VINCENT N. SCHEIDT

Biological Consultant

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Preliminary Biological Resources Assessment

To: Mr. Soheil Nakhshab

From: Vince Scheidt, Biological Consultant

Date: October 20, 2016

RE: Biological Resources – Truax Tentative Map Project, San Diego

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Per your request, I have completed a Preliminary Biological Reconnaissance Assessment for the Truax Tentative Map Project (City Project Nbr. 509894) located in the Park West area of the City of San Diego. The purpose of this reconnaissance was to assess existing site conditions, focusing on any sensitive habitats or sensitive species insofar as they could constitute development constraints. The second purpose is to identify any potential follow-up studies and mitigation scenarios, as applicable.

In order to assess site conditions, I completed a site reconnaissance inspection of the property on the morning of October 13, 2016. The focus of this inspection was on proposed parcel 3, which was vacant. Parcels 1 and 2 were fully developed with single-family homes. The entirety of parcel 3 was walked, and all species and habitats were identified as they were encountered. Sufficient time was spent to clearly locate and inventory all plants and animals resident on the site to the extent that they were detectable given the season of the survey.

One hundred percent of the vegetation onsite qualifies as either Non-native Vegetation (NNV) or Disturbed Habitat (DH). Indicator species within the NNV include Peruvian Peppertree (*Schinus molle),* Murray Red Gum (*Eucalyptus camaldulensis*), Hottentot Fig (*Carpobrotus edulis*), Jade Plant (*Crassula ovata*), and many other naturalized ornamental plants. Indicators of the DH include Wild Lettuce *(Lactuca serriola),* Common Goosefoot *(Chenopodium murale)*, Russian Thistle *(Salsola pestifer)*, and other ruderal weeds. The site supports no native vegetation, having been completely graded and developed in the past.

Conclusions

Impacts to onsite biological resources are "less than significant" as defined by the California Environmental Quality Act (CEQA). The site supports no native vegetation, with the only onsite habitats being NNV and DH, which are ranked as MSCP Tier IV habitats, requiring no mitigation. No special status species, including narrow endemics or other significant species, were found onsite. The Truax Tentative Map Project site is found outside of the City of San Diego's Multi-Habitat Planning Area (MHPA) and thus is not subject to land-use adjacency regulations.

Figure 1, attached, shows onsite habitats along with representative site photos.

Figure 1. Vegetation - Truax Tentative Map Project

= Non-native Vegetation or Development

= Disturbed Habitat

Photo 1. View looking southwest from near the northeastern property edge. Note small eucalyptus (NNV - red arrow) and ruderal weeds (DH) in open areas.

Photo 2. View looking northeast onto proposed parcel 3 from the north end of Union Street. Note the iceplant (NNV - red arrow) ground cover and ornamentals on the right and, weedy ruderal vegetation (DH) on the left.

Michael W. Hart
Engineering Geologist
P.O. Box 261227 • San Diego • California • 92196 • 858 578-4672

File No. 1014-2016
September 20, 2016

Solene Clavel
Nakhshab Development Design, Inc.
2900 Fourth Ave., #100
San Diego, California
92103

Subject: Truax Property, Parcels 1-3
2513 Union Street, San Diego, California
GEOLOGIC RECONNAISSANCE

Dear Ms. Clavel:
In accordance with your request I have completed a geologic reconnaissance of the subject residential property. The results of this study indicate the site is underlain by the San Diego and Lindavista Formations that consist of massive to thinly-bedded, fine to medium-grained sandstone and conglomerate. These units are locally overlain by undocumented fill and slopewash. The results of this study indicate the site is not located on an active or potentially active fault. In addition, it is concluded that there is no evidence that the property is situated on or adjacent to an ancient landslide. If you have any questions after reviewing the report, please contact me at your convenience.

Very truly yours,

Michael W. Hart
CEG 706

1cc addressee

GEOLOGIC RECONNAISSANCE
TRUAX PROPERTY, PARCELS 1-3
2513 UNION STREET
SAN DIEGO, CALIFORNIA

INTRODUCTION

This report presents the results of a geologic reconnaissance for three residential parcels located at the northern terminus of Union Street in San Diego, California (Figure 1). This report is a reconnaissance level study whose purpose is to describe the geologic characteristics of the site as well as the potential geologic hazards to which the site may be susceptible. The scope of work included geologic mapping, a review of published geologic literature, and interpretation of aerial photographs. In keeping with the Technical Guidelines of the City of San Diego for the preparation of Geologic Reconnaissance reports, this study does not include subsurface excavations such as borings or test pits and none were requested.

FIELD WORK

Fieldwork performed for this study consisted of geologic mapping including observation of natural and man-made geologic outcrops on and adjacent to the property utilizing a site plan and topographic map prepared Coffee Engineering dated 8/31/16.

SITE DESCRIPTION AND PROPOSED PROJECT

It is my understanding that a new residence is proposed for the vacant Parcel 3 and that the existing residence on Parcel 1 will be demolished and a new home constructed. The multi-story residence existing on Parcel 2 is to be remodeled and retained.

The properties are located on the east side of Union Street and north of Laurel Street in San Diego, California. Parcel 3 is currently undeveloped and covered with grasses, a few trees, and shrubs. Parcel 3 has been previously graded nearly level and is bounded on the south by a fill slope and on the north by cut and fill slopes that vary from approximately 5 to 35 feet in height. The fill slope along the southern property line of parcel 3 is partially supported by a concrete

block retaining wall that is 5 to 10 (+/-) feet in height (Figure 2). Portions of the slope along the northern property line of Parcel 3 are vertical to near vertical.

Currently the drainage on the graded pad is essentially flat with a slight gradient toward the northwest property corner (see topographic and geologic map, Figure 2). The highest elevation on the graded pad is 120 feet (+/-). The lowest site elevation of 102 occurs near the northwest property corner. Grading plans for Parcel 3 are currently not fully developed however, it is anticipated that future cuts and fills will be less than 5 feet in height.

GENERAL GEOLOGY AND GEOLOGIC SETTING

The project is situated on the western slope of an extensive Pleistocene marine terrace that extends eastward for at least 10 miles. The marine terrace is underlain by sediments primarily eroded from the Peninsular Ranges as a result of tectonic uplift beginning in the Cretaceous Period approximately 60 million years ago. The Tertiary and Quaternary-aged marine sediments underlying the terrace consist primarily of essentially horizontally bedded sandstone and cobble conglomerate (Kennedy, 1975) described more fully in the following paragraphs.

The closest significant fault to the project is a branch of the Rose Canyon fault that lies approximately 1100 feet to the west. Approximately two miles to the east, the nearly flat surface of the marine terrace is broken by the north/south trending Florida Canyon and Texas Street faults that define a broad graben, or down-dropped fault block.

STRATIGRAPHY

Mapping by Kennedy (1975) indicates the site is underlain by a single geologic unit identified as the San Diego Formation. Geologic mapping for this report indicates that the San Diego Formation in this area is overlain by the Lindavista Formation (Very old Paralic deposits, Qvop9 of Kennedy and Tan, 2008) and relatively thin surficial deposits consisting of fill and slopewash described below.

San Diego Formation (Tsd)

The San Diego Formation is a Pliocene-aged sedimentary unit that is composed of light grey to light yellow-brown, very fine-grained micaceous sandstone. In the area of Parcels 2 and 3 the San Diego Formation is overlain by the Lindavista Formation. The contact between these two

units is obscured by existing improvements and fill but is estimated to lie at an approximate elevation of 130 feet.

Lindavista Formation (Qvop9)

This unit is composed of well to very well cemented medium to course grained red-brown sandstone and pebble conglomerate and is well exposed in a low cut slope located at the rear of Parcels 1 and 2. Topsoil developed on the Lindavista Formation is poorly exposed, however, in nearby localities it consists of approximately one foot of silty sand underlain by a two to three feet thick dark brown clay or argillic horizon.

Slopewash (Qsw)

Slopewash soils are defined as thick deposits of dark brown silty to sandy clay. These soils have accumulated on the north and west facing slopes in the central and northern portion of the site. They are exposed underlying fill along the northern property line of Parcel 3 and in the cut slope along the east side of Union Street.

Fill

Undocumented fill exist on the slope between Parcels 2 and 3, on the building pad of Parcel 3, and in the low cut slope between Parcel 3 and the driveway of the neighboring residence to the north. Typically, such soils consist of loose, porous, silty sands and sandy clay with scattered cobbles.

GEOLOGIC STRUCTURE

All the geologic units underlying the property, as evidenced by nearby cut slopes, dip horizontally to approximately 2 to 3 degrees to the west (Geologic Section, Figure 3). Observations of cut slopes bounding the property on the north and east indicate that fractures and joints in this unit are near-vertical trend approximately north-south.

GEOLOGIC HAZARDS

Potential geologic hazards considered in this report include the potential for surface faulting, liquefaction, seismically induced settlement, landsliding, and seismic shaking. Each is discussed in detail below.

Local Faulting

According to mapping by Kennedy (1975, 1977) and the Seismic Hazard Maps of the City of San Diego, the site is located approximately 1,100 feet east of the Rose Canyon fault zone and approximately 1.5 miles west of the Florida Canyon fault. Inspection of limited outcrops as well reference to the City of San Diego Seismic Safety Study maps indicates there are no other faults mapped on or adjacent to the site. The property is located just north of the Downtown Special Fault zone whose northern boundary lies along the center line of Laurel Street. It is concluded from the foregoing that the property is not underlain by active or potentially active faults.

Seismicity

The site will be affected by seismic shaking as a result of earthquakes on major active faults located throughout the southern California area. The nearest active fault system, the Rose Canyon fault, is the most significant fault to the site with respect to the potential for seismic activity. Lindvall and Rockwell (1995) have described the Rose Canyon fault system in terms of several segments that have distinctive earthquake potential. The closest segment is the Mission Bay segment that extends from San Diego Bay on the south to La Jolla on the north. The Del Mar segment extends offshore from La Jolla to Oceanside.

According to Lindvall and Rockwell (1995), the Mission Bay and Del Mar fault segments are capable of generating M_w6.4 to M_w6.6 earthquakes, respectively, with an estimated recurrence time of approximately 720 years for these events and 1800 years for an earthquake event of M_w6.9 that would result from rupture of both segments concurrently. A M_w6.9 event could produce peak ground accelerations at the site of approximately 0.6 to 0.7g (Joyner and Boore, 1982). Other active faults, the Elsinore, San Jacinto, and San Andreas faults lie approximately 44, 64, and 95 miles, respectively, to the east with corresponding estimated peak ground accelerations for Maximum Probable Earthquake events of approximately 0.08g, 0.03g, and 0.02g (Joyner and Boore, 1982).

Liquefaction and Seismically Induced Settlement

The bedrock soils underlying the site consist of moderately dense sandstones comprising the San Diego and Lindavista Formations. Properly compacted fills comprised of sandy soils as well as the underlying bedrock are not considered susceptible to seismically induced liquefaction or settlement.

Landsliding and Slope Stability

Geologic mapping for this report indicates that the site is not located on or adjacent to a deep-seated landslide. The Landslide Hazards map for the Point Loma Quadrangle by Tan (1995) indicates the site lies within Subarea 3-1. Slopes within this area are defined as being "at or near their stability limits due to a combination of weak materials and steepness. Such slopes can be expected to fail locally when adversely modified".

The fill slope located between Parcels 2 and 3 is comprised of undocumented fill and may be subject to shallow slope failures and sloughing. There are two areas along the north side of Parcel 3 that are bounded by vertical slopes. The first is located in the northwest corner of the Parcel along the south side of the driveway to the adjacent residence. This slope is approximately eight feet in height and comprised of undocumented fill underlain by clayey slopewash. The second area is located in the northeastern portion of Parcel 3. The slope in this area is vertical and approximately 35 feet high. Inspection of the slope from the neighboring residence to the north indicates that it is comprised of horizontally bedded, moderately cemented sandstone of the San Diego Formation and has been subject to minor blockfalls. Since this slope is located in a relatively narrow portion of the property, the proposed residence should not be affected if it is situated in the western portion of the lot. Future landscaping improvements located at or near the top of slope should be avoided because of the potential for erosion and blockfalls.

Cut slopes in the San Diego and Lindavista Formations typically have sufficient factors of safety to adequately resist slope moments when constructed at inclinations of 2.0 horizontal to 1.0 vertical. However, it is recommended that any cut slopes that are to be unsupported by retaining walls be inspected during grading by an engineering geologist to determine if adversely dipping planes of geologic weakness are present.

GROUNDWATER:

No seepage or other evidence of groundwater was observed during field work for this geologic reconnaissance. The depth to the regional groundwater surface is unknown, however, the currently proposed building pads will not be excavated to a depth where it could be reasonably anticipated that the regional groundwater level would be intercepted. It is possible that perched

groundwater could occur on cut slopes after or during heavy rains or from seepage from uphill properties. The recommendations of the geotechnical report and project civil engineer regarding site drainage should be implemented in the design of the project.

CONCLUSIONS AND RECOMMENDATIONS

1. The property is underlain by the San Diego and Lindavista Formations that consist of fine to medium -grained sandstone and conglomerate. These formational soils are locally overlain by surficial soils consisting of slopewash and undocumented fill.

2. The closest mapped potentially active fault is the Florida Canyon fault located approximately 1.5 miles east of the site. The closest active fault to the property is a strand of the Rose Canyon fault that lies approximately 1,100 ft. to the west. Based on review of the geologic literature, chiefly Kennedy (1975) and the City of San Diego Seismic Hazard Maps, it is concluded that the site is not underlain by an active or potentially fault.

3. A study of topographic maps and inspection of cut slopes that bound the site indicates there is no evidence that the property is located on or adjacent to a deep-seated landslide.

4. It is recommended that future cut slopes be inspected during grading by an engineering geologist to determine if the findings of this study are essentially the same as encountered during development of the site.

5. When development plans become available it is recommended that a geotechnical engineer be consulted to provide recommendations for stabilization of the cut slope at the northwest corner of Parcel 3 and the fill slope between Parcels 2 and 3 that is composed of undocumented fill. The geotechnical engineer should also provide a recommendation for an allowable structural setback from the vertical slope in the eastern portion of Parcel 3 as well as recommendations for mitigation of undocumented fill located on the proposed building pad of Parcel 3.

