance of the irrigation system may be performed by the landscape maintenance contractor.

During inspection, the inspector shall check for the maintenance indicators given below:

- Eroded areas due to concentrated flow
- Ponding water
- Refer to proprietary product information for the irrigation system for other maintenance indicators, as applicable

Refer to proprietary product information for the irrigation system for routine maintenance activities for the irrigation system, as applicable. If none of the maintenance indicators listed above are identified during inspection of the irrigation system, no other action is required. If any of the maintenance indicators listed above is identified during the inspection, additional (non-routine) maintenance will be required to restore the irrigation system to an operable condition. If inspection indicates breaks or leaks in the irrigation lines or individual sprinkler heads, the affected portion of the irrigation system shall be repaired. If inspection indicates eroded areas due to concentrated flow from the irrigation system, the eroded areas shall be repaired and the irrigation system shall be adjusted or repaired as applicable to prevent further erosion. If inspection indicates ponding water resulting from the irrigation system, the irrigation system operator shall identify the cause of the ponded water and adjust or repair the irrigation system as applicable to prevent ponding water. Refer to proprietary product information for the irrigation system for other non-routine maintenance activities as applicable.

4.2.2 Inspection and Maintenance Activities for Treatment Control BMPs

*Bioretention Basins (***DMA 4***)*

During inspection, the inspector shall check for the maintenance indicators given below:

- Accumulation of sediment, litter and/or debris at the inlets/outlets
- Standing water in the storage and draining layer indicating clogging in the underdrains
- Dislodged energy dissipaters or erosion

Routine maintenance of the Bioretention Basins shall include removal and proper disposal of accumulated materials (e.g., sediment, litter). After installation inspection should occur once a month for 4-6 months. After this time period inspection should occur annually, particularly after there has been heavy rain or storms.

If inspection indicates that the underdrains for the Bioretention Basins are clogged, the additional non-routine maintenance will be required to backwash and clear the underdrains. The party responsible to ensure implementation and funding of maintenance of permanent BMPs shall contract for additional cleaning and disposal services as necessary if non-routine cleaning and disposal is required.

*Permeable Pavers (*DMA 1, DMA 2, DMA 3, and DMA 6)

During inspection, the inspector shall check for the maintenance indicators given below:

- Accumulation of sediment and debris
- Loss of fill material between the pavers
- Damaged or broken pavers
- Standing water in the storage and draining layer indicating clogging in the underdrains

The surface of the pavers should be kept clean and free of debris. It will be necessary to carry out vacuuming and washing of the surface in order to keep the voids clear and allow them to function as they are intended. Street sweepers and vacuums can be used to maintain these types of pavers, and should be performed approximately 4 times a year. The level of fill material in the voids of the pavers should be checked and refilled when necessary, particularly after pressure cleaning.

After installation, inspection should occur once a month for 4-6 months. After this time period inspection should occur annually, particularly after there has been heavy rain or storms, at which time the drainage voids can become clogged with organic debris. Sweeping and vacuuming the permeable surface should occur every 3 months.

If routine cleaning does not restore infiltration rates, then reconstruction of part of the whole of a pervious surface may be required, surface area affected by hydraulic failure should be lifted for inspection of the internal materials to identify the location and extent of the blockage, surface materials shall be lifted and replaced after brush cleaning and geotextiles may need complete replacement, sub-surface layers may need cleaning and replacing, and removed silts may need to be disposed of as controlled waste. The party responsible to ensure implementation and funding of maintenance of porous pavement shall contract for additional cleaning and disposal services as necessary if non-routine cleaning and reconstruction is required.

4.3 Inspection and Maintenance Frequency

The Table below lists the BMPs to be inspected and maintained and the minimum frequency of inspection and maintenance activities.

Table 4.1: Summary Table of Inspection and Maintenance Frequency

BMP	**Inspection Frequency**	**Maintenance Frequency**
Landscaped Areas	Monthly	Routine mowing and trimming and trash removal: monthly Non-routine maintenance as-needed based on maintenance indicators in Section 4.2.1
Outlet Protection	Monthly	Routine maintenance to remove trash, debris, and leaves. Repair any damage to roof drains. Immediately reposition all displaced energy dissipaters. If soil erosion is found, reposition or increase limits of energy dissipater to fully cover eroded area. Non-routine maintenance as-needed
Concrete Stamping (or equivalent)	Annual	As-needed based on maintenance indicators in Section 4.2.1
Irrigation systems	Monthly	As needed based on maintenance indicators in Section 4.2.1
Bioretention Basins (LID-based TC-BMP)	Annual, and after major storm events	Routine maintenance to remove accumulated materials at the inlets and outlets: annually, on or before September 30th. As-needed maintenance based on maintenance indicators in Section 4.2.2
Permeable Pavers (LID-based TC-BMP)	2-3 times per year	Routine maintenance to vacuum clean surface using commercially available sweeping machine, at the end of the winter (April), Mid-summer (July/August) and after Autumn leaf-fall (November)
	Annual, and after major storm events	Routine maintenance to remove accumulated materials at the outlets: annually, on or before September 30th. As-needed maintenance based on maintenance indicators in Section 4.2.2
	As needed (infrequent) Maximum 15-20 years	Non - Routine maintenance to restore infiltration rates by reconstruction of part, or the whole of, a pervious surface. As-needed maintenance based on maintenance indicators in Section 4.2.2

The frequencies given in the Summary Table of Inspection and Maintenance Frequency are minimum recommended frequencies for inspection and maintenance activities for the project. Typically, the frequency of maintenance required for permanent BMPs is site and drainage area specific. If it is determined during the regularly scheduled inspection and/or routine maintenance that a BMP requires more frequent maintenance (e.g., to remove accumulated trash) it may be necessary to increase the frequency of inspection and/or routine maintenance.

4.4 Recordkeeping Requirements

The party responsible to ensure implementation and funding of maintenance of permanent BMPs shall maintain records documenting the inspection and maintenance activities. The records must be kept a minimum of 5 years and shall be made available to the City of San Diego for inspection upon request at any time.

5.0 SUMMARY

This water quality technical report (WQTR) summarizes permanent storm water management features proposed for the project that will collectively meet the requirements for source control, LID, water quality treatment BMPs, and hydromodification management.

Based on the Storm Water Requirements Applicability Checklist, the project is a “Priority Development Project,” and applies to the following priority development project categories: commercial development and similar non-residential development greater than one acre, parking lot with a minimum area of 5,000 square feet or a minimum of 15 parking spaces and Water Quality Sensitive Area. However, the project is exempt from hydromodification management requirements since the project two discharge points outfall to exempt receiving water, San Diego River, which meets the criteria identified in Table 4-2 of the Storm Water Standards.

Based on the anticipated pollutants of concern that may be generated on-site and identification of receiving waters that are listed as impaired on the 2010 CWA Section 303(d) List of Water Quality Limited Segments, the following are the project’s pollutants of concern: sediment, heavy metals, organic compounds, trash and debris, oil and grease, and bacteria & virus.

In addition to treatment control BMPs, the project will incorporate, where feasible, source control BMPs and Low Impact Development (LID) design practices, which are described in detail in Section 3.0 of this report.

The project includes a proposed network of storm water management features that will utilize bioretention basins and permeable pavers to meet the requirements for treatment control BMPs (TC-BMPs). The bioretention basins will treat sediment, trash and debris, oxygen demanding substances, oil and grease, bacteria & viruses, and pesticides at a high level of efficiency, and nutrients at a medium level of efficiency. Permeable pavers will treat for sediments, trash, metals, oil & grease, and organics at a high level of removal efficiency, bacteria at a medium level of efficiency, and treat for nutrients at a low level of efficiency. The above BMPs were selected for the project and provide, “Medium” to “High” removal efficiencies for all targeted pollutants of concern.

The following BMPs for the project require permanent maintenance: landscaped areas, irrigation system, bioretention basins, and permeable pavers. The operation and maintenance information provided in Section 4.0 of this WQTR provides inspection criteria, maintenance indicators, and maintenance activities for the above-listed BMPs that require permanent maintenance.

The project has incorporated permanent storm water BMPs to provide source control, LID site design, water quality treatment in accordance with the City of San Diego Storm Water Standards.

APPENDIX A

Storm Water Requirements Applicability Checklist

THE CITY OF SAN DIEGO

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

Storm Water Requirements Applicability Checklist

FORM
DS-560
JANUARY 2011

Project Address:
2450 Camino Del Rio North, San Diego, CA 92108

Project Number *(for City Use Only)*:

SECTION 1. Permanent Storm Water BMP Requirements:

Additional information for determining the requirements is found in the Storm Water Standards Manual.

Part A: Determine if Exempt from Permanent Storm Water BMP Requirements.

Projects that are considered maintenance, or are otherwise not categorized as "development projects" or "redevelopment projects" according to the Storm Water Standards manual are not required to install permanent storm water BMPs. **If "Yes" is checked for any line in Part A, proceed to Part C and check the box labeled "Exempt Project." If "No" is checked for all of the lines, continue to Part B.**

1. The project is not a Development Project as defined in the Storm Water Standards Manual: for example habitat restoration projects, and construction inside an existing building. ☐ Yes ☑ No
2. The project is only the construction of underground or overhead linear utilities. ☐ Yes ☑ No
3. The project qualifies as routine maintenance (replaces or renews existing surface materials because of failed or deteriorating condition). This includes roof replacement, pavement spot repairs and resurfacing treatments such as asphalt overlay or slurry seal, and replacement of damaged pavement. ☐ Yes ☑ No
4. The project only installs sidewalks, bike lanes, or pedestrian ramps on an existing road, and does not change sheet flow condition to a concentrated flow condition. ☐ Yes ☑ No

Part B: Determine if Subject to Priority Development Project Requirements.

Projects that match one of the definitions below are subject to additional requirements including preparation of a Water Quality Technical Report.
If "Yes" is checked for any line in Part B, proceed to Part C and check the box labeled "Priority Development Project." If "No" is checked for all of the lines, continue to Part C and check the box labeled "Standard Development Project."

1. **Residential development of 10 or more units.** ☐ Yes ☑ No
2. **Commercial development and similar non-residential development greater than one acre.** Hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; and other light industrial facilities. ☑ Yes ☐ No
3. **Heavy industrial development greater than one acre.** Manufacturing plants, food processing plants, metal working facilities, printing plants, and fleet storage areas. ☐ Yes ☑ No
4. **Automotive repair shop.** Facilities categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539. ☐ Yes ☑ No
5. **Restaurant.** Facilities that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), and where the land area for development is greater than 5,000 square feet. ☐ Yes ☑ No
6. **Hillside development greater than 5,000 square feet.** Development that creates 5,000 square feet of impervious surface and is located in an area with known erosive soil conditions and where the development will grade on any natural slope that is twenty-five percent or greater. ☐ Yes ☑ No
7. **Water Quality Sensitive Area.** Development located within, directly adjacent to, or discharging directly to a Water Quality Sensitive Area (as depicted in Appendix C) in which the project either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" is defined as being situated within 200 feet of the Water Quality Sensitive Area. "Discharging directly to" is defined as outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands. ☑ Yes ☐ No
8. **Parking lot with a minimum area of 5,000 square feet or a minimum of 15 parking spaces** and potential exposure to urban runoff (unless it meets the exclusion for parking lot reconfiguration on line 11). ☑ Yes ☐ No

9. **Street, road, highway, or freeway.** New paved surface in excess of 5,000 square feet used for the transportation of automobiles, trucks, motorcycles, and other vehicles (unless it meets the exclusion for road reconfiguration on line 11). ☐ Yes ☑ No

10. **Retail Gasoline Outlet (RGO)** that is: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. ☐ Yes ☑ No

11. **Significant Redevelopment**; project installs and/or replaces 5,000 square feet or more of impervious surface and the existing site meets at least one of the categories above. The project is not considered Significant Redevelopment if reconfiguring an existing road or parking lot without a change to the footprint of an existing developed road or parking lot. The existing footprint is defined as the outside curb or the outside edge of pavement when there is no curb. ☐ Yes ☑ No

12. **Other Pollutant Generating Project.** Any other project not covered in the categories above, that disturbs one acre or more and is not excluded by the criteria below. ☐ Yes ☑ No

Projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces or if they sheet flow to surrounding pervious surfaces.

Part C: Select the appropriate category based on the outcome of Parts A & B.

1. If "Yes" is checked for any line in Part A, then check this box. Continue to Section 2. ☐ Exempt Project
2. If "No" is checked for all lines in Part A, and Part B, then check this box. Continue to Section 2. ☐ Standard Development Project
3. If "No" is checked for all lines in Part A, and "Yes" is checked for at least one of the lines in Part B, then check this box. Continue to Section 2. See the Storm Water Standards Manual for guidance on determining if Hydromodification Management Plan requirements apply. ☑ Priority Development Project

SECTION 2. Construction Storm Water BMP Requirements:
For all projects, complete Part D. If "Yes" is checked for any line in Part D, then continue to Part E.

Part D: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES Permit for Storm Water Discharges Associated with Construction Activities? (See State Water Resources Control Board Order No. 2009-0009-DWQ for rules on enrollment) ☑ Yes ☐ No
2. Does the project propose grading or soil disturbance? ☑ Yes ☐ No
3. Would storm water or urban runoff have the potential to contact any portion of the construction area, including washing and staging areas? ☑ Yes ☐ No
4. Would the project use any construction materials that could negatively affect water quality if discharged from the site (such as, paints, solvents, concrete, and stucco)? ☑ Yes ☐ No
5. Check this box if "Yes" is checked for line 1. Continue to Part E. ☑ SWPPP Required
6. Check this box if "No" is checked for line 1, and "Yes is checked for any line 2-4. Continue to Part E. ☐ WPCP Required
7. Check this box if "No" is checked for all lines 1-4. Part E does not apply. ☐ No Document Required

Part E: Determine Construction Site Priority
This prioritization must be completed with this form, noted on the plans, and included in the SWPPP or WPCP. The City reserves the right to adjust the priority of the projects both before and during construction. [Note: The construction priority does NOT change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by City staff.]

☑ 1. **High Priority**
  a) Projects where the site is 50 acres or more and grading will occur during the wet season
  b) Projects 1 acre or more and tributary to an impaired water body for sediment (e.g., Peñasquitos watershed)
  c) Projects 1 acre or more within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within a Water Quality Sensitive Area.
  d) Projects subject to phased grading or advanced treatment requirements.

☐ **2 Medium Priority**. Projects 1 acre or more but not subject to a high priority designation.

☐ **3 Low Priority.** Projects requiring a Water Pollution Control Plan but not subject to a medium or high priority designation.

Name of Owner or Agent *(Please Print)*: Title:

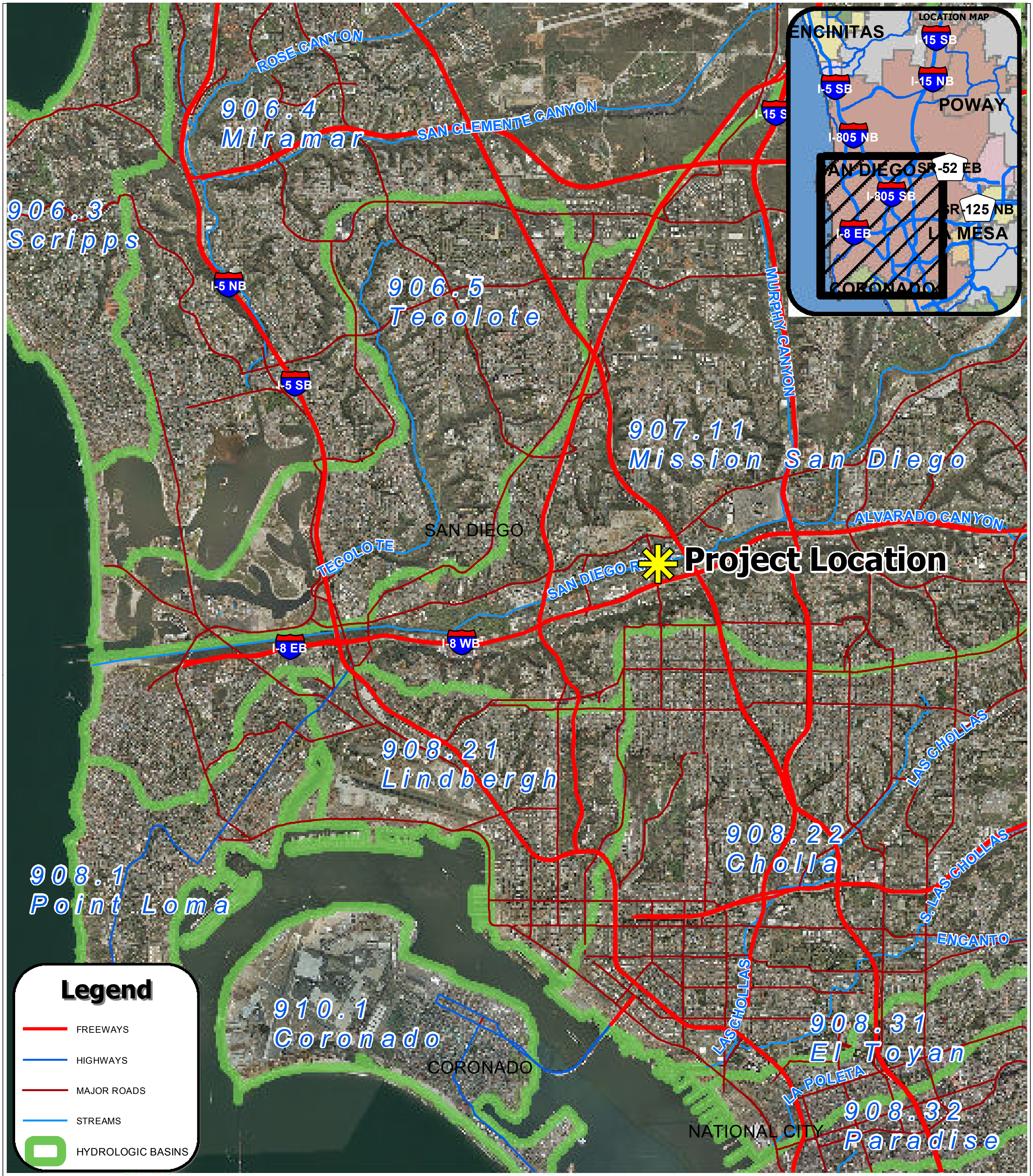
Signature: Date:

APPENDIX B

Hydrologic Unit Map

and

2010 CWA Section 303(d) List of Water Quality Limited Segments



RICK ENGINEERING COMPANY

PREPARED BY
GIS SERVICES DIVISION

1 inch = 8,000 feet

0 4,000 8,000 16,000 Feet

EXHIBIT DATE: 02/28/2014 REC JN: 17010
H:\17010\GIS\17010_HydrologicUnitBaseMap.mxd

HYDROLOGIC UNIT FOR DISCOVERY CENTER AT GRANT PARK

THIS PROJECT LOCATED WITHIN
THE CITY OF SAN DIEGO

2010 California 303(d) List of Water Quality Limited Segments*

Water quality limited segments requiring a TMDL(5A), being addressed by TMDL(5B), and/or being addressed by an action other than TMDL(5C).

REGION	REGION NAME	WATER BODY NAME	WBID	WATER BODY TYPE	WBTYPE CODE	INTEGRATED REPORT CATEGORY	USGS CATALOGING UNIT*	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT	POLLUTANT	POLLUTANT CATEGORY	FINAL LISTING DECISION	TMDL REQUIREMENT STATUS**	EXPECTED TMDL COMPLETION DATE***	COMMENTS INCLUDED ON 303(d) LIST
9	Regional Board 9 - San Diego Region	San Diego River (Lower)	CAR9071100020011025101606	River & Stream	R	5	18070304	90711000	16	Miles	Enterococcus	Pathogens	List on 303(d) list (TMDL required list)	5A	2021	
9	Regional Board 9 - San Diego Region	San Diego River (Lower)	CAR9071100020011025101606	River & Stream	R	5	18070304	90711000	16	Miles	Fecal Coliform	Pathogens	Do Not Delist from 303(d) list (TMDL required list)	5A	2009	Lower 6 miles.
9	Regional Board 9 - San Diego Region	San Diego River (Lower)	CAR9071100020011025101606	River & Stream	R	5	18070304	90711000	16	Miles	Low Dissolved Oxygen	Nutrients	List on 303(d) list (TMDL required list)	5A	2019	Impairment transcends adjacent Calwater watershed 90712.
9	Regional Board 9 - San Diego Region	San Diego River (Lower)	CAR9071100020011025101606	River & Stream	R	5	18070304	90711000	16	Miles	Manganese	Metals/Metalloids	List on 303(d) list (TMDL required list)	5A	2021	
9	Regional Board 9 - San Diego Region	San Diego River (Lower)	CAR9071100020011025101606	River & Stream	R	5	18070304	90711000	16	Miles	Nitrogen	Nutrients	List on 303(d) list (TMDL required list)	5A	2021	
9	Regional Board 9 - San Diego Region	San Diego River (Lower)	CAR9071100020011025101606	River & Stream	R	5	18070304	90711000	16	Miles	Phosphorus	Nutrients	List on 303(d) list (TMDL required list)	5A	2019	Impairment transcends adjacent Calwater watershed 90712.
9	Regional Board 9 - San Diego Region	San Diego River (Lower)	CAR9071100020011025101606	River & Stream	R	5	18070304	90711000	16	Miles	Total Dissolved Solids	Salinity	List on 303(d) list (TMDL required list)	5A	2019	Impairment transcends adjacent Calwater watershed 90712.
9	Regional Board 9 - San Diego Region	San Diego River (Lower)	CAR9071100020011025101606	River & Stream	R	5	18070304	90711000	16	Miles	Toxicity	Toxicity	List on 303(d) list (TMDL required list)	5A	2021	