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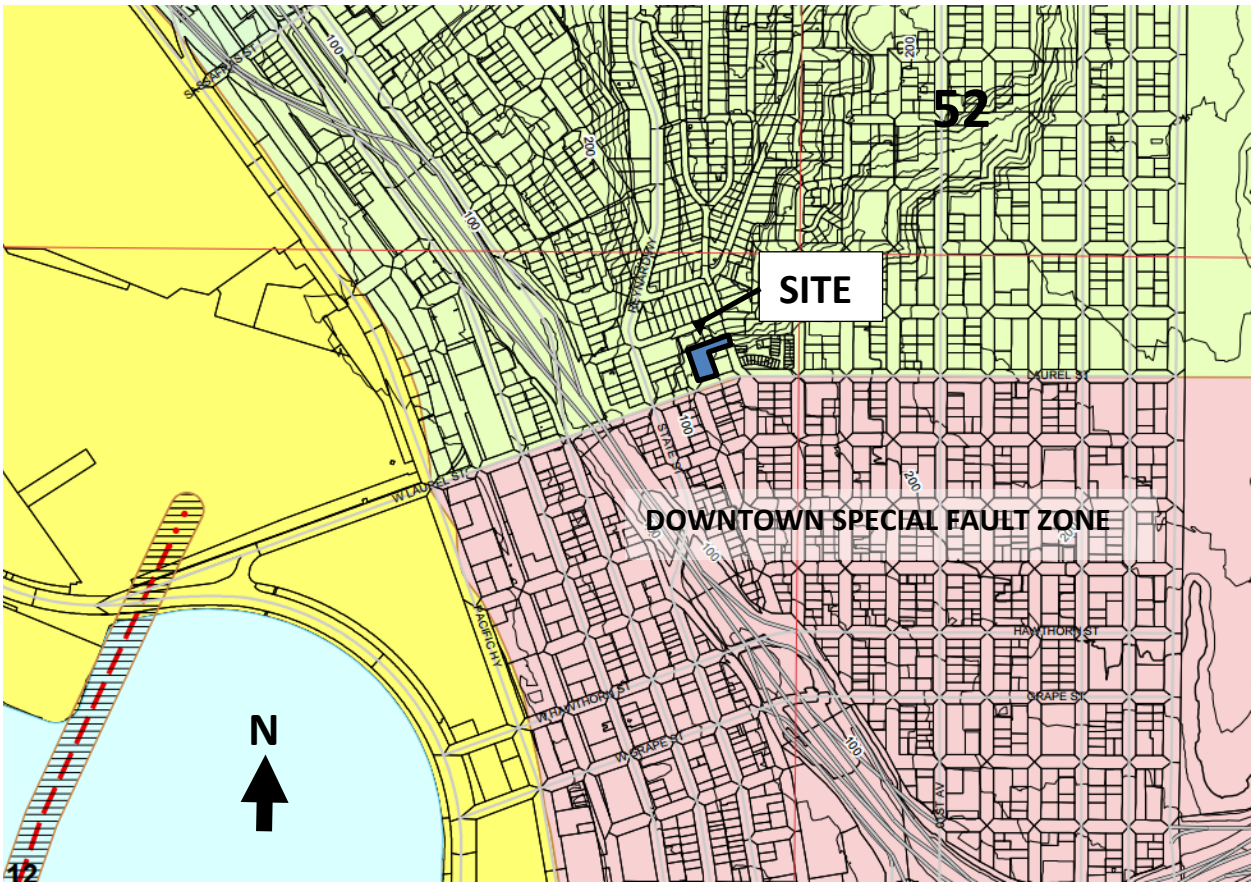

LOCATION AND GEOLOGIC HAZARDS MAP, TRUAX PROPERTY, PARCELS 1-3 2513 UNION STREET, SAN DIEGO, CALIFORNIA

(MODIFIED AFTER CITY OF SAN DIEGO SEISMIC SAFETY STUDY MAP NO. 17)

Legend

52: Other level areas, gently sloping to steep terrain, with favorable geologic structure, low risk

MICHAEL W. HART, ENGINEERING GEOLOGIST
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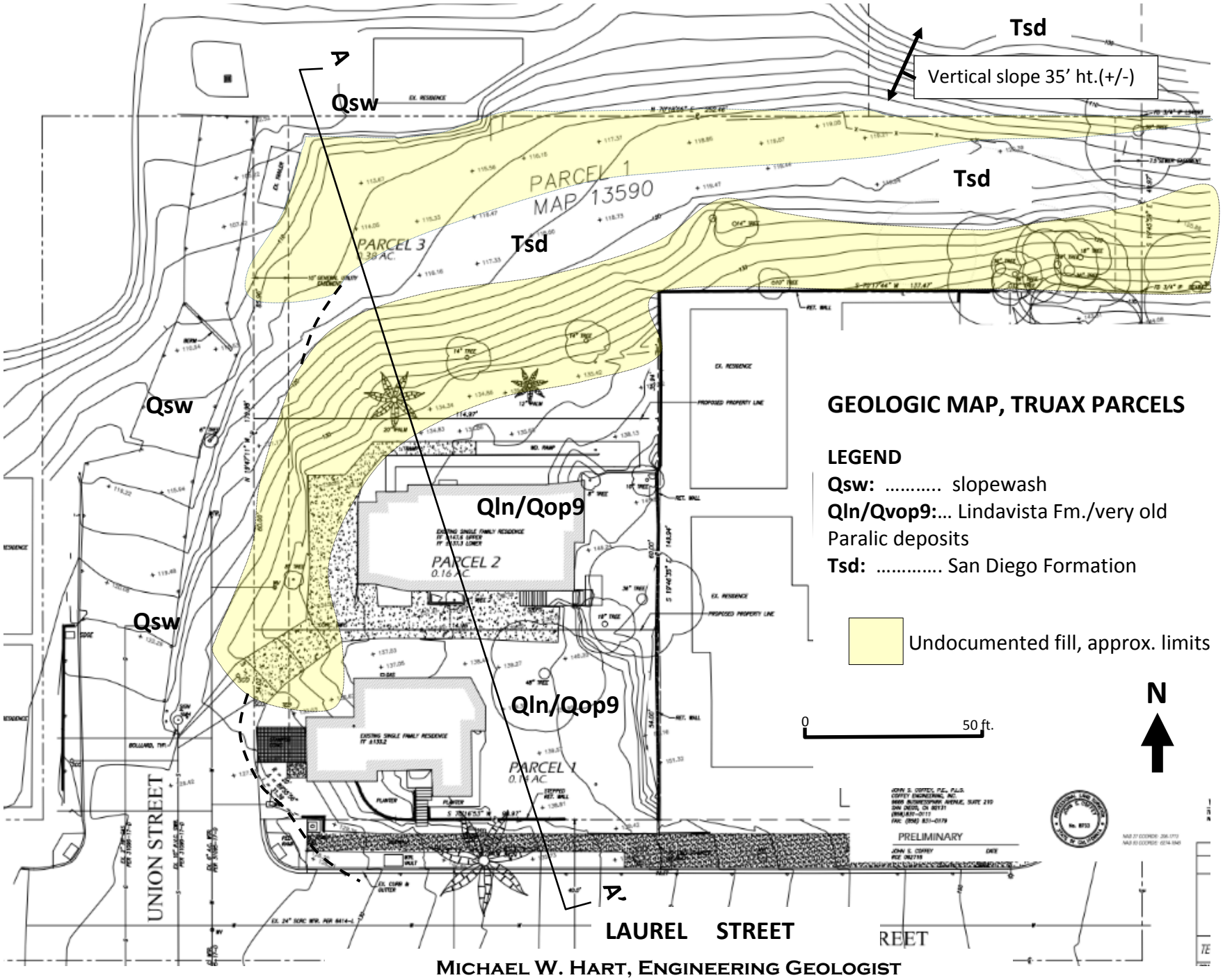

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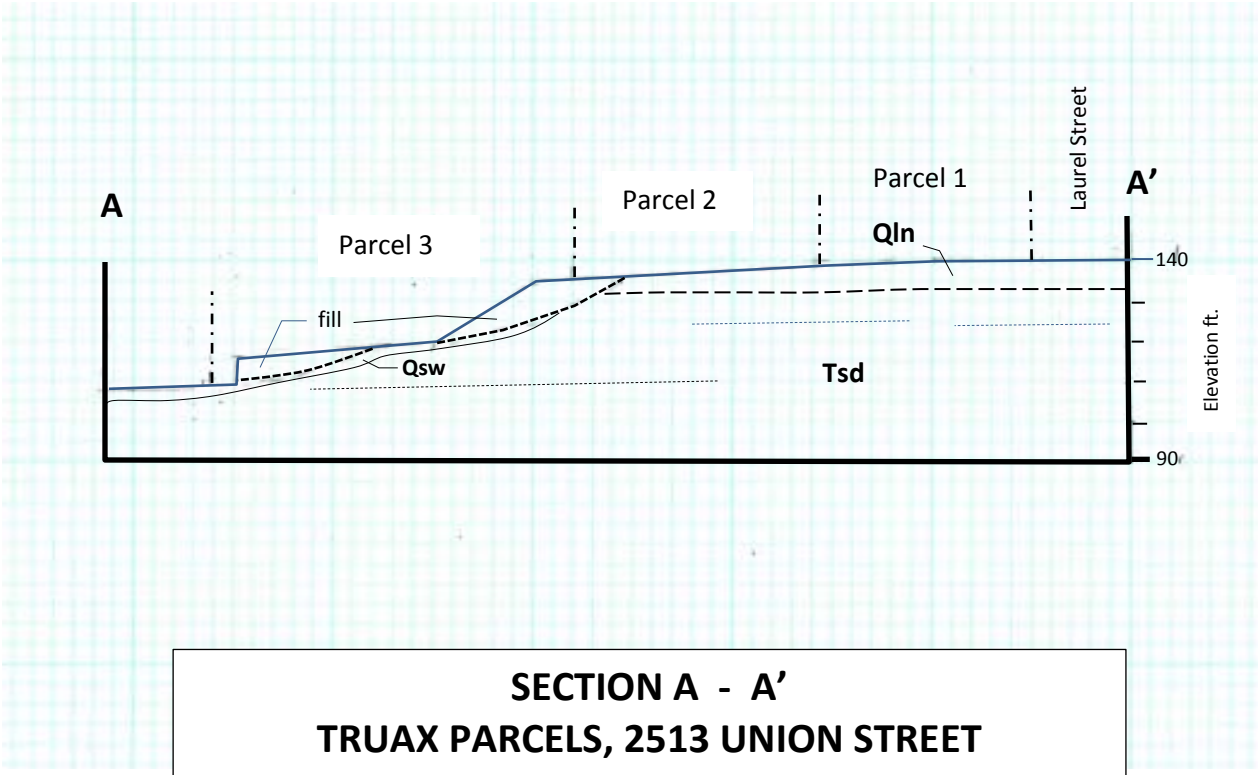
Figure 2



SECTION A - A'
TRUAX PARCELS, 2513 UNION STREET
SAN DIEGO, CALIFORNIA

Legend
Qsw: Slopewash
Qln: Lindavista Formation (Qvop9)
Tsd: San Diego Formation

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ALLIED EARTH TECHNOLOGY

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ROBERT CHAN, P.E.

LIMITED GEOTECHNICAL INVESTIGATION

PROPOSED PARCEL MAP SITE

2513 UNION STREET

SAN DIEGO, CALIFORNIA

FOR

NAKHSHAB DEVELOPMENT DESIGN, INC.

PROJECT NO. 16-1288J1

OCTOBER 20, 2016

ALLIED EARTH TECHNOLOGY

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ROBERT CHAN, P.E.

October 20, 2016

Nakhshab Development Design, Inc.
2900 Fourth Avenue, Suite 100
San Diego, CA. 92103

Subject : Project No. 16-1288J1
Limited Geotechnical Investigation
Proposed Parcel Map Site
2513 Union Street
San Diego, California

Gentlemen :

In accordance with your request, we have performed a limited geotechnical investigation for the proposed minor subdivision of subject property. Subject property is more specifically referred to as being Parcel 1 of Parcel Map No. 13590, in the City and County of San Diego, State of California.

It is our understanding that subject property, consisting of 0.68 acres, is to be subdivided into 3 separate parcels with no significant exterior site modifications on the private lots. An extended sidewalk and a new driveway along Laurel Street is proposed, as Union Street north of Laurel Street is to be vacated. Private driveway feature north of the new driveway apron are to generally remain as constructed.

A Geologic Reconnaissance Report prepared by Michael W. Hart, Engineering Geologist, has been made available to us for review in preparing this Limited Geotechnical Investigation Report.

The approximate location of subject property is shown on Figure No. 1, entitled, "Site Location Map".

ALLIED EARTH TECHNOLOGY

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ROBERT CHAN, P.E.

October 20, 2016

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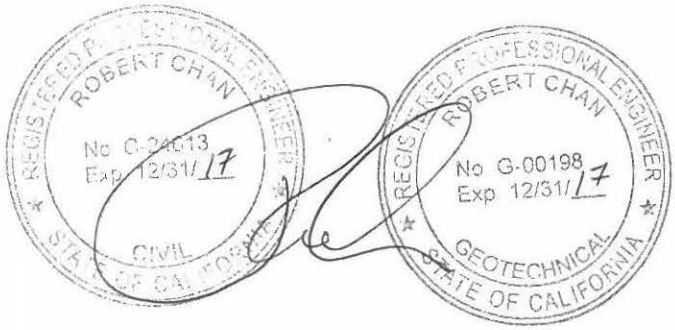


Subject : Project No. 16-1288J1
Response to City Comments
Proposed Parcel Map Site
2513 Union Street
San Diego, California

Gentlemen :

The following are responses to City comments :

#6 *Indicate if the presence of rocks or liquids containing deleterious chemicals which, if not corrected, could cause construction materials such as concrete, steel, and ductile or cast iron to corrode or deteriorate.*

See attached sulfate test results which indicate negligible sulfate content

#7 *The project's geotechnical consultant should clarify if the geologic conditions are favorable or unfavorable with respect to gross slope stability at the site.*

The geologic conditions are favorable with respect to gross slope stability at the site.