APPENDIX C

Water Quality Treatment Calculations

and

BMP Details

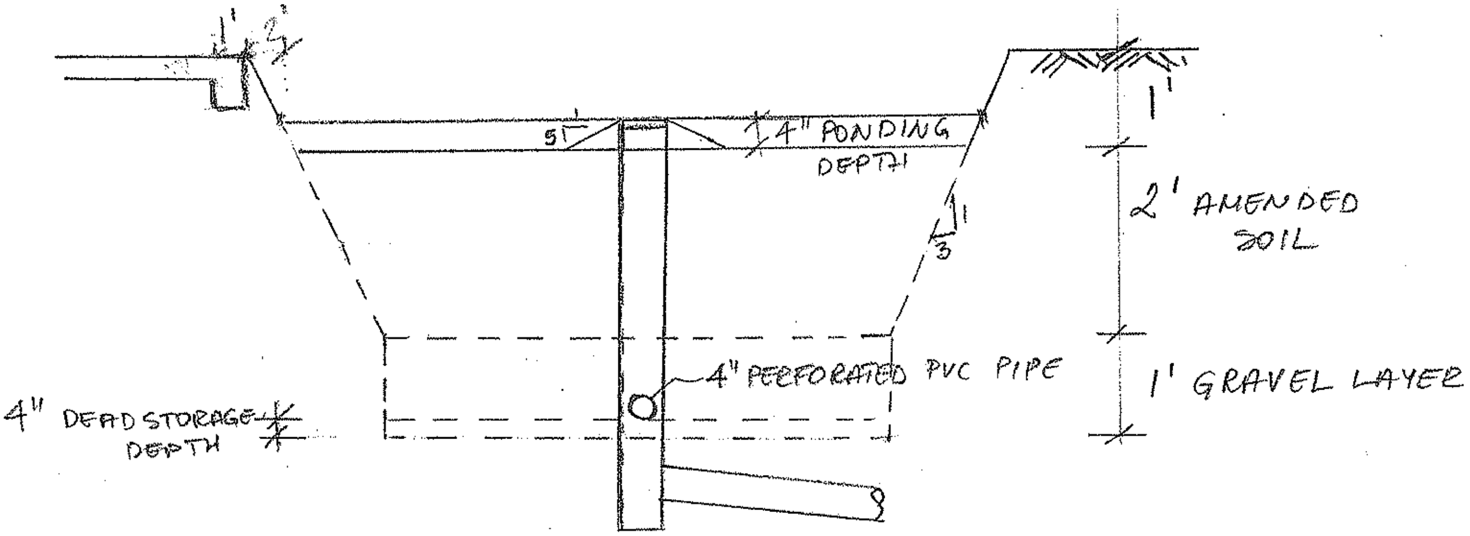
RICK™
ENGINEERING COMPANY

5620 Friars Road
San Diego, CA 92110-2596

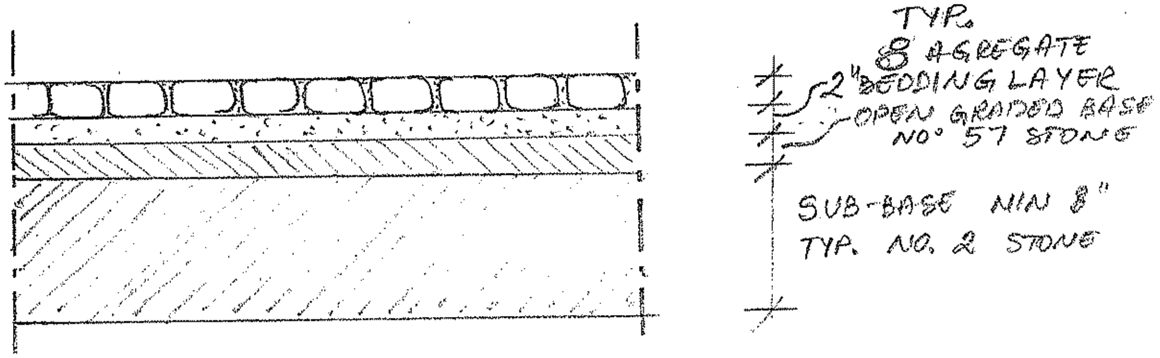
Tel: (619) 291-0707
Fax: (619) 291-4165

Date 2-10-2014
Job No. 17010
Page
Done By
Checked By

BIORETENTION BASIN



PERMEABLE PAVERS



Discovery Center at Grant Park

09-10-2015

TC-BMP: Bioretention Facility

											Bioretention Facility		
BMP Facility ID	Drainage Management Area (acres)	Drainage Management Area (ft^2)	% Impervious	Impervious Area (ft^2)	Pervious Area Landscape (ft^2)	Pervious Area Permeable Pavers (ft^2)	Runoff Factor for Impervious Area	Runoff Factor for Landscape Area	Runoff Factor for Permeable Pavers Area	Area X Weighted Runoff Factor (ft^2)	Sizing Factor	Minimum Area Required (ft^2)	Provided Area at Ponding Depth (ft^2)
DMA 4	0.54	23,462	69%	16,099	8,836	0	1.0	0.1	0.2	16,983	0.04	679	679

Discovery Center at Grant Park

9/14/2015

TC-BMP: Permeable Pavers

Bedding Layer voids	25%
Base Layer Voids	32%
Sub-Base Layer Voids	40%

											Permeable Pavers							
BMP Facility ID	Drainage Management Area (acres)	Drainage Management Area (ft²)	% Impervious	Impervious Area (ft²)	Pervious Area Landscape (ft²)	Pervious Area Permeable Pavers (ft²)	Runoff Factor for Impervious Area	Runoff Factor for Landscape Area	Runoff Factor for Permeable Pavers	Area X Weighted Runoff Factor (ft²)	D_{85} (in)	V_{BMP} Required (ft³)	Bedding Layer 8 Aggregate (ft)[1]	Base Layer No. 57 Stone (ft)[2]	Sub-Base Layer No. 2 Stone (ft)[3]	Total Effective Depth (ft)	Required Area (ft²)	Provided Area (ft²)
DMA 1	0.34	14,950	60%	8,990	2,787	3,172	1.0	0.1	0.2	9,904	0.61	503	0.17	0.33	0.67	0.3	1,878	3,172
DMA 2	0.79	34,368	84%	28,778	2,542	3,049	1.0	0.1	0.2	29,642	0.61	1,507	0.17	0.33	0.83	0.3	4,538	3,049
DMA 3	0.23	10,019	57%	5,726	1,693	2,601	1.0	0.1	0.2	6,415	0.61	326	0.17	0.33	0.67	0.3	1,217	2,601
DMA 6	0.11	4,792	58%	2,783	0	2,009	1.0	0.1	0.2	3,185	0.61	162	0.17	0.33	0.67	0.3	604	2,009
																	8238	10830

Notes:

[1] - Bedding Layer 25% void space, 2" depth

[2] - Base Layer 32% void space, 4" depth

[3] - Sub-Base Layer 40% void space, variable depth

Discovery Center at Grant Park

9-14-2015

TC-BMP: Self Treating Areas

BMP Facility ID	Drainage Management Area (acres)	Drainage Management Area (ft^2)	% Impervious	Impervious Area (ft^2)	Pervious Area Landscape (ft^2)	Pervious Area (ft^2)	Runoff Factor for Impervious Area	Runoff Factor for Landscape Area	Runoff Factor for Permeable Pavers Area	Area X Weighted Runoff Factor (ft^2)
DMA 8	0.43	18,781	5%	1,032	10,739	7,010	Self Treating Area			
DMA 9	0.25	10,890	3%	373	6,050	4,467	Self Treating Area			
DMA 10	0.21	8,985	0%	0	6663.3	2,322	Self Treating Area			
DMA 11	0.11	4,633	0%	0	0	4,633	Self Treating Area			

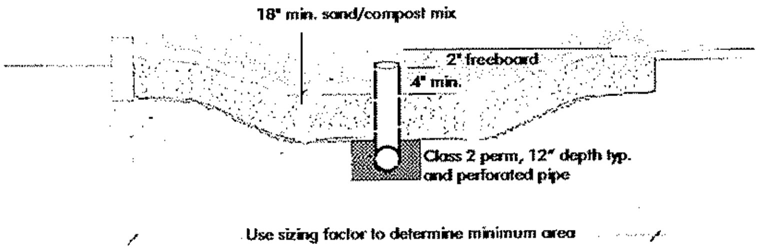
STORM WATER STANDARDS

January 20, 2012

THE CITY OF SAN DIEGO

thinkBLUE
SAN DIEGO

4.7 Bioretention Facilities



Bioretention facility configured for treatment-only requirements. Bioretention facilities can rectangular, linear, or nearly any shape.

Bioretention detains runoff in a surface reservoir, filters it through plant roots and a biologically active soil mix, and then infiltrates it into the ground. Where native soils are less permeable, an underdrain conveys treated runoff to storm drain or surface drainage.

Bioretention facilities can be configured in nearly any shape. When configured as linear **swales**, they can convey high flows while percolating and treating lower flows.

Bioretention facilities can be configured as in-ground or above-ground planter boxes, with the bottom open to allow infiltration to native soils underneath. If infiltration cannot be allowed, use the sizing factors and criteria for the Flow-Through Planter.

Best Uses

- Commercial areas
- Residential subdivisions
- Industrial developments
- Roadways
- Parking lots
- Fit in setbacks, medians, and other landscaped areas

Advantages

- Can be any shape
- Low maintenance
- Can be landscaped

Limitations

- Require 4% of tributary impervious square footage
- Typically requires 3-4 feet of head
- Irrigation typically required

4.7.1 Criteria

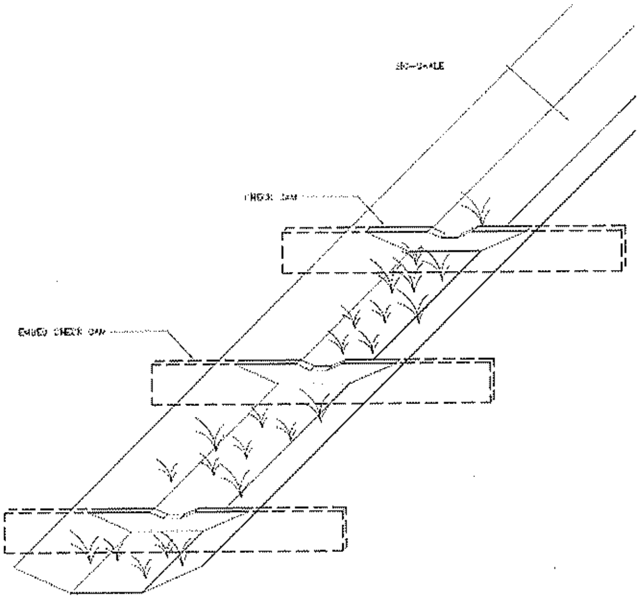
For development projects subject only to runoff treatment requirements, the following criteria apply:

Parameter	**Criterion**
Soil mix depth	18 inches minimum
Soil mix minimum percolation rate	5 inches per hour minimum sustained (10 inches per hour initial rate recommended)
Soil mix surface area	0.04 times tributary impervious area (or equivalent)
Surface reservoir depth	6 inches minimum; may be sloped to 4 inches where adjoining walkways.