#8 *The geotechnical consultant must provide a statement as to whether or not the site is suitable for the intended use.*

The site is suitable for the intended use.

LABORATORY TEST RESULTS

1. The maximum dry density and optimum moisture content of the upper soils encountered were determined in accordance with A.S.T.M. D1557, Method A. The results of the tests are presented as follows :

Soil Type	Soil Description	Maximum Dry Density (lbs./cu.ft.)	Optimum Moisture Content (% Dry Wt.)
1	Light brown/tan silty fine sands (SM)	118.0	12.5

1. The Expansion Index of the most clayey soils was determined in accordance with ASTM D4928-108. The results of the test are presented as follows:

Soil Type	Soil Description	Expansion Index
1	Light brown/tan silty fine sands (SM)	23*

*Considered to possess low expansion potential

3. The sulfate content of the soils encountered were determined in accordance with California Test No. 317. The results are presented below :

Soil Type	**Soil Description**	**Sulfate Content (ppm)**	
1	**Light brown/tan silty fine sand (SM)**	**110**	**Negligible**

City of San Diego
2016 STORM WATER STANDARDS
WATER QUALITY STUDY BMP REPORT

Created by: Michael Rein
Date: 03/15/17

Priority Development Project (PDP) Exemption Requirements:

The proposed project includes an extended sidewalk and new driveway along Laurel Street. Private driveway features north of the new driveway apron within Union Street are to be widened and include a fire hammerhead turnaround. The proposed additions include the removal and replacement of 2,380 square feet of impervious surface. These improvements are intended to repair and replace sidewalk along Laurel Street, as well as parts of the existing driveway. Proposed additions also include a driveway widening and extension that will create 2,607 square feet of new impervious surface. Therefore, new development will not create and/or replace more than a total of 5,000 square-feet, or more, of impervious surfaces collectively over the project site. This project does not meet any other PDP requirements, or conditions, and therefore is a standard development project.

Required Permanent Best Management Practices for Standard Development Projects

Source Control (SC) BMP Requirements:

How to comply: Projects shall comply with this requirement by implementing source control BMPs listed in this section that are applicable to their project. Applicability shall be determined through consideration of the development project's features and anticipated pollutant sources. Appendix E provides guidance for identifying source control BMPs applicable to a project. The "Source Control BMP Checklist for All Development Projects" located in Appendix I-4 shall be used to document compliance with source control BMP requirements.

SC-1: Prevent illicit discharges into the MS4

An illicit discharge is any discharge to the MS4 that is not composed entirely of storm water except discharges pursuant to a National Pollutant Discharge Elimination System permit and discharges resulting from firefighting activities. Projects must effectively eliminate discharges of non-storm water into the MS4. This may involve a suite of housekeeping BMPs which could include effective irrigation, dispersion of non-storm water discharges into landscaping for infiltration, and controlling wash water from vehicle washing.

DISCUSSION: Any non-storm water discharges will flow through landscape areas before leaving the site.

SC-2: Identify the storm drain system using stenciling or signage

Storm drain signs and stencils are visible source controls typically placed adjacent to the inlets. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Stenciling shall be provided for all storm water conveyance system inlets and catch basins within the project area. Inlet stenciling may include concrete stamping, concrete painting, placards, or other methods approved by the local municipality. In addition to storm drain stenciling, projects are encouraged to 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.

Language associated with the stamping (e.g., “No Dumping-Drains to Ocean”) must be satisfactory to the City Engineer. Stamping may also be required in Spanish.

DISCUSSION: Storm drain stenciling can be implemented on the catch basin near the hammerhead turnaround that collects storm water runoff from the hillside.

SC-3: Protect outdoor material storage areas from rainfall, run-on, runoff, and wind dispersal

Materials with the potential to pollute storm water runoff shall be stored in a manner that prevents contact with rainfall and storm water runoff. Contaminated runoff shall be managed for treatment incorporate the following structural or pollutant control BMPs for outdoor material storage areas, as applicable and feasible:
Materials with the potential to contaminate storm water shall be:

• Placed in an enclosure such as, but not limited to, a cabinet, or similar structure, or under a roof or awning that prevents contact with rainfall runoff or spillage to the storm water conveyance system; or
• Protected by secondary containment structures such as berms, dikes, or curbs.
• The storage areas shall be paved and sufficiently impervious to contain leaks and spills, where necessary.
(continued below)
• The storage area shall be sloped towards a sump or another equivalent measure that is effective to contain spills.
• Runoff from downspouts/roofs shall be directed away from storage areas.
• The storage area shall have a roof or awning that extends beyond the storage area to minimize collection of storm water within the secondary containment area. A manufactured storage shed may be used for small containers.

DISCUSSION: No material storage areas will be present.

SC-4: Protect materials stored in outdoor work areas from rainfall, run-on, runoff, and wind dispersal

Outdoor work areas have an elevated potential for pollutant loading and spills. All development projects shall include the following structural or pollutant control BMPs for any outdoor work areas with potential for pollutant generation, as applicable and feasible:
• Create an impermeable surface such as concrete or asphalt, or a prefabricated metal drip pan, depending on the size needed to protect the materials.
• Cover the area with a roof or other acceptable cover.
• Berm the perimeter of the area to prevent water from adjacent areas from flowing on to the surface of the work area.
• Directly connect runoff to sanitary sewer or other specialized containment system(s), as needed and where feasible. This allows the more highly concentrated pollutants from these areas to receive special treatment that removes particular constituents. Approval for this connection must be obtained from the appropriate sanitary sewer agency.
• Locate the work area away from storm drains or catch basins.

DISCUSSION: There is no proposed outdoor work area for this project.

SC-5: Protect trash storage areas from rainfall, run-on, runoff, and wind dispersal

Storm water runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. All development projects shall include the following structural or pollutant control BMPs, as applicable:

• Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This can include berming or grading the waste handling area to prevent run-on of storm water.
• Ensure trash container areas are screened or walled to prevent offsite transport of trash.
• Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
• Locate storm drains away from immediate vicinity of the trash storage area and vice versa.
• Post signs on all dumpsters informing users that hazardous material are not to be disposed.

DISCUSSION: This BMP is not applicable to the proposed project.

SC-6: Use any additional BMPs determined to be necessary by the Copermittee to minimize pollutant generation at each project site
Appendix E.1 provides guidance on permanent controls and operational BMPs that are applicable at a project site based on potential sources of runoff pollutants at the project site. The project shall implement all applicable and feasible source control BMPs listed in Appendix E.1. In addition to the source control BMPs in Appendix E.1, additional source control requirements apply for the following project types within the City jurisdiction. Guidance for implementing these additional source control requirements are presented in Appendix E.

• **SC-6A: Large Trash Generating Facilities**: Includes but are not limited to restaurants, supermarkets, "big box" retail stores serving food, and pet stores. Refer to Appendix E.20

• **SC-6B: Animal Facilities**: Includes but are not limited to animal shelters, dog daycare centers, veterinary clinics, groomers, pet care stores, and breeding, boarding, and training facilities. Refer to Appendix E.21

• **SC-6C: Plant Nurseries and Garden Centers**: Includes but are not limited to commercial facilities that grow, distribute, sell, or store plants and plant material. Refer to Appendix E.22

• **SC-6D: Automotive-related Uses**: include but are not limited to facilities that perform maintenance or repair of vehicles, vehicle washing facilities, and retail gasoline outlets. Refer to Appendix E.23

DISCUSSION: This source control is limited to on-site storm drain inlets, landscaping, and sidewalk improvements (Refer to Form I-4).

Site Design (SD) BMP Requirements:

How to comply: Projects shall comply with this requirement by using all of the site design BMPs listed in this section that are applicable and practicable to their project type and site conditions. Applicability of a given site design BMP shall be determined based on project type, soil conditions, presence of natural features (e.g. streams), and presence of site features (e.g. parking areas). Explanation shall be provided by the applicant when a certain site design BMP is considered to be not applicable or not practicable/feasible. Site plans shall show site design BMPs and provide adequate details necessary for effective implementation of site design BMPs. The "Site Design BMP Checklist for All Development Projects" located in Appendix I-5 shall be used to document compliance with site design BMP requirements.

SD-1: Maintain natural drainage pathways and hydrologic features

Maintain or restore natural storage reservoirs and drainage corridors (including topographic depressions, areas of permeable soils, natural swales, and ephemeral and intermittent streams)

Buffer zones for natural water bodies (where buffer zones are technically infeasible, require project applicant to include other buffers such as trees, access restrictions, etc.)

During the site assessment, natural drainages must be identified along with their connection to creeks and/or streams, if any. **Natural drainages offer a benefit to storm water management as the soils and habitat already function as a natural filtering/infiltrating swale.** When determining the development footprint of the site, altering natural drainages should be avoided. By providing a development envelope set back from natural drainages, the drainage can retain some water quality benefits to the watershed. In some situations, site constraints, regulations, economics, or other factors may not allow avoidance of drainages and sensitive areas. Projects proposing to dredge or fill materials in Waters of the U.S. must obtain Clean Water Act Section 401 Water Quality Certification. Projects proposing to dredge or fill waters of the State must obtain waste discharge requirements. Both the 401 Certification and the Waste Discharge Requirements are administered by the San Diego Water Board. The project applicant shall consult the local jurisdiction for other specific requirements.

Projects can incorporate SD-1 into a project by implementing the following planning and design phase techniques as applicable and practicable:

• Evaluate surface drainage and topography in considering selection of Site Design BMPs that will be most beneficial for a given project site. Where feasible, maintain topographic depressions for infiltration.
• Optimize the site layout and reduce the need for grading. Where possible, conform the site layout along natural landforms, avoid grading and disturbance of vegetation and soils, and replicate the site's natural drainage patterns. Integrating existing drainage patterns into the site plan will help maintain the site's predevelopment hydrologic function.
• Preserve existing drainage paths and depressions, where feasible and applicable, to help
• Structural BMPs cannot be located in buffer zones if a State and/or Federal resource agency (e.g. SDRWQCB, California Department of Fish and Wildlife; U.S. Army Corps of Engineers, etc.) prohibits maintenance or activity in the area.

DISCUSSION: Existing drainage patterns are integrated into the site plan to maintain the site's predevelopment hydrologic function. To accomplish this, a grass lined 3-foot swale along Union Street will be implemented to convey water to an 18" inlet north of the project site. The site layout along the driveway extension has minimal topographic changes to reduce the need for any major grading.

SD-2: Conserve natural areas, soils and vegetation

• Conserve natural areas within the project footprint including existing trees, other vegetation, and soils

To enhance a site's ability to support source control and reduce runoff, the conservation and restoration of natural areas must be considered in the site design process. By conserving or restoring the natural drainage features, natural processes are able to intercept storm water, thereby reducing the amount of runoff. The upper soil layers of a natural area contain organic material, soil biota, vegetation, and a configuration favorable for storing and slowly conveying storm water and establishing or restoring vegetation to stabilize the site after construction. The canopy of existing native trees and shrubs also provide a water conservation benefit by intercepting rain water before it hits the ground. By minimizing disturbances in these areas, natural processes are able to intercept storm water, providing a water quality benefit. By keeping the development concentrated to the least environmentally sensitive areas of the site and set back from natural areas, storm water runoff is reduced, water quality can be improved, environmental impacts can be decreased, and many of the site's most attractive native landscape features can be retained. In some situations, site constraints, regulations, economics, and/or other factors may not allow avoidance of all sensitive areas on a project site. Project applicant shall consult the local municipality for jurisdictional specific requirements for mitigation of removal of sensitive areas.

Projects can incorporate SD-2 by implementing the following planning and design phase techniques as applicable and practicable:

• Identify areas most suitable for development and areas that should be left undisturbed. Additionally, reduced disturbance can be accomplished by increasing building density and increasing height, if possible.
• Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
• Avoid areas with thick, undisturbed vegetation. Soils in these areas have a much higher capacity to store and infiltrate runoff than disturbed soils, and reestablishment of a mature vegetative community can take decades. Vegetative cover can also provide additional volume storage of rainfall by retaining water on the surfaces of leaves, branches, and trunks of trees during and after storm events.
• Preserve trees, especially native trees and shrubs, and identify locations for planting additional native or drought tolerant trees and large shrubs.
• In areas of disturbance, topsoil should be removed before construction and replaced after the project is completed. When handled carefully, such an approach limits the disturbance to native soils and reduces the need for additional (purchased) topsoil during later phases.
• Avoid sensitive areas, such as wetlands, biological open space areas, biological mitigation sites, streams, floodplains, or particular vegetation communities, such as coastal sage scrub and intact forest. Also, avoid areas that are habitat for sensitive plants and animals, particularly those, State or federally listed as endangered, threatened or rare. Development in these areas is often restricted by federal, state and local laws.

DISCUSSION: Proposed planter/parkway pockets over areas, which are currently paved, can provide additional volume storage of rainfall. Existing planter pockets along Laurel Street are to not be disturbed.

SD-3: Minimize impervious area

• Construct streets, sidewalks or parking lots aisles to the minimum widths necessary, provided public safety is not compromised

• Minimize the impervious footprint of the project

One of the principal causes of environmental impacts by development is the creation of impervious surfaces. Imperviousness links urban land development to degradation of aquatic ecosystems in two ways:

• First, the combination of paved surfaces and piped runoff efficiently collects urban pollutants and transports them, in suspended or dissolved form, to surface waters. These pollutants may originate as airborne dust, be washed from the atmosphere during rains, or may be generated by automobiles and outdoor work activities.

• Second, increased peak flows and runoff durations typically cause erosion of stream banks and beds, transport of fine sediments, and disruption of aquatic habitat. Measures taken to control stream erosion, such as hardening banks with riprap or concrete, may permanently eliminate habitat. Impervious cover can be minimized through identification of the smallest possible land area that can be practically impacted or disturbed during site development. Reducing impervious surfaces retains the permeability of the project site, allowing natural processes to filter and reduce sources of pollution.

Projects can incorporate SD-3 by implementing the following planning and design phase techniques as applicable and practicable:

• Decrease building footprint through (the design of compact and taller structures when allowed by local zoning and design standards and provided public safety is not compromised.
• Construct walkways, trails, patios, overflow parking lots, alleys and other low-traffic areas with permeable surfaces.
• Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and alternative transportation (e.g. pedestrians, bikes) are not compromised.
• Consider the implementation of shared parking lots and driveways where possible.
• Landscaped area in the center of a cul-de-sac can reduce impervious area depending on configuration. Design of a landscaped cul-de-sac must be coordinated with fire department personnel to accommodate turning radii and other operational needs.
• Design smaller parking lots with fewer stalls, smaller stalls, more efficient lanes.
• Design indoor or underground parking.
• Minimize the use of impervious surfaces in the landscape design.

DISCUSSION: The proposed sidewalk incorporates minimum design width. Existing asphalt located at the intersection along Laurel Street will be replaced with the proposed planter/parkway pockets. The use of impervious surfaces is also minimized by implementing the proposed grass swale along Union Street.

SD-4: Minimize soil compaction

• Minimize soil compaction in landscaped areas

The upper soil layers contain organic material, soil biota, and a configuration favorable for storing and slowly conveying storm water down gradient. By protecting native soils and vegetation in appropriate areas during the clearing and grading phase of development the site can retain some of its existing beneficial hydrologic function. Soil compaction resulting from the movement of heavy construction equipment can reduce soil infiltration rates. It is important to recognize that areas adjacent to and under

building foundations, roads and manufactured slopes must be compacted with minimum soil density requirements in compliance with local building and grading ordinances.

Projects can incorporate SD-4 by implementing the following planning and design phase techniques as applicable and practicable:

• Avoid disturbance in planned green space and proposed landscaped areas where feasible. These areas that are planned for retaining their beneficial hydrological function should be protected during the grading/construction phase so that vehicles and construction equipment do not intrude and inadvertently compact the area.
• In areas planned for landscaping where compaction could not be avoided, re-till the soil surface to allow for better infiltration capacity. Soil amendments are recommended and may be necessary to increase permeability and organic content. Soil stability, density requirements, and other geotechnical considerations associated with soil compaction must be reviewed by a qualified landscape architect or licensed geotechnical, civil or other professional engineer.

DISCUSSION: Soil compaction shall be minimized in landscaped areas designated for storm water treatment.

SD-5: Disperse impervious areas
Disconnect impervious surfaces through disturbed pervious areas
Design and construct landscaped or other pervious areas to effectively receive and infiltrate, retain and/or treat runoff from impervious areas prior to discharging to the MS4

Impervious area dispersion (dispersion) refers to the practice of essentially disconnecting impervious areas from directly draining to the storm drain system by routing runoff from impervious areas such as rooftops, walkways, and driveways onto the surface of adjacent pervious areas. The intent is to slow runoff discharges, and reduce volumes while achieving incidental treatment. Volume reduction from dispersion is dependent on the infiltration characteristics of the pervious area and the amount of impervious area draining to the pervious area. Treatment is achieved through filtration, shallow sedimentation, sorption, infiltration, evapotranspiration, biochemical processes and plant uptake.
The effects of imperviousness can be mitigated by disconnecting impervious areas from the drainage system and by encouraging detention and retention of runoff near the point where it is generated. Detention and retention of runoff reduces peak flows and volumes and allows pollutants to settle out or adhere to soils before they can be transported downstream. Disconnection practices may be applied in almost any location, but impervious surfaces must discharge into a suitable receiving area for the practices to be effective. Information gathered during the site assessment will help determine appropriate receiving areas.
Project designs should direct runoff from impervious areas to adjacent landscaping areas that have higher potential for infiltration and surface water storage. This will limit the amount of runoff generated, and therefore the size of the mitigation BMPs downstream. The design, including consideration of slopes and soils, must reflect a reasonable expectation that runoff will soak into the soil and produce no runoff of the DCV. On hillside sites, drainage from upper areas may be collected in conventional catch basins and piped to landscaped areas that have higher potential for infiltration. Or use low retaining walls to create terraces that can accommodate BMPs.
Projects can incorporate SD-5 by implementing the following planning and design phase techniques as applicable and practicable:
• Implement design criteria and considerations listed in impervious area dispersion fact sheet (SD-5) presented in Appendix E.

• Drain rooftops into adjacent landscape areas.
• Drain impervious parking lots, sidewalks, walkways, trails, and patios into adjacent landscape areas.
• Reduce or eliminate curb and gutters from roadway sections, thus allowing roadway runoff to drain to adjacent pervious areas.
• Replace curbs and gutters with roadside vegetated swales and direct runoff from the paved street or parking areas to adjacent LID facilities. Such an approach for alternative design can reduce the overall capital cost of the site development while improving the storm water quantity and quality issues and the site's aesthetics.
• Plan site layout and grading to allow for runoff from impervious surfaces to be directed into distributed permeable areas such as turf, landscaped or permeable recreational areas, medians, parking islands, planter boxes, etc.
• Detain and retain runoff throughout the site. On flatter sites, landscaped areas can be interspersed among the buildings and pavement areas. On hillside sites, drainage from upper areas may be collected in conventional catch basins and conveyed to landscaped areas in lower areas of the site.
• Pervious area that receives run on from impervious surfaces shall have a minimum width of 10 feet and a maximum slope of 5%.

DISCUSSION: Existing asphalt located at the intersection along Laurel Street will be replaced with the proposed planter/parkway pockets, which will act as a landscape buffer.

SD-6: Collect runoff

• Use small collection strategies located at, or as close to as possible to the sources (i.e. the point where storm water initially meets the ground) to minimize the transport of runoff and pollutants to the MS4 and receiving waters

• Use permeable material for projects with low traffic areas and appropriate soil conditions

Distributed control of storm water runoff from the site can be accomplished by applying small collection techniques (e.g. green roofs), or integrated management practices, on small sub-catchments or on residential lots. Small collection techniques foster opportunities to maintain the natural hydrology provide a much greater range of control practices. Integration of storm water management into landscape design and natural features of the site, reduce site development and long-term maintenance costs, and provide redundancy if one technique fails. On flatter sites, it typically works best to intersperse landscaped areas and integrate small scale retention practices among the buildings and paving.
Permeable pavements contain small voids that allow water to pass through to a gravel base. They come in a variety of forms; they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or poured in place pavement (porous concrete, permeable asphalt). Project applicants should identify locations where permeable pavements could be substituted for impervious concrete or asphalt paving. The O&M of the site must ensure that permeable pavements will not be sealed in the future. In areas where infiltration is not appropriate, permeable paving systems can be fitted with an under drain to allow filtration, storage, and evaporation, prior to drainage into the storm drain system.

Projects can incorporate SD-6 by implementing the following planning and design phase techniques as applicable and practicable:

• Implementing distributed small collection techniques to collect and retain runoff
• Installing permeable pavements (see SD-6B in Appendix E)

DISCUSSION: This BMP is not applicable to the proposed project.

SD-7: Landscape with native or drought tolerant species

All development projects are required to select a landscape design and plant palette that minimizes required resources (irrigation, fertilizers and pesticides) and pollutants generated from landscape areas. Native plants require less fertilizers and pesticides because they are already adapted to the rainfall patterns and soils conditions. Plants should be selected to be drought tolerant and not require watering after establishment (2 to 3 years). Watering should only be required during prolonged dry periods after plants are established. Final selection of plant material needs to be made by a landscape architect experienced with LID techniques. Microclimates vary significantly throughout the region and consulting local municipal resources will help to select plant material suitable for a specific geographic location.

Projects can incorporate SD-7 by landscaping with native and drought tolerant species. Recommended plant list is included in Appendix E (Fact Sheet PL).

DISCUSSION: Landscape palette will be chosen with considerations for native and drought tolerant species.

SD-8: Harvest and use precipitation

Harvest and use BMPs capture and stores storm water runoff for later use. Harvest and use can be applied at smaller scales (Standard Projects) using rain barrels or at larger scales (PDPs) using cisterns. This harvest and use technique has been successful in reducing runoff discharged to the storm drain system conserving potable water and recharging groundwater.
Rain barrels are above ground storage vessels that capture runoff from roof downspouts during rain events and detain that runoff for later reuse for irrigating landscaped areas. The temporary storage of roof runoff reduces the runoff volume from a property and may reduce the peak runoff velocity for small, frequently occurring storms. In addition, by reducing the amount of storm water runoff that flows overland into a storm water conveyance system (storm drain inlets and drain pipes), less pollutants are transported through the conveyance system into local creeks and the ocean. The reuse of the detained water for irrigation purposes leads to the conservation of potable water and the recharge of groundwater. SD-8 fact sheet in Appendix E provides additional detail for designing Harvest and Use BMPs. Projects can incorporate SD-8 by installing rain barrels or cisterns, as applicable.

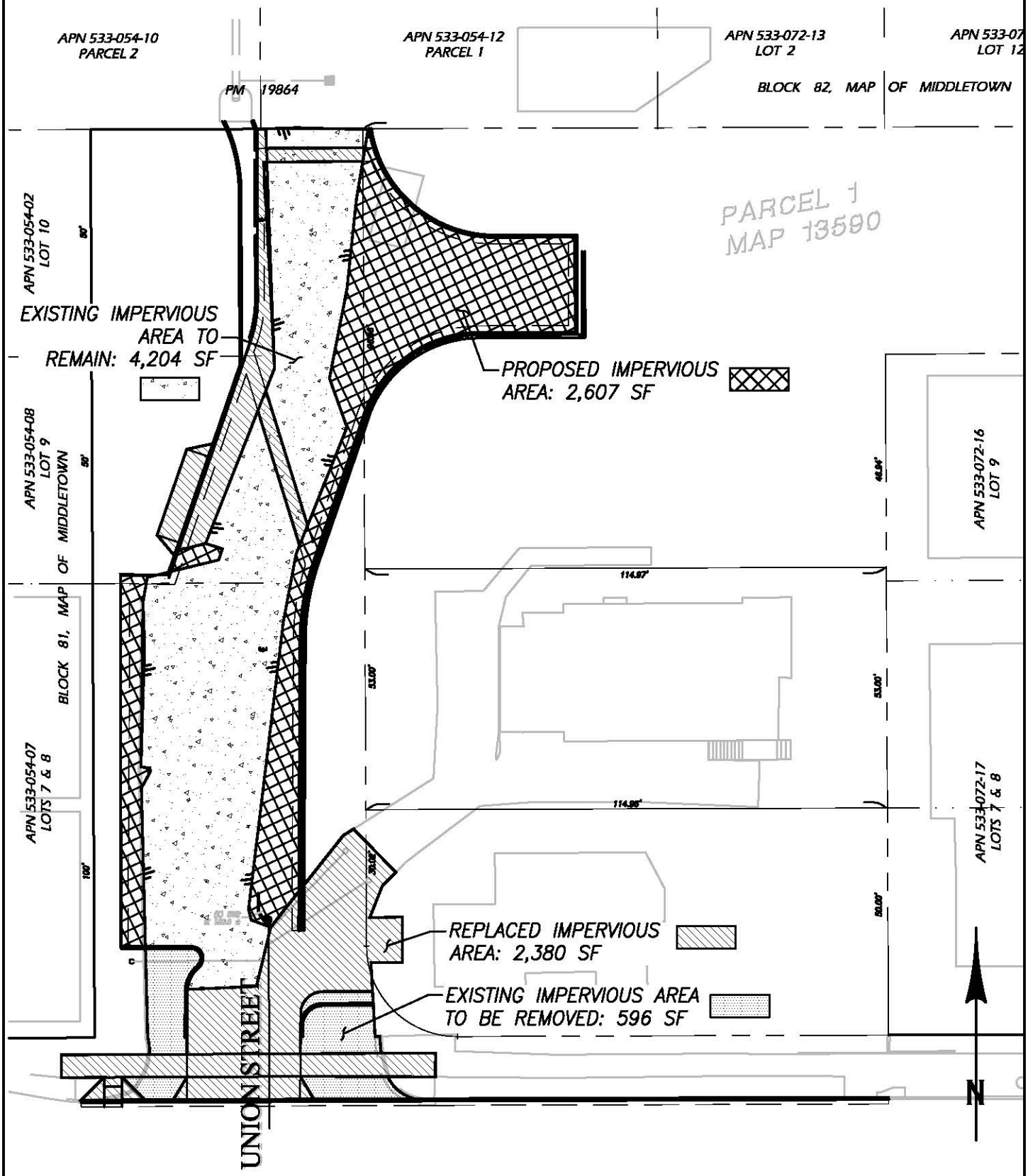
DISCUSSION: Rainwater harvesting is not proposed for this project as a reduction in runoff is not necessary.

Source Control BMP Checklist for Standard Projects			Form I-4
All development projects must implement source control BMPs SC-1 through SC-6 and. Refer to Chapter 4 and Appendix E of the BMP Design Manual for information to implement BMPs shown in this checklist. **Note: All selected BMPs must be shown on the construction plans.**			
Source Control Requirement	Applied[(1)]?		
SC-1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
SC-2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
SC-6 BMPs based on Potential Sources of Runoff Pollutants			
On-site storm drain inlets	☑ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☑ N/A
Interior parking garages	☐ Yes	☐ No	☑ N/A
Need for future indoor & structural pest control	☐ Yes	☐ No	☑ N/A
Landscape/Outdoor Pesticide Use	☑ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☑ N/A
Food service	☐ Yes	☐ No	☑ N/A
Refuse areas	☐ Yes	☐ No	☑ N/A
Industrial processes	☐ Yes	☐ No	☑ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☑ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☑ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☑ N/A
Loading Docks	☐ Yes	☐ No	☑ N/A
Fire Sprinkler Test Water	☐ Yes	☐ No	☑ N/A
Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☑ N/A
Plazas, sidewalks, and parking lots	☑ Yes	☐ No	☐ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☑ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☑ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☑ N/A
SC-6D: Automotive-related Uses	☐ Yes	☐ No	☑ N/A
Discussion / justification for **all** "No" answers shown above:			

Site Design BMP Checklist for Standard Projects			Form I-5
All development projects must implement site design BMPs SD-1 through SD-8. Refer to Chapter 4 and Appendix E of the BMP Design Manual for information to implement BMPs shown in this checklist. **Note: All selected BMPs must be shown on the construction plans.**			
Site Design Requirement	Applied[(1)]?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☑ Yes	☐ No	☐ N/A
SD-2 Conserve Natural Areas, Soils, and Vegetation	☑ Yes	☐ No	☐ N/A
SD-3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
SD-4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
SD-5 Impervious Area Dispersion	☑ Yes	☐ No	☐ N/A
SD-6 Runoff Collection	☐ Yes	☐ No	☑ N/A
SD-7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
SD-8 Harvesting and Using Precipitation	☐ Yes	☐ No	☑ N/A
Discussion / justification for **all** "No" answers shown above:			

(1) Answer for each source control and site design category shall be pursuant to the following:

- "Yes" means the project will implement the BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.