Parameter	Criterion
Underdrain	Required in Group "C" and "D" soils. Perforated pipe embedded in gravel ("Class 2 permeable" recommended), connected to storm drain or other accepted discharge point.

4.7.2 Details

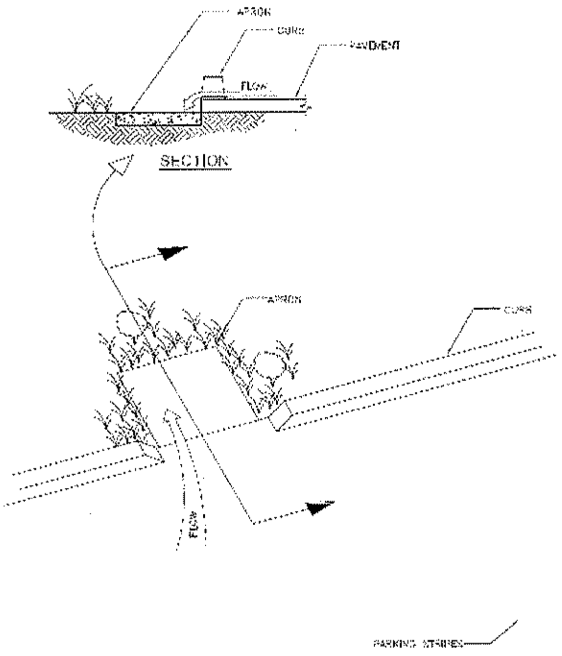
Plan. On the surface, a bioretention facility should be one level, shallow basin—or a series of basins. As runoff enters each basin, it should flood and fill throughout before runoff overflows to the outlet or to the next downstream basin. This will help prevent movement of surface mulch and soil mix.



Use check dams for linear bioretention facilities (swales) on a slope.

In a linear swale, check dams should be placed so that the lip of each dam is at least as high as the toe of the next upstream dam. A similar principle applies to bioretention facilities built as terraced roadway shoulders.

Inlets. Paved areas draining to the facility should be graded, and inlets should be placed, so that runoff remains as sheet flow or as dispersed as possible. Curb cuts should be wide (12" is recommended) to avoid clogging with leaves or debris. Allow for a minimum reveal of 4"-6" between the inlet and soil mix elevations to ensure turf or mulch buildup does not block the inlet. In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet.



Recommended design details for bioretention facility inlets (see text).

Where runoff is collected in pipes or gutters and conveyed to the facility, protect the landscaping from high-velocity flows with energy-dissipating rocks. In larger installations, provide cobble-lined channels to better distribute flows throughout the facility.

Upturned pipe outlets can be used to dissipate energy when runoff is piped from roofs and upgradient paved areas.

Soil mix. The required soil mix is similar to a loamy sand. It must maintain a minimum percolation rate of 5" per hour throughout the life of the facility, and it must be suitable for maintaining plant life. Typically, on-site soils will not be suitable due to clay content.

Storage and drainage layer. "Class 2 permeable," Caltrans specification 68-1.025, is recommended. Open-graded crushed rock, washed, may be used, but requires 4"-6" washed pea gravel be substituted at the top of the crushed rock gravel layers. Do not use filter fabric to separate the soil mix from the gravel drainage layer or the gravel drainage layer from the native soil.

Underdrains. No underdrain is required where native soils beneath the facility are Hydrologic Soil Group A or B. For treatment-only facilities where native soils are Group C or D, a perforated pipe must be bedded in the gravel layer and must terminate at a storm drain or other approved discharge point.

Outlets. In treatment-only facilities, outlets must be set high enough to ensure the surface reservoir fills and the entire surface area of soil mix is flooded before the outlet elevation is reached. In swales, this can be achieved with appropriately placed check dams.

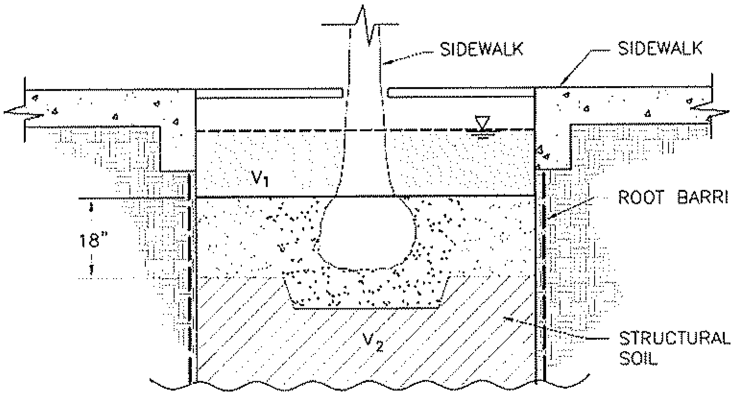
The outlet should be designed to exclude floating mulch and debris.

Vaults, utility boxes and light standards. It is best to locate utilities outside the bioretention facility—in adjacent walkways or in a separate area set aside for this purpose. If utility structures are to be placed within the facility, the locations should be anticipated and adjustments made to ensure the minimum bioretention surface area and volumes are achieved. Leaving the final locations to each individual utility can produce a haphazard, unaesthetic appearance and make the bioretention facility more difficult to maintain.

Emergency overflow. The site grading plan should anticipate extreme events and potential clogging of the overflow and route emergency overflows safely.

Trees. Bioretention areas can accommodate small or large trees. There is no need to subtract the area taken up by roots from the effective area of the facility. Extensive tree roots maintain soil permeability and help retain runoff. Normal maintenance of a bioretention facility should not affect tree lifespan.

The bioretention facility can be integrated with a tree pit of the required depth and filled with structural soil. If a root barrier is used, it can be located to allow tree roots to spread throughout the bioretention facility while protecting adjacent pavement. Locations and planting elevations should be selected to avoid blocking the facility's inlets and outlets.



Bioretention facility configured as a tree well. The root barrier is optional.

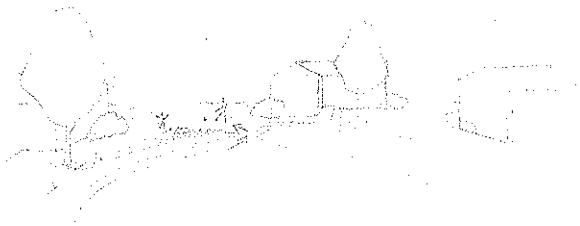
4.7.3 Applications

Multi-purpose landscaped areas. Bioretention facilities are easily adapted to serve multiple purposes. The loamy sand soil mix will support turf or a plant palette suitable to the location and a well-drained soil.

Example landscape treatments:

- Lawn with sloped transition to adjacent landscaping.
- Swale in setback area
- Swale in parking median
- Lawn with hardscaped edge treatment
- Decorative garden with formal or informal plantings
- Traffic island with low-maintenance landscaping
- Raised planter with seating
- Bioretention on a terraced slope

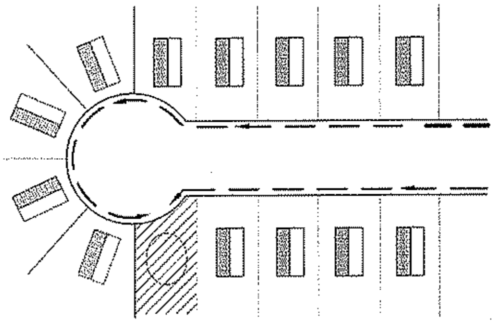
Bioretention facility configured as a recessed decorative lawn with hardscaped edge.



Bioretention facility configured and planted as a lawn/ play area.