TRUAX
IMPERVIOUS AREA EXHIBIT

SCALE: 1"=30'

COFFEY ENGINEERING, INC.
9666 BUSINESSPARK AVE, SUITE 210, SAN DIEGO, CA 92131 PH (858)831-0111 FAX (858)831-0179

COFFEY ENGINEERING, INC.

Drainage Study

2513 Union Street
San Diego, CA 92101

APN 533-072-18

Project Information

Owner: City of San Diego
Developer: Nakhshab Development and Design

March 20, 2017

9666 BUSINESSPARK AVENUE, SUITE 210 SAN DIEGO, CA 92131 PHONE: (858)831-0111 FAX: (858)831-0179

Table of Contents

1. **Existing Conditions**

The 0.68-acre site contains 2 existing dwellings. Approximately 55% of the site (primarily in the northerly portion with no existing residence) sheet flows northerly into the adjoining lots to the north and to the north end of the partially improved Union Street. Approximately 35% drains westerly into the driveway in the Union Street right-of-way (to be carried northerly along the driveway), and approximately 10% of the property area sheet flows to the Laurel Street right-of-way. For that portion that drains into the Union Street right-of-way, an existing 18" public storm drain line collects the flows and carries them northerly into W. Maple Street. For that portion of Union Street flow that crosses into the private driveway adjoining the site to the north, the inlet for that driveway carries flows westward (via a 6"PVC@9.5% drain line) and into the 18" RCP public drain @15.3%. See Drainage Map 'A'.

2. **Proposed Project**

The project proposes a subdivision into 3 lots with no significant exterior site modifications on the private lots. An extended sidewalk and a new driveway along Laurel is proposed. Union Street is to be partially improved with a wider driveway and fire turnaround. Approximately 2,600 square feet of additional impervious area is proposed as a result of the driveway.

3. **Purpose and Scope of Report**

This report will evaluate the existing and water run-off flow patterns and flow rate characteristics for the project site. In addition, the report will determine if there are any anticipated negative impacts as a result of the proposed sidewalk and driveway apron along the north side of Laurel Street. We will verify if the existing 18" storm drain located at the end of the driveway has the capacity for the additional run-off created with these improvements. All calculations are made for a 100-year expected storm event.

4. **Method of Calculations**

The Rational Method, as defined by *County of San Diego Hydrology Manual (2003)*, will be used to calculate storm water flow rates. Where noted, the following calculations were used to determine flow properties:

Rainfall Characteristics

$Q = C * I * A$, where

Q = Flow rate (ft^3/sec)
C = Runoff coefficient
(Runoff coefficient per County of San Diego Hydrology Manual Table 3-1 reproduced in Appendix C. Soil type D determined from the *Soil Hydrologic Groups* map from the County of San Diego Hydrology Manual reproduced in Appendix C also.)
I = Rainfall intensity (in/hr.)
A = Area (acres)

Rainfall Intensity (per County of San Diego Hydrology Manual Figure 3-1 reproduced in Appendix C)

$I = 7.44 * P_6 * D^{-0.645}$, where

I = Rainfall intensity (in/hr.)
P_6 = Adjusted 6-hour precipitation (inches)
D = Storm duration (min), equal to T_c for time-of-concentration storms

Tc = Ti+Tt+Tp (time-of-concentration), where
Ti=Over land initial time.
Tt=Travel time on natural watersheds.
Tp=Travel time on drainage structures (pipes, brow ditch, gutter etc.)

Overland Time of Flow (per County of San Diego Hydrology Manual Figure 3-3 reproduced in Appendix C)

$Ti = 1.8(1.1-C) D^{0.50} / (s^{0.33})$ (Overland initial time of concentration formula), where

D= Watercourse Distance (feet)(see table 3-2 for the max. overland flow length)
s = Slope (%)
C= Runoff Coefficient
Ti=Initial time of concentration (min.)

5. **Results and Conclusions:**

There is an existing ridgeline approximately 7 to 20 feet north of the north line of the Laurel Street right-of-way at the Union Street intersection, separating flows to the north and south of the line. This ridgeline will not be altered by the construction of a driveway apron and sidewalk across the intersection opening. A slight reduction in runoff rate in Laurel Street is expected due to proposed planter/parkway pockets over areas which are currently paved with asphalt at the intersection. The small increase in runoff rate of 0.375 CFS can be easily accommodated by the existing 18" SD @ 1.0% slope (GIS maps indicate last leg of pipe is 1%), and the double D-25 curb outlet, and it will not have any significant negative effect at W. Maple Street D-25 curb outlet. The original design for the 18-inch pipe assumed a flow rate of 5.0 cfs, and the proposed flow rate after the completion of the project is only 2.7 cfs (it is presumed from historical maps that a larger tributary area contributed to the 18-inch pipe, and that this tributary area has been reduced by the development of Horton Avenue).

Calculations in appendix B demonstrate that the existing pipe drains and double curb outlet have the capacity to handle the storm drain runoff with the proposed conditions. Please refer to Appendix A and B for drainage maps and flow characteristic calculations to support this conclusion.

6. **Clean Water Act (CWA) Compliance**

The proposed project is exempt from permitting under Federal Clean Water Act section 401 or 404 because it does not directly discharge into navigable waters of the United States.

7. **Declaration of Responsible Charge**

I hereby declare that I am the Civil Engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with current design.

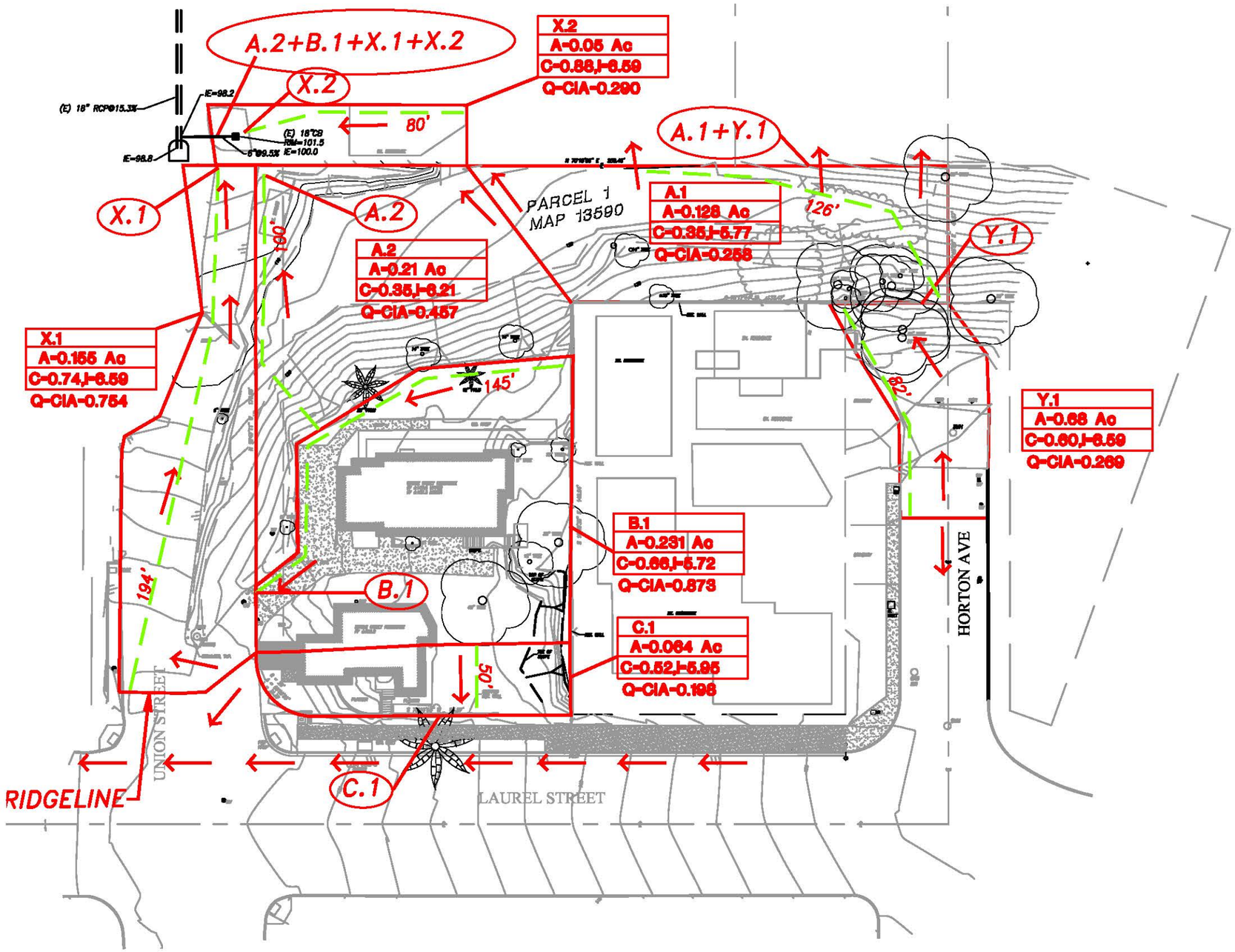
I understand that the check of project drawings and specifications by the City of San Diego is confined to a review only and does not relieve me, as Engineer of Work, of my responsibilities for project design.

3/20/17

John S. Coffey
RCE 62716
Exp. 06-30-18

Date

Appendix A –Reference Plans Drainage Maps



LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
EXISTING CONTOUR	90
DIRECTION OF FLOW	
SITE BASIN LIMIT	
WATER COURSE DISTANCE	L-699'

SCALE: 1"=40'

Union - Laurel

2513 Union Street San Diego CA 92101

DRAINAGE MAP 'A'
EXISTING CONDITIONS
SCALE: 1"=40'

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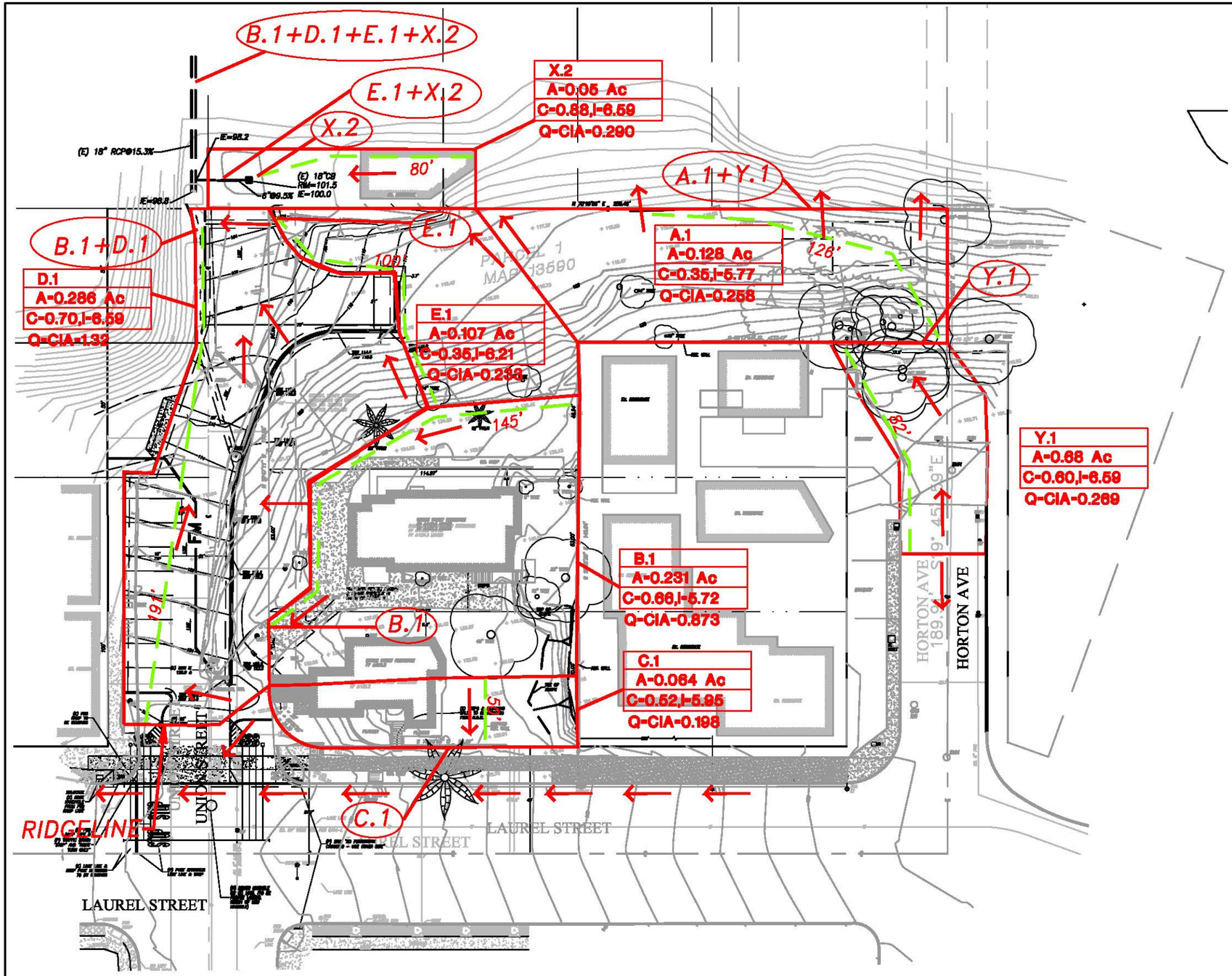


LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
EXISTING CONTOUR	90
DIRECTION OF FLOW	
SITE BASIN LIMIT	
WATER COURSE DISTANCE	L=699'

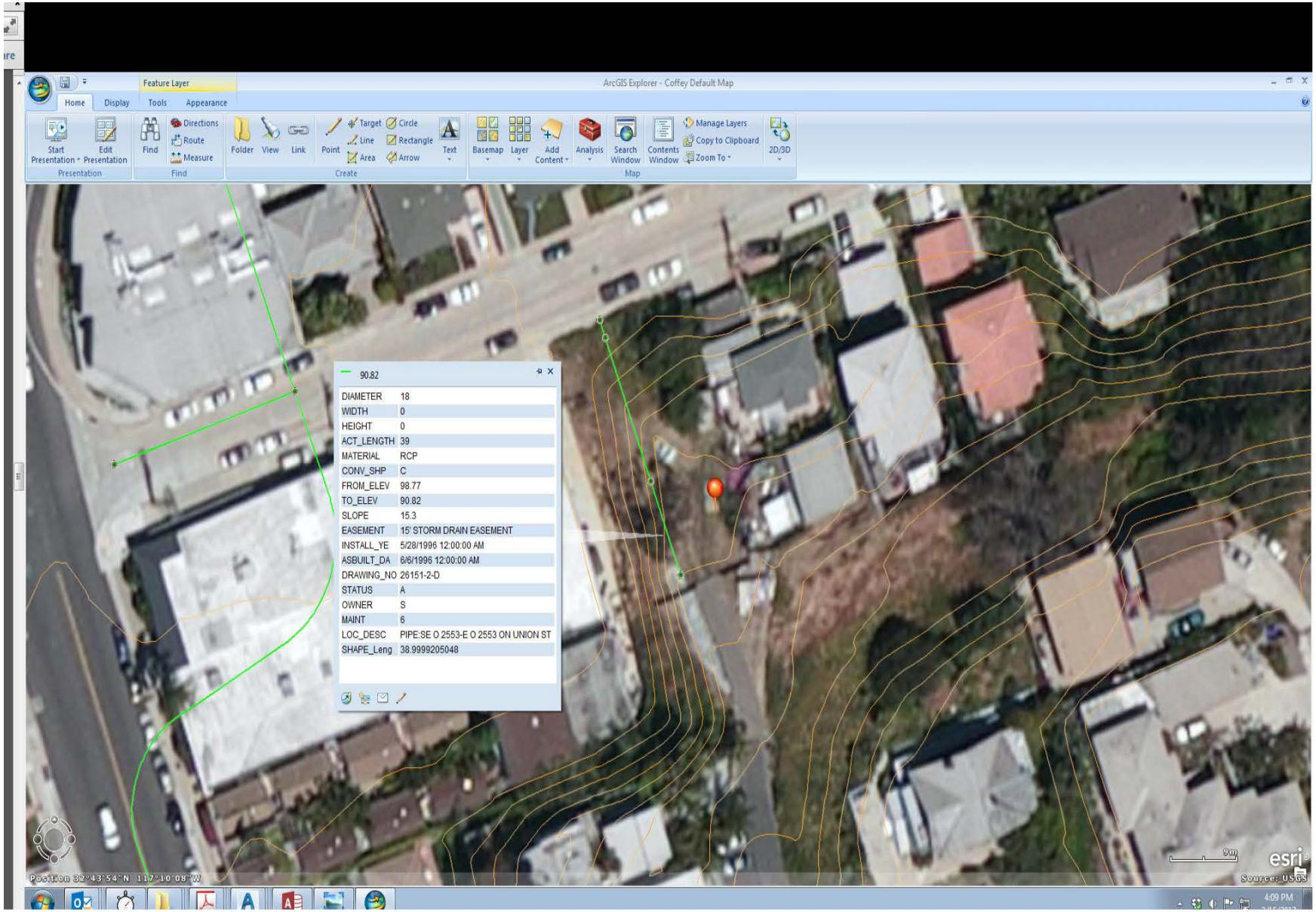
SCALE: 1"=40'

Union - Laurel

2513 Union Street San Diego CA 92101

DRAINAGE MAP 'B'
PROPOSED CONDITIONS
SCALE: 1"=40'

COFFEY ENGINEERING, INC.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Appearance
Start Presentation
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Find
Directions
Route
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TO_ELEV 90.82
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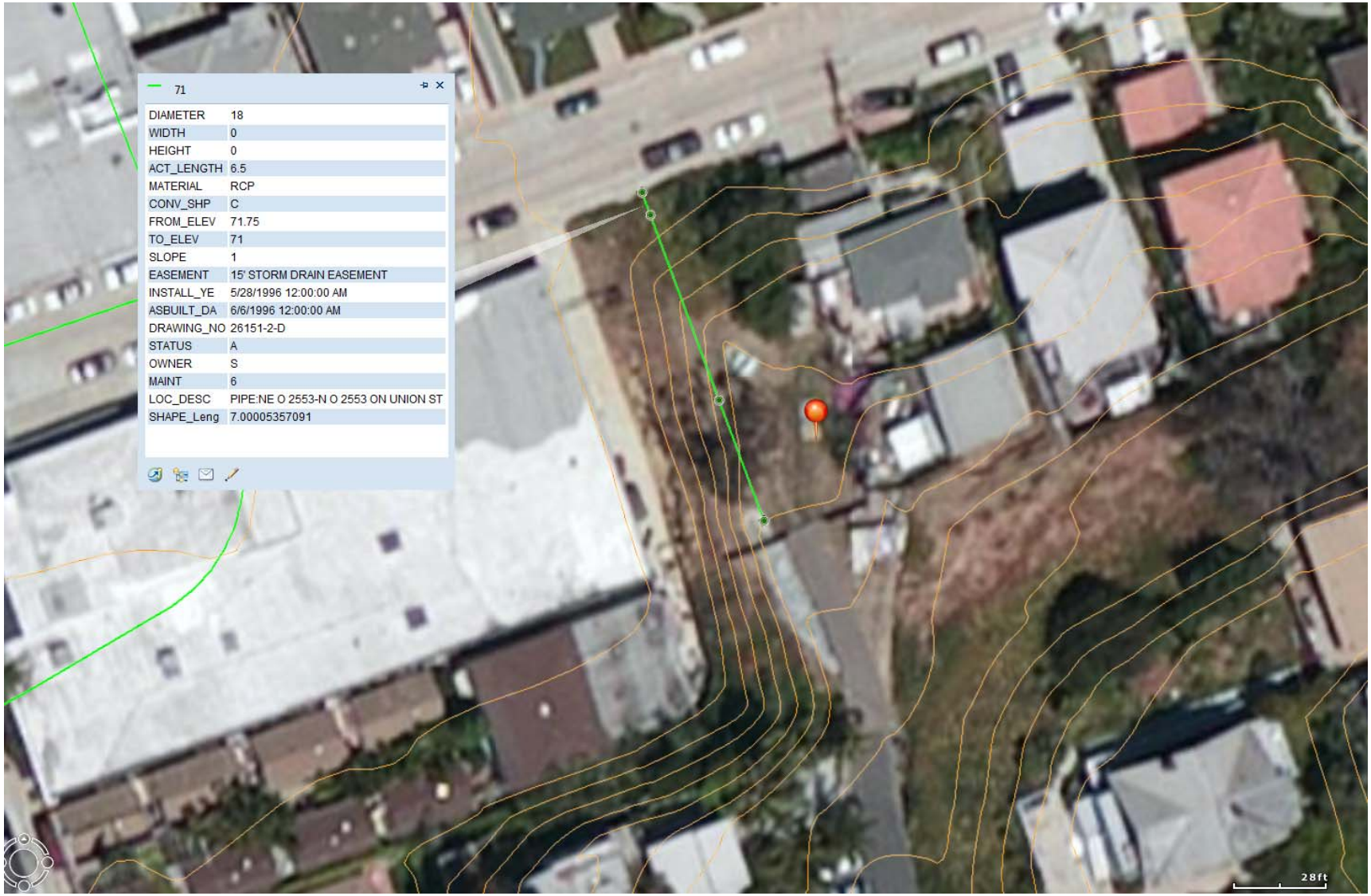
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TO_ELEV 71
SLOPE 1
EASEMENT 15' STORM DRAIN EASEMENT
INSTALL_YE 5/28/1996 12:00:00 AM
ASBUILT_DA 6/6/1996 12:00:00 AM
DRAWING_NO 26151-2-D
STATUS A
OWNER S
MAINT 6
LOC_DESC PIPE:NE O 2553-N O 2553 ON UNION ST
SHAPE_Leng 7.00005357091
28ft

GENERAL NOTES

1. BEFORE EXCAVATING, VERIFY LOCATION OF UNDERGROUND UTILITIES--
   CONTACT:

UNDERGROUND SERVICE ALERT	800-422-4133
WATER & SEWER	236-6660
COMMUNICATIONS DIVISION	236-5505
BUILDING & IRRIGATION	236-5500
CABLE T.V.	262-1161

2. APPROVAL OF THESE PLANS BY THE CITY ENGINEER DOES NOT AUTHORIZE ANY WORK TO BE PERFORMED UNTIL A PERMIT HAS BEEN ISSUED.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY MONUMENTATION AND/OR BENCHMARKS WHICH WILL BE DISTURBED OR DESTROYED BY CONSTRUCTION. SUCH POINTS SHALL BE REFERENCED AND REPLACED WITH APPROPRIATE MONUMENTATION BY A LICENSED LAND SURVEYOR OR A REGISTERED CIVIL ENGINEER AUTHORIZED TO PRACTICE LAND SURVEYING. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED BY THE LICENSED LAND SURVEYOR OR REGISTERED CIVIL ENGINEER AS REQUIRED BY THE LAND SURVEYOR'S ACT.

SPECIAL NOTE

THE FOLLOWING NOTE IS PROVIDED TO GIVE DIRECTION TO THE CONTRACTOR BY THE ENGINEER OF WORK. THE CITY ENGINEER'S SIGNATURE ON THESE PLANS DOES NOT CONSTITUTE APPROVAL OF THIS NOTE AND THE CITY WILL NOT BE RESPONSIBLE FOR ITS ENFORCEMENT.

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ENFORCEMENT OF SAFETY MEASURES AND REGULATIONS AND FOR THE PROTECTION OF ADJACENT PROPERTY, PUBLIC AND PRIVATE.

TRAFFIC STRIPING, PAVEMENT MARKINGS AND PAVEMENT MARKERS

ALL STRIPING AND INSTALLATION OF ALL PAVEMENT MARKERS AND SIGNS SHALL BE THE RESPONSIBILITY OF THE CONSTRACTOR. PAVEMENT MARKERS AND STRIPING SHALL CONFORM TO SECTION 84 AND SECTION 85 OF THE LATES CALTRANS' STANDARD SPECIFICATIONS, AND CALTRANS' TRAFFIC CONTOL MANUAL.

CONTROL OF ALIGNMENT AND LAYOUT SAHLL BE THE RESPONSIBILITY OF THE CONTRACTOR AND IS SUBJECT TO APPROVAL BY THE TRAFFIC ENGINEER.

SECTION 84-03.02, "MATERIALS," OF THE STANDART SPECIFICATIONS, IS AMENDED TO READ:

PAINT FOR TRAFFIC STRIPES SHALL CONFORM TO THE FOLLOWING STATE SPECIFICATIONS:

PAINT

RAPID DRY WATER-BORNE, WHITE AND YELLOW 8010-42L-30 OR 8010-61G-10

GLASS BEADS SHALL CONFORM TO STATE SPECIFICATION NO. 8010-51J-22 (TYPE II).

COPIES OF STATE SPECIFICATIONS FOR TRAFFIC PAINT AND GLASS BEADS MAY BE OBTAINED FROM THE TRANSPORTATION LABORATORY, P.O. BOX 19128, SACRAMENTO, CA 95819, (916) 739-2400.

THINNING OF PAINT WILL NOT BE ALLOWED.

THE CONTRACTOR SHALL INSTALL REFLECTORIZED PAVEMENT MARKERS ON ALL LANE LINES AND CENTERLINE STRIPING.

CONSTRACTOR IS RESPONSIBLE FOR ALL SANDBLASTING OF CONFLICTING STRIPING AND REPLACING ALL STRIPING AND PAVEMENT MARKING REMOVED DUE TO CONSTRUCTION.

THE INSTALLATION OF ALL SIGNS WILL BE DONE BY THE CONTRACTOR. ALL SIGNS MUST CONFORM TO THE CALIFORNIA DEPARTMENT OF TRANSPORTATION TRAFFIC MANUAL. ALL SIGN POSTS MUST BE ANCHORED TWO FEET IN CONCRETE AND 18-24 INCHES FROM FACE OF CURB. THE BOTTOM OF SIGNS MUST BE SEVEN (7) FEET FROM THE GROUND.

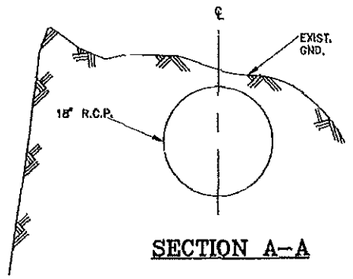
CONTRACTOR SHALL NOTIFY CITY TRAFFIC ENGINEER AT 236-5333 UPON COMPLETION OF STRIPING AND SIGNING.