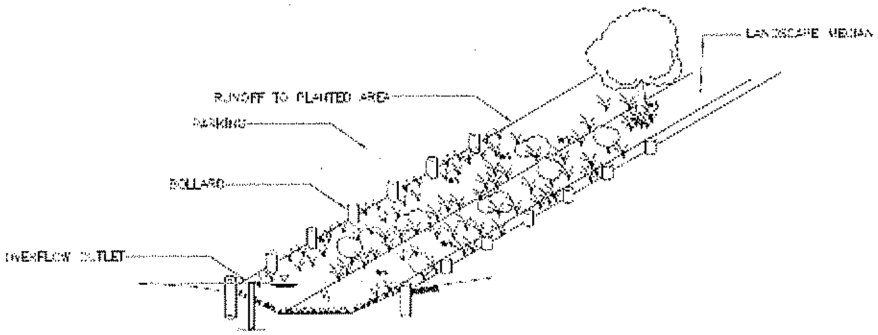
Residential subdivisions. Some subdivisions are designed to drain roofs and driveways to the streets (in the conventional manner) and then drain the streets to bioretention areas, with one bioretention area for each 1 to 6 lots, depending on subdivision layout and topography.

If allowed by the local jurisdiction, bioretention areas can be placed on a separate, dedicated parcel with joint ownership.



Bioretention facility receiving drainage from
individual lots and the street in a residential subdivision.

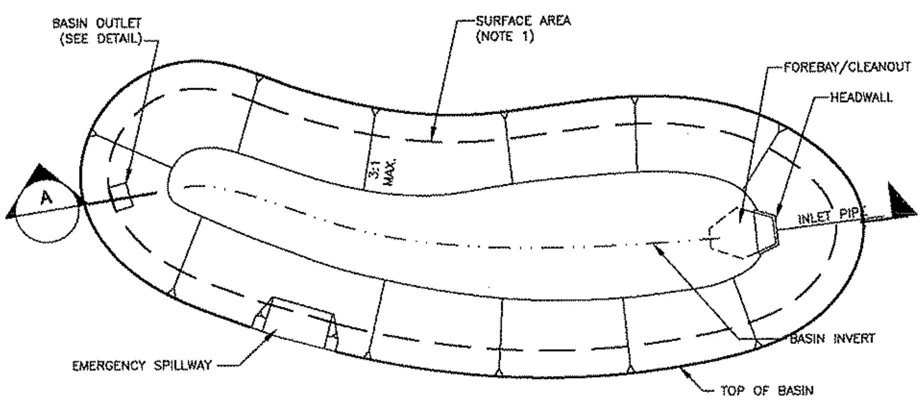
Sloped sites. Bioretention facilities must be constructed as a basin, or series of basins, with the circumference of each basin set level. It may be necessary to add curbs or low retaining walls.



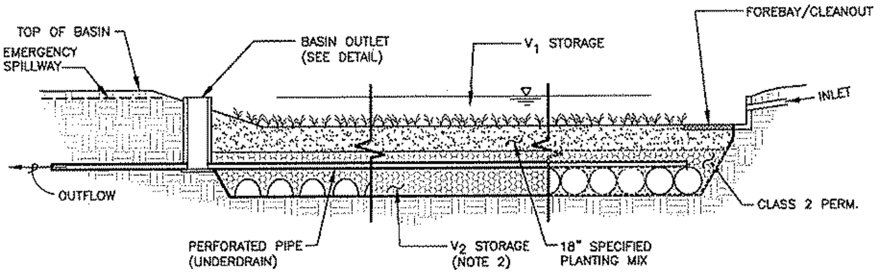
Bioretention facility configured as a parking median.
Note use of bollards in place of curbs, eliminating the need for curb cuts.

4.7.4 Design Checklist for Bioretention

- ☐ Volume or depth of surface reservoir meets or exceeds minimum.
- ☐ 18" depth "loamy sand" soil mix with minimum long-term percolation rate of 5"/hour.
- ☐ Area of soil mix meets or exceeds minimum.
- ☐ Perforated pipe underdrain bedded in "Class 2 perm" with connection and sufficient head to storm drain or discharge point (except in "A" or "B" soils).
- ☐ No filter fabric.
- ☐ Underdrain has a clean-out port consisting of a vertical, rigid, non-perforated PVC pipe, with a minimum diameter of 6 inches and a watertight cap.
- ☐ Location and footprint of facility are shown on site plan and landscaping plan.
- ☐ Bioretention area is designed as a basin (level edges) or a series of basins, and grading plan is consistent with these elevations. If facility is designed as a swale, check dams are set so the lip of each dam is at least as high as the toe of the next upstream dam.
- ☐ Inlets are 12" wide, have 4"-6" reveal and an apron or other provision to prevent blockage when vegetation grows in, and energy dissipation as needed.
- ☐ Overflow connected to a downstream storm drain or approved discharge point.
- ☐ Emergency spillage will be safely conveyed overland.
- ☐ Plantings are suitable to the climate and a well-drained soil.
- ☐ Irrigation system with connection to water supply.
- ☐ Vaults, utility boxes, and light standards are located outside the minimum soil mix surface area.
- ☐ When excavating, avoid smearing of the soils on bottom and side slopes. Minimize compaction of native soils and "rip" soils if clayey and/or compacted. Protect the area from construction site runoff.



PLAN VIEW
NOT TO SCALE



A SECTION
NOT TO SCALE

NOTE

1. SURFACE AREA LIMIT DETERMINED BY EXTENT OF SPECIFIED PLANTING MIX, WHICH IS GOVERNED BY THE OUTLET SPILL ELEVATION. FOR REQUIRED SURFACE AREA REFER TO THE FACTORS AND EQUATIONS IN THE STORMWATER C.3 GUIDEBOOK.
2. V_2 STORAGE ACCOMPLISHED WITH INFILTRATION ARCHES, PERFORATED PIPES, CLASS 2 PERM OR OTHER AT THE DESIGNERS DISCRETION.

Bioretention Facility

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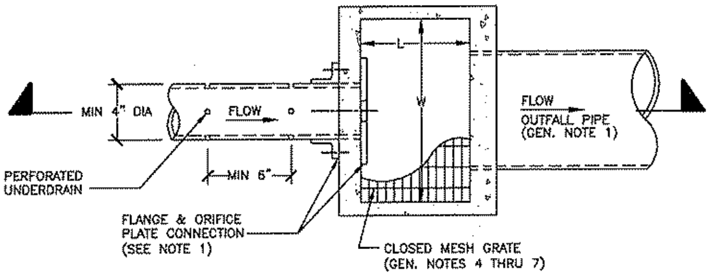
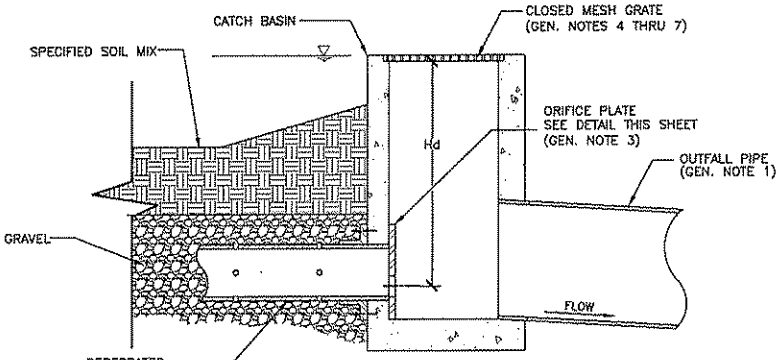
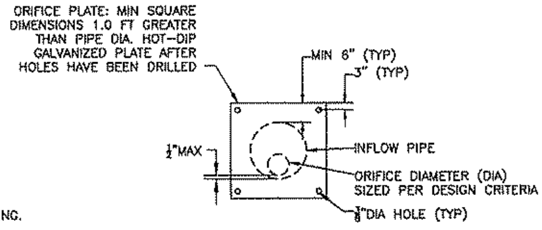


PLAN
N.T.S.



SECTION
N.T.S.