TRAFFIC CONTROL NOTES

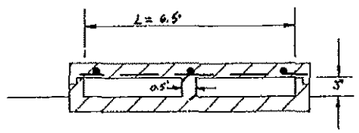
1. TRAFFIC REQUIREMENTS SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1988 EDITION. WORKING HOURS SHALL BE BETWEEN 8:30 A.M. AND 3:30 P.M. AS SHOWN ON THE PLANS, AND CONTRACTOR SHALL MAINTAIN THE FULL WIDTH OF ALL TRAVELED LANES ON EXISTING ROADWAYS DURING THE HOURS OF 3:30 P.M. AND 8:30 A.M. AND AT ALL TIMES ON SATURDAYS, SUNDAYS, AND LEGAL HOLIDAYS. WHEN CONSTRUCTION OPERATIONS ARE NOT ACTIVELY IN PROGRESS, THE CONTRACTOR SHALL MAINTAIN ALL TRAVELED LANES OF THE ROADWAY. ANY DEVIATION FROM THESE REQUIREMENTS SHALL BE APPROVED BY THE CITY TRAFFIC ENGINEER.
2. ALL WORK SHALL BE PERFORMED DURING HOURS OF DAYLIGHT. ALL TRENCHES SHALL BACKFILLED OR TRENCH PLATED AT THE END OF EACH WORK DAY. UPON COMPLETION OF TRENCH BACKFILL, THE SURFACE OF THE ROADWAY SHALL BE BROUGHT TO A SMOOTH, EVEN CONDITION, FREE OF HUMPS AND DEPRESSIONS. AFTER BACKFILL HAS BEEN COMPLETED, THE CONTRACTOR SHALL AT HIS OWN EXPENSE, REPAIR ANY DAMAGE TO THE ROADWAY, INCLUDING ANY DAMAGE CAUSED BY HIS/HER OPERATIONS OR CONSTRUCTION TRAFFIC. ALL EXISTING STRIPING, PAVEMENT MARKINGS, SIGNING AND LOOP DETECTION ALTERED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION BY CONTRACTOR AT COMPLETION OF WORK.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR PERFORMING WORK ON A CITY STREET TO SUPPLY, INSTALL AND MAINTAIN THE TRAFFIC CONTROL DEVICES AS SHOWN HEREIN, AS WELL AS ANY SUCH ADDITIONAL TRAFFIC CONTROL DEVICES AS MAY BE REQUIRED, TO ENSURE THE SAFE MOVEMENTS OF TRAFFIC, PEDESTRIANS AND BICYCLISTS THROUGH OR AROUND THE WORK AREA AND PROVIDE MAXIMUM PROTECTION AND SAFETY TO CONSTRUCTION WORKERS.
4. ALL SIGNS, DELINEATORS, BARRICADES, ETC., SHALL CONFORM TO THE LATEST CALTRANS MANUAL FOR TRAFFIC CONTROL THROUGH CONSTRUCTION ZONES.
5. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO ANY EXCAVATION:

   UNDERGROUND SERVICE ALERT 1-800-422-4133
6. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED AGENCIES AT LEAST FIVE (5) WORKING DAYS IN ADVANCE OF ANY STREET OR ALLEY CLOSURE OR IMPLEMENTING ANY CONSTRUCTION DETOUR.

   A. FIRE DEPARTMENT DISPATCH 236-6741 or 236-5721
   B. POLICE DEPARTMENT, TRAFFIC DIVISION 495-7800
   C. SAN DIEGO TRANSIT AUTHORITY 238-0100 EXT. 83
   D. TRASH PICKUP 236-5660
   E. TRAFFIC SIGNALS 236-5660
   F. ALL OTHER AFFECTED AGENCIES AS NECESSARY
7. IF CONSTRUCTION IS TO BE PERFORMED IN STAGES, ALL WORK SHALL BE COMPLETED IN EACH STAGE PRIOR TO BEGINNING WORK ON THE NEXT STAGE.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR POSTING TOW AWAY/NO PARKING SIGNS AND BAGGING PARKING METERS (IF REQUIRED). SIGNS MUST BE POSTED 24 HOURS IN ADVANCE OF THE APPOVED PROHIBITION.
9. EQUIPMENT, MATERIAL OR DEBRIS SHALL NOT BE STORED OR REMAIN IN THE PUBLIC RIGHT-OF-WAY WITHOUT PRIOR APPROVAL BY THE CITY ENGINEER.
10. THE CITY ENGINEER RESERVES THE RIGHT TO OBSERVE THESE TRAFFIC CONTROL PLANS IN OPERATION AND TO MAKE ANY CHANGES AS FIELD CONDITIONS WARRANT. ANY CHANGES SHALL SUPERSEDE THESE PLANS AND BE COMPLETED AT THE CONTRACTOR'S EXPENSE.
11. ACCESS TO PRIVATE PROPERTY SHALL BE MAINTAINED AT ALL TIMES. IF SPECIAL APPROVAL IS GRANTED BY THE CITY TRAFFIC ENGINEER TOCLOSE OR INTERFERE IN ANY WAY WITH A DRIVEWAY, THEN THE CONTRACTOR SHALL NOTIFY THE OWNER OR OCCUPANT (IF NOT OWNER-OCCUPIED) OF THE CLOSURE OF THE DRIVEWAYS AT LEAST FIVE (5) WORKING DAYS PRIOR TO THE CLOSURE. THE CONTRACTOR SHALL MINIMIZE THE INCONVENIENCE AND MINIMIZE THE TIME PERIOD THAT THE DRIVEWAYS WILL BE CLOSED. THE CONTRACTOR SHALL FULLY EXPLAIN TO THE OWNER/OCCUPANT HOW LONG THE WORK WILL TAKE AND WHEN CLOSURE IS TO START.
12. ALL TAVEL LANES WILL BE A MINIMUM OF 12 FEET WIDE UNLESS APPROVED BY THE CITY TRAFFIC ENGINEER.
13. FOR LAND CLOSURES ON ROADWAYS WITH BIKE LANES, ALL TRAVAEL LANES WILL BE A MINIMUM OF 14 FEET UNLESS OTHERWISE APPOVED BY THE CITY TRAFFIC ENGINEER.
14. PEDESTRIAN OR BICYCLIST FLOW WILL NOT BE DISTURBED UNLESS APPOVED BY THE CITY TRAFFIC ENGINEER.
15. CONTRACTOR SHALL NOTIFY SAN DIEGO TRANSIT (238-0100 EXT. 83) AT LEAST FIVE (5) WORKING DAYS PRIOR TO ANY CONSTRUCTION OR TRAFFIC CONTROL AFFECTING BUS STOPS.
16. THIS TRAFFIC CONTROL PLAN IS NOT VALID UNTIL WORK DATES ARE APPROVED. CONTRACTOR MUST SUBMIT THREE REDUCED COPIES OF TRAFFIC CONTROL PLAN TO TRAFFIC ENGINEERING DIVISION (238-5333), A MINIMUM OF FIVE (5) DAYS PRIOR TO START OF WORK.



SECTION A-A



SECTION B-B

TYPICAL SECTIONS
N.T.S.

IMPORTANT NOTICE
SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIGALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID. FOR YOUR DIGALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-422-4133 TWO WORKING DAYS BEFORE YOU DIG

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND SPECIFICATIONS AND STANDARD DRAWINGS OF THE CITY OF SAN DIEGO.

STANDARD SPECIFICATIONS

1. STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (1988 EDITION), INCLUDING THE 1988 REGIONAL AND 1988 CITY OF SAN DIEGO SUPPLEMENT AMENDMENTS DOC. NO. 769709, FILED SEPTEMBER 20, 1988.
2. STANDARD SPECIAL PROVISIONS ADDENDUM PERTAINING TO STREET LIGHTING & TRAFFIC SIGNAL SYSTEMS (1990 ED.) DOCUMENT NO. 769753 FILED FEBRUARY 5, 1991
3. CALIFORNIA DEPARTMENT OF TRANSPORTATION, MANUAL OF TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE WORK ZONES. (1985 EDITION, DOCUMANT NO. 769744 FILED NOVEMBER 7, 1990.)

STANDARD DRAWINGS

1. CITY OF SAN DIEGO DRAWINGS, DOCUMENT NO. 769710, FILED SEPTEMBER 20, 1988.

LEGEND

IMPROVEMENTS	S.D. NO.	SYMBOL
18" REINFORCED CONCRETE PIPE (R.C.P.)	D-30	
CURB OUTLET, TYPE "A", MODIFIED (SEE SECTION B-B, AT LEFT)	D-25	
4" P.C.C. SIDEWALK, CONTIGUOUS	G-7, SDG 100	
INLET APRON FOR CULVERTS	D-39	
STORM DRAIN CLEANOUT - TYPE B5	D-10	
EXISTING SLOPE		
DIRECTION OF FLOW		
TYPE "G" CURB & GUTTER	G-2, SDG-100	
ROLLED CURB & GUTTER	G-4	

DECLARATION OF RESPONSIBLE CHARGE

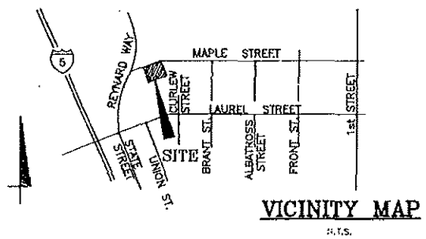
I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

ENGINEER OF WORK

Richard C. Chumbley 2/17/92

RICHARD C. CHUMBLEY DATE
R.C.E. 36276
2582 FLETCHER PARKWAY
EL CAJON, CA 92020
PHONE: (619) 461-0900

REGISTERED PROFESSIONAL ENGINEER — RICHARD C. CHUMBLEY — NO. C 36276 — EXP. 6-30-92 — CIVIL — STATE OF CALIFORNIA



VICINITY MAP
N.T.S.

A.D.T. NONE (STREET CLOSED -- VACATED)

BENCH MARK
ARROYO DRIVE
AT REYNARD WAY; NEBP
ELEV = 58.738' M.S.L.

REGISTERED PROFESSIONAL ENGINEER — M. SAMMAK No. 37146 6-30-93 CIVIL — STATE OF CALIFORNIA

ENGINEERING PERMIT NO. W41741

PRIVATE CONTRACT

IMPROVEMENT PLAN FOR
UNION STREET
BETWEEN LAUREL AND MAPLE

CITY OF SAN DIEGO
ENGINEERING DEPARTMENT
SHEET 1 OF 2 SHEETS

W.O. NO. 910164

M. Sammak 7/17/92
FOR CITY ENGINEER DATE

DESCRIPTION	BY	APPROVED	DATE	FILED
ORIGINAL	ECC			

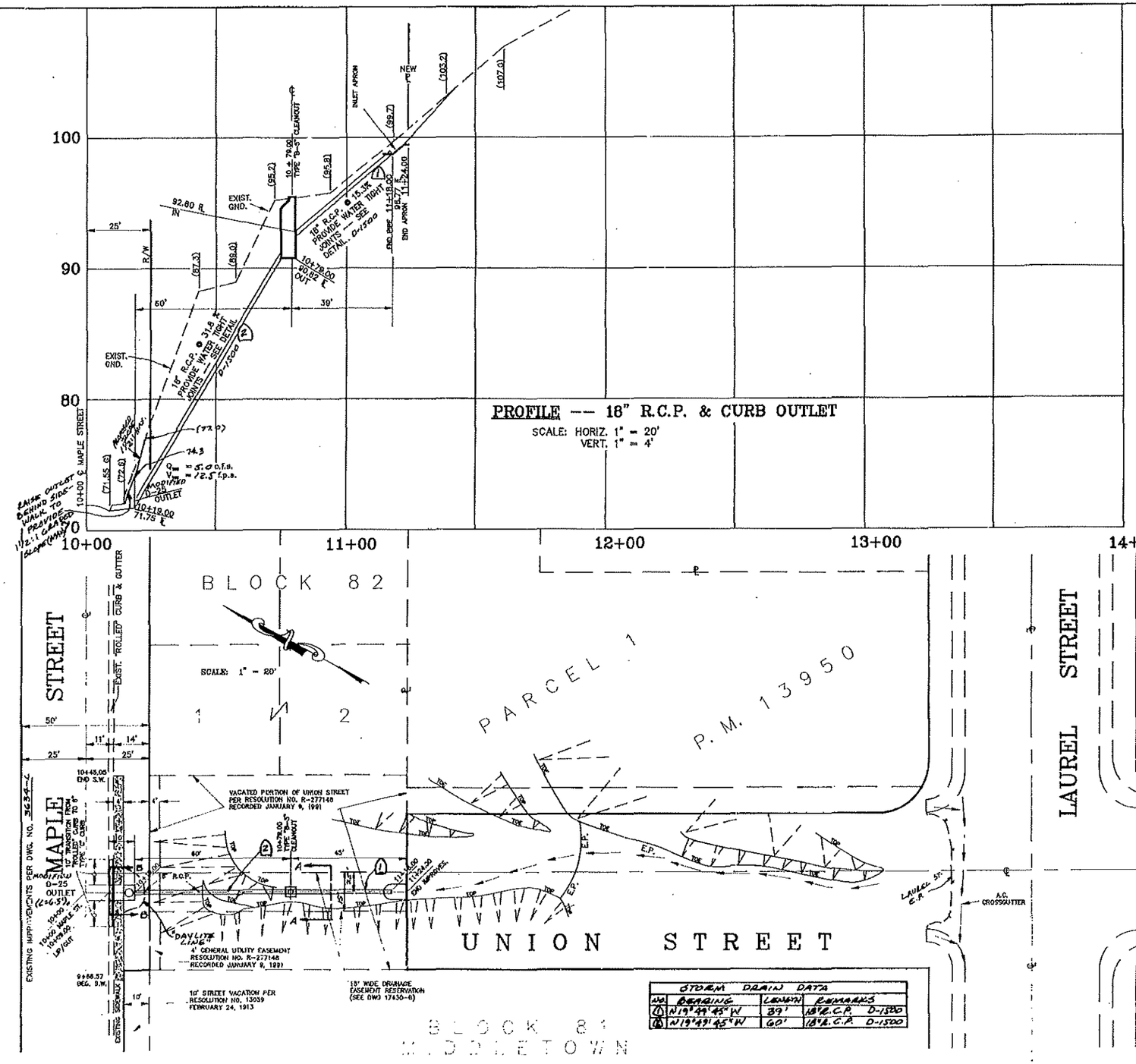
AS-BUILT DRAWN D.E.S. 4/96
ENGINEER RAY PATLOCK DATE STARTED 9-14-94
INSPECTOR DAN SCHAEFER DATE COMPLETED 5-28-96

1846-6277
NAD 83 COORD.
206-1717
LAMBERT COORDINATES

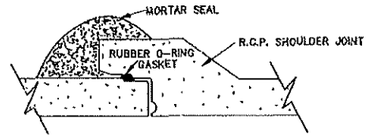
26151-1-D

J.N. 88-41

FEB



STORM DRAIN DATA			
NO.	BEARING	LENGTH	REMARKS
1	N19°49'45"W	39'	18" R.C.P. D-1500
2	N19°49'45"W	60'	18" R.C.P. D-1500



DETAIL: TYPICAL WATER-TIGHT JOINT
N.T.S.