FLOW CONTROL ORIFICE PLATE

NOTE

1. ORIFICE PLATE & FLANGE CONNECTION TO CONCRETE SHALL BE FITTED WITH 30 DUROMETER NEOPRENE RING.

Bioretention Facility Outlet Detail - A

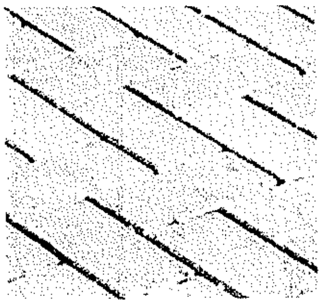
P:\Projects\San Diego County\133904 - SDCo Hydromod Management Plan\CAD\ES\C000_OutletDetail.dwg 6-09-08 07:16:00 PM estlee

BELGARD®
COMMERCIAL

Aqua Roc™

(Example Manufacturer)

[illegible]



[illegible]

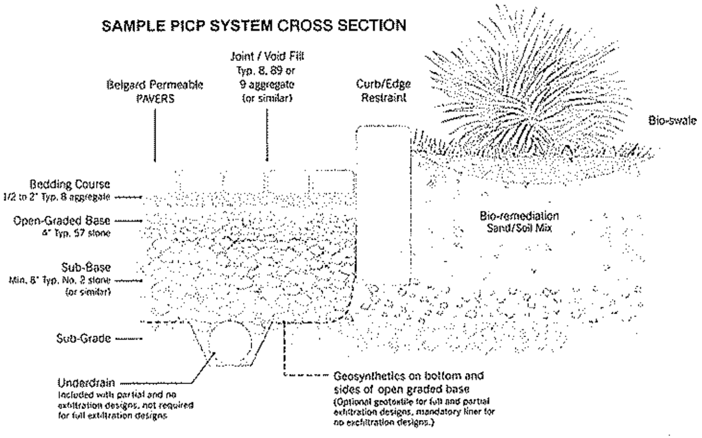
ADA COMPLIANT [illegible]

Aqua Roc™

Aqua Roc is a versatile paver featuring not only the environmentally-friendly benefits of a permeable paver, but also high visual appeal, low maintenance, and proven durability. Aqua Roc's versatile pattern range allows for flexible design options, making it an excellent choice for vehicular use.

Benefits of Belgard® Permeable Paving Stone Systems

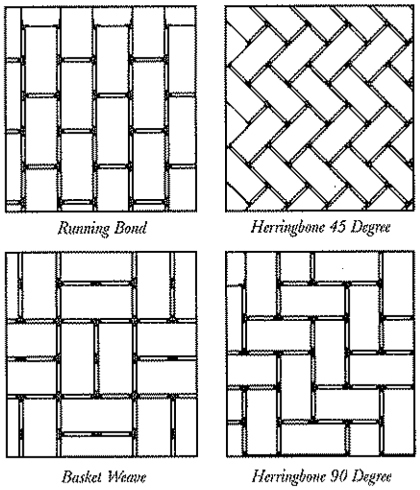
- [illegible] Protection Agency's [illegible]
  [illegible] BMPs
- [illegible] LEED [illegible] 2009 [illegible]
  [illegible] runoff by up to 100%
- [illegible] maximum daily load [illegible] limits
  [illegible]
- [illegible] reduces heat island effect
- [illegible] need for [illegible] and
  [illegible] saving space and money
- [illegible] accommodate all native soil types
- [illegible] proven field performance


SAMPLE PICP SYSTEM CROSS SECTION

The availability of specific aggregate will often vary from region to region. In cases where it becomes necessary to substitute a similar size, your project engineer should always be consulted.

Shape

4 1/2" x 9" x 3 1/8"
(114.3mm x 228.6mm x 80mm)


Running Bond *Herringbone 45 Degree*
Basket Weave *Herringbone 90 Degree*

Laying Patterns

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APPENDIX D

Hydromodification Requirements
Exemption Backup Material

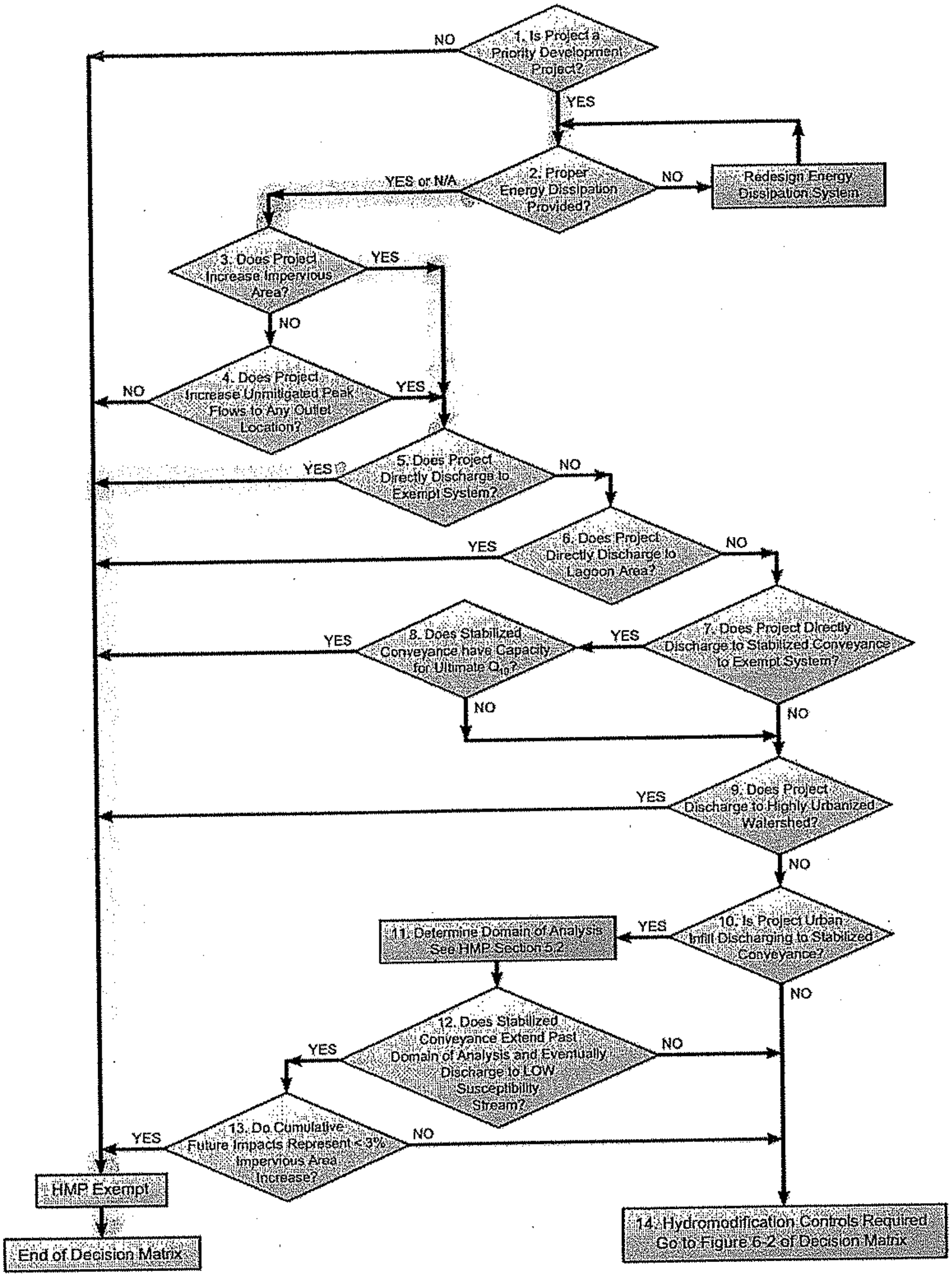


Figure 4-1. HMP Applicability Determination

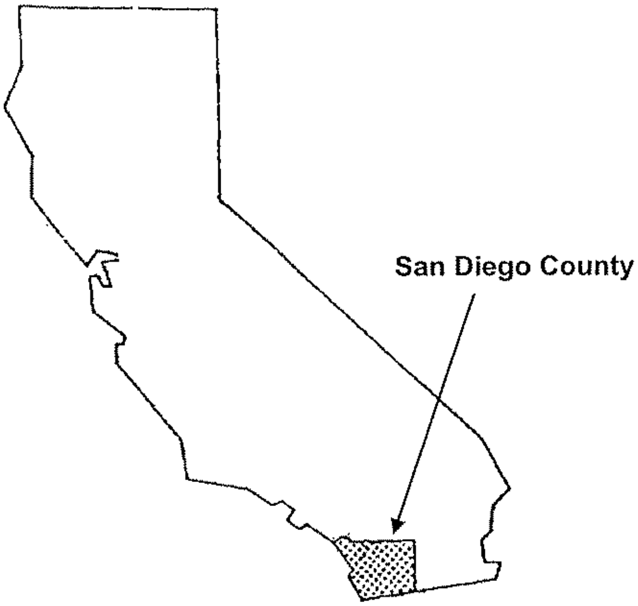
FLOOD INSURANCE STUDY

SAN DIEGO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

VOLUME 1 OF 11

Community Name	Community Number
SAN DIEGO COUNTY, UNINCORPORATED AREAS	060284
CARLSBAD, CITY OF	060285
CHULA VISTA, CITY OF	065021
CORONADO, CITY OF	060287
DEL MAR, CITY OF	060288
EL CAJON, CITY OF	060289
ENCINITAS, CITY OF	060726
ESCONDIDO, CITY OF	060290
IMPERIAL BEACH, CITY OF	060291
LA MESA, CITY OF	060292
LEMON GROVE, CITY OF	060723
NATIONAL CITY, CITY OF	060293
OCEANSIDE, CITY OF	060294
POWAY, CITY OF	060702
SAN DIEGO, CITY OF	060295
SAN MARCOS, CITY OF	060296
SANTEE, CITY OF	060703
SOLANA BEACH, CITY OF	060725
VISTA, CITY OF	060297



REVISED
May 16, 2012

U.S. DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

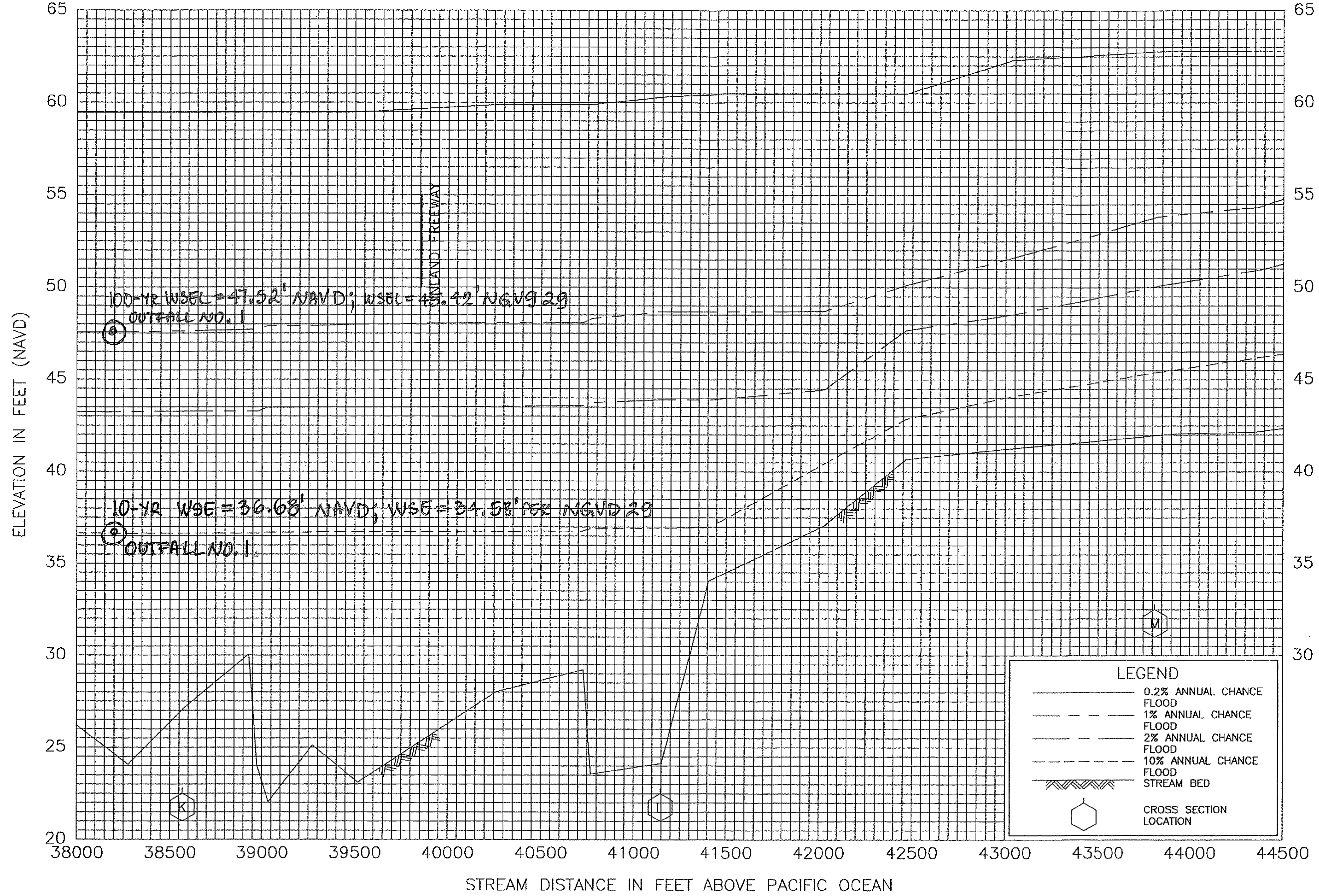
FLOOD INSURANCE STUDY NUMBER
06073CV001C

TABLE 8: SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	**Drainage Area (sq. miles)**	**Peak Discharges (cubic feet per second)** 10% Annual-Chance	2% Annual-Chance	1% Annual-Chance	0.2% Annual-Chance
Downstream of Confluence with San Clemente Creek	32.1	2,500	7,600	11,000	26,500
Upstream of Confluence with San Clemente Creek	13.7	1,300	4,000	6,200	13,900
Upstream of State Highway 52	13.2	1,300	3,800	6,100	13,400
Downstream of Genesse Avenue	9.7	1,100	3,200	5,000	11,200
Downstream of Interstate Highway 805	6.9	900	2,700	4,100	9,400
Samagutuma Creek					
At Mouth	6.4	900	2,600	4,000	7,000
San Clemente Canyon Creek					
Upstream of Confluence with Rose Canyon Creek	18.4	1,400	4,200	6,900	16,000
Upstream of Genesee Avenue	15.3	1,200	3,600	5,600	12,000
Upstream of Interstate Highway 805	12.5	1,000	3,100	4,900	11,000
San Diego River					
At Confluence with Murphy Canyon Creek	420.0	3,100	17,000	36,000	112,000
Just Downstream of Confluence of San Vicente Creek	290.0	2,500	--	31,000	--

FLOOD INSURANCE STUDY VOLUME 9 OF 11, REVISED MAY 16, 2012

OUTFALL NO. 1



100-YR WSEL = 47.52' NAVD; WSEL = 45.42' NGVD 29

OUTFALL NO. 1

10-YR WSE = 36.68' NAVD; WSE = 34.58' PER NGVD 29

OUTFALL NO. 1

FLOOD PROFILES

SAN DIEGO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

SAN DIEGO COUNTY, CA
(AND INCORPORATED AREAS)

351P

JN: 17010

APPENDIX E

Storm Water Management and Discharge Control Maintenance Agreement
for
Discovery Center at Grant Park

THE SWMDCMA(s) WILL BE PROVIDED UPON FINAL DESIGN OF THE PROJECT

MAP POCKET 1

Water Quality Technical Report
Exhibit
for
Discovery Center at Grant Park

LID SITE DESIGN AND SOURCE CONTROL BMP LEGEND

▨	LANDSCAPED AREA (GRASS, VEGETATION, LANDSCAPING)
▨	BIORETENTION BASIN (TREATMENT CONTROL BMP - TC BMP)
▨	PERMEABLE PAVERS (TC BMP)
☐	CONCRETE SIDEWALK/PATHWAY
—	DMA's BOUNDARY
▨	PERMEABLE PAVERS/CONCRETE

40 20 0 40 80 120
GRAPHIC SCALE 1" = 40'

WATER QUALITY TECHNICAL REPORT
FOR
DISCOVERY CENTER
AT GRANT PARK

J-17010

Date: April 30, 2014
Revised: September 14, 2015

RICK ENGINEERING COMPANY
5620 FRIARS ROAD
SAN DIEGO, CA 92 0
6 9.29 .0707
(FAX)6 9.29 .4 65
rickengineering.com
San Diego Riverside Sacramento Orange Phoenix Tucson

NOT FOR CONSTRUCTION - EXHIBIT FOR WATER QUALITY TECHNICAL REPORT ONLY