ENGINEER OF WORK
Richard C. Chumbley
RICHARD C. CHUMBLEY R.C.E. 36276
2582 FLETCHER PARKWAY
EL CAJON, CA 92020
PHONE: (619) 461-0900

2/15/92
DATE

REGISTERED PROFESSIONAL ENGINEER — RICHARD C. CHUMBLEY — NO. C 36276 — EXP. 6-30-92 — CIVIL — STATE OF CALIFORNIA

PRIVATE CONTRACT

IMPROVEMENT PLAN FOR
UNION STREET
BETWEEN LAUREL AND MAPLE

CITY OF SAN DIEGO
ENGINEERING DEPARTMENT
SHEET 2 OF 2 SHEETS

W.O. NO. 910164

M. Lemmon FOR CITY ENGINEER 7/14/92 DATE

DESCRIPTION	BY	APPROVED	DATE	FILMED
ORIGINAL	R.C.C.			

1846-6277
NAD 83 COORD
206-1717
CONSULT COORDINATES
26151-2-D

AS-BUILT DRAWN D.E.S. 6/6/96
CHECKED RAY PATRICK DATE STARTED 9-14-94
SUPERVISED DAVID SCHMITZ DATE COMPLETED 5-28-96

J.N. 88-41

AS-BUILT

FEB 16 192

0 1 2 3 4 IN.

Appendix B –Calculation/Evaluations

Table A - Time of Concentration Flow Characteristics

	Urban Overland Flow				Pipe Flow			Summary			P_6 = 2.5	
Flow ID	Urban watercourse distance, D_u (ft)	Watercourse slope, s (%)	Runoff Coefficient, C	Overland Flow Time, T (min)	Pipe Length, L_p (ft)	Average velocity, V (fps)	Pipe travel time, D_p (min)	(5 min minimum) Total time-of-concentration, T_c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	**Q (cfs)**	
								PRE-CONSTRUCTION- ON-SITE				
A.1	126	15.00	0.35	*6.14*	0	0.0	*0.00*	6.14	5.77	0.128	**0.258**	
A.2	100	15.00	0.35	*5.47*	0	0.0	*0.00*	5.47	6.21	0.210	**0.457**	
B.1	163	4.30	0.66	*6.22*	0	0.0	*0.00*	6.22	5.72	0.231	**0.873**	
C.1	50	2.00	0.52	*5.86*	0	0.0	*0.00*	5.86	5.95	0.064	**0.198**	
								PRE-CONSTRUCTION-OFF-SITE				
X.1	194	12.00	0.74	*3.94*	0	0.0	*0.00*	5.00	6.59	0.155	**0.754**	
X.2	80	6.00	0.88	*1.95*	0	0.0	*0.00*	5.00	6.59	0.050	**0.290**	
Y.1	82	15.00	0.60	*3.30*	0	0.0	*0.00*	5.00	6.59	0.068	**0.269**	
A.2+B.1+X.1+X.2											**2.373**	
								POST-CONSTRUCTION				
D.1	194	12.00	0.70	*4.38*	0	0.0	*0.00*	5.00	6.59	0.286	**1.320**	
E.1	100	15.00	0.35	*5.47*	0	0.0	*0.00*	5.47	6.21	0.107	**0.233**	
E.1+X.2											**0.523**	6"@9.5%
B.1+D.1+E.1+X.2											**2.716**	18"RC@1%

18”CONC. PIPE @ 1% - SECTIONS- B.1+D.1+E.1+X.1+X.2 DATE: 03-16-2017

TIME: 18:42:00

(1) Diameter (inches) ... 18. (2) Mannings n ..... .013

(3) slope (ft/ft) ..... .0100 **(4) Q (cfs) 2.72**

(5) depth (ft) ..... 0.52 (6) depth/Diameter ... 0.35

Velocity (fps) ..... 5.00 Velocity Head 0.39

Area (Sq. Ft.) 0.55

Critical Depth ..... 0.63 Critical Slope ... 0.0051

Critical Velocity ... 3.91 Froude Number 1.42

MODIFIED D-25 CURB OUTLET (DOUBLE WIDTH)-AT W. MAPLE ST. - SECTIONS- B.1+D.1+E.1+X.1+X.2

DATE: 03-20-2017

TIME: 11:06:09

(1) INVERT **WIDTH (feet) ... 6.00** (2) Mannings n ..... .013

(3) SLOPE (ft/ft) ..... .0100 (4) **Q (cfs) 2.72**

(5) LEFT SIDE (6) RIGHT SIDE

SLOPE (X to 1) ..... 0.00 SLOPE (X to 1) ... 0.00

(7) **DEPTH (ft) ..... 0.15** TOP WIDTH (FT) ... 6.00

VELOCITY (fps) ..... 3.08 VEL. HEAD (ft) ... 0.15

AREA (sq. ft) ..... 0.88 P + M (pounds) ... 20

CRITICAL DEPTH ..... 0.19 CRITICAL SLOPE ... 0.0046

CRITICAL VELOCITY ..... 2.44 FROUDE NUMBER 1.42

6”PVC @ 9.5% - SECTIONS- E.1+X.1

DATE: 03-19-2017

TIME: 18:54:37

(1) Diameter (inches) ... 6. (2) Mannings n ..... .013

(3) slope (ft/ft) ..... .0950 (4) Q (cfs) 0.52

(5) depth (ft) ..... 0.19 (6) depth/Diameter ... 0.38

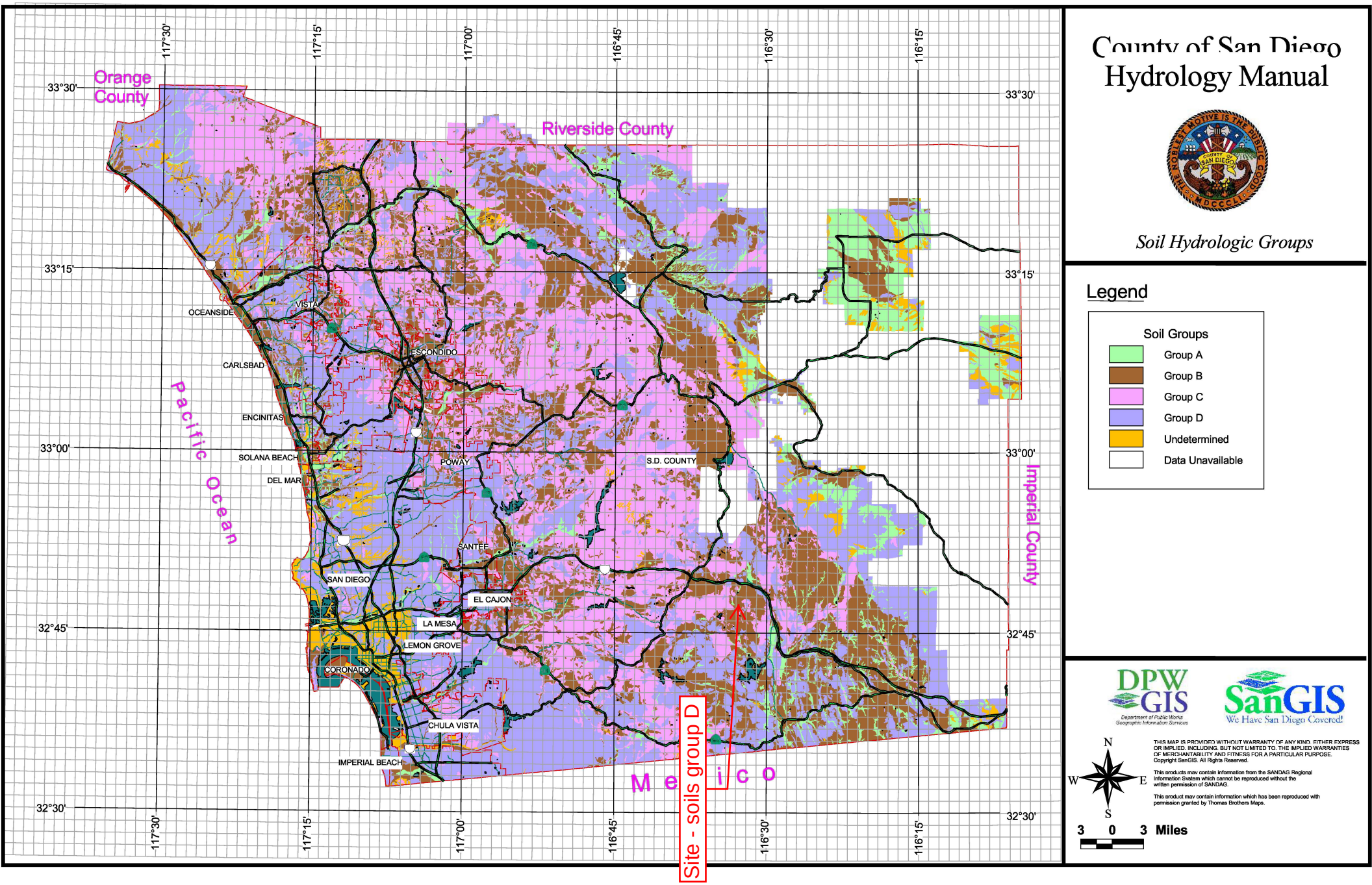
Velocity (fps) ..... 7.71 Velocity Head 0.92

Area (Sq. Ft.) 0.07

Critical Depth ..... 0.37 Critical Slope ... 0.0109

Critical Velocity ... 3.37 Froude Number 3.63

Appendix C –Reference Tables & Figures (County of San Diego Hydrology Manual)



County of San Diego Hydrology Manual

Soil Hydrologic Groups

Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

DPW GIS
Department of Public Works Geographic Information Services

SanGIS
We Have San Diego Covered!

N
W E
S

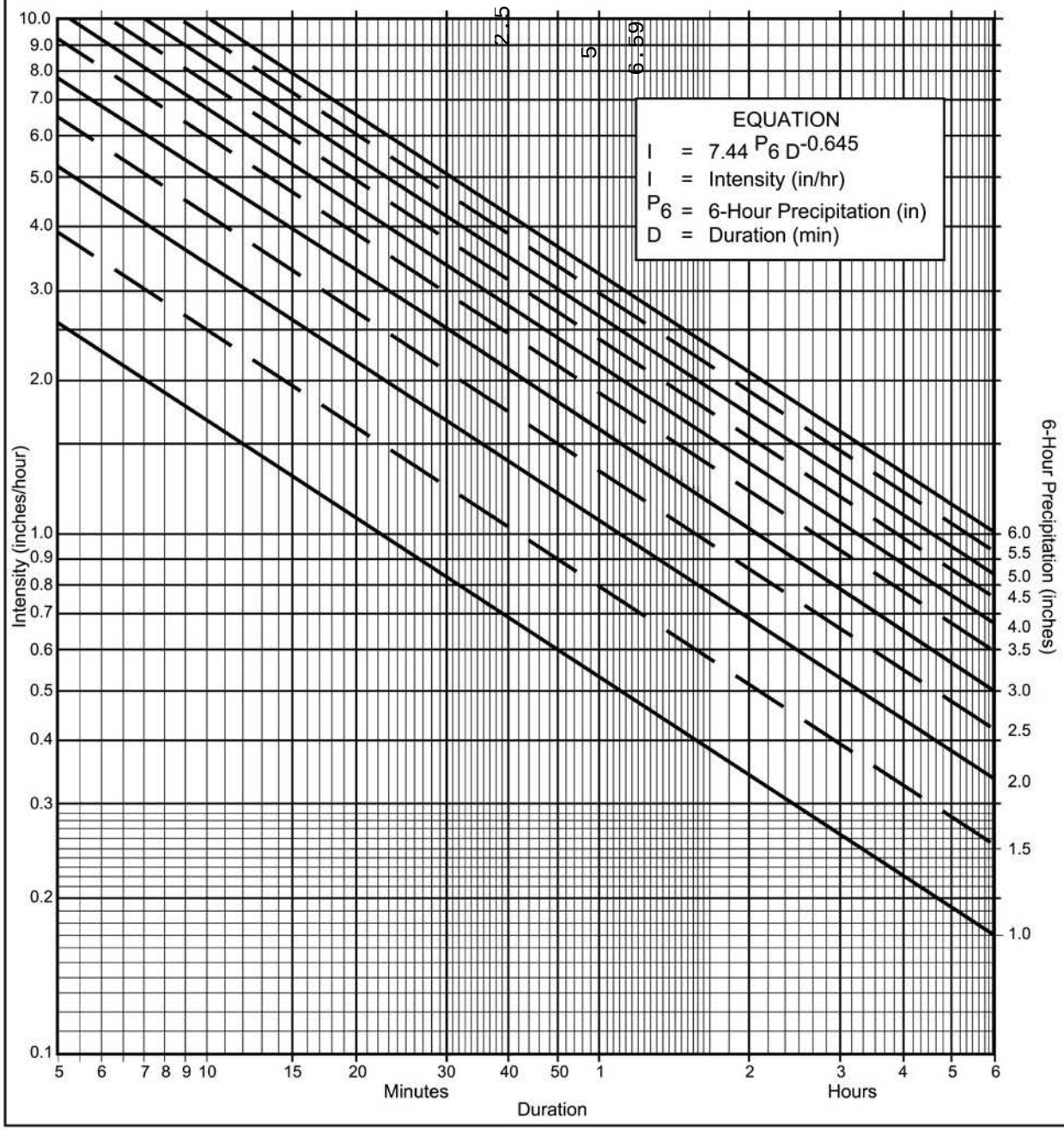
3 0 3 Miles

Site Soil type 'D'

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use			Runoff Coefficient "C"			
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency _____ year

(b) P_6 = _____ in., P_{24} = _____, $\frac{P_6}{P_{24}}$ = _____ %(2)

(c) Adjusted P_6(2) = _____ in.

(d) t_x = _____ min.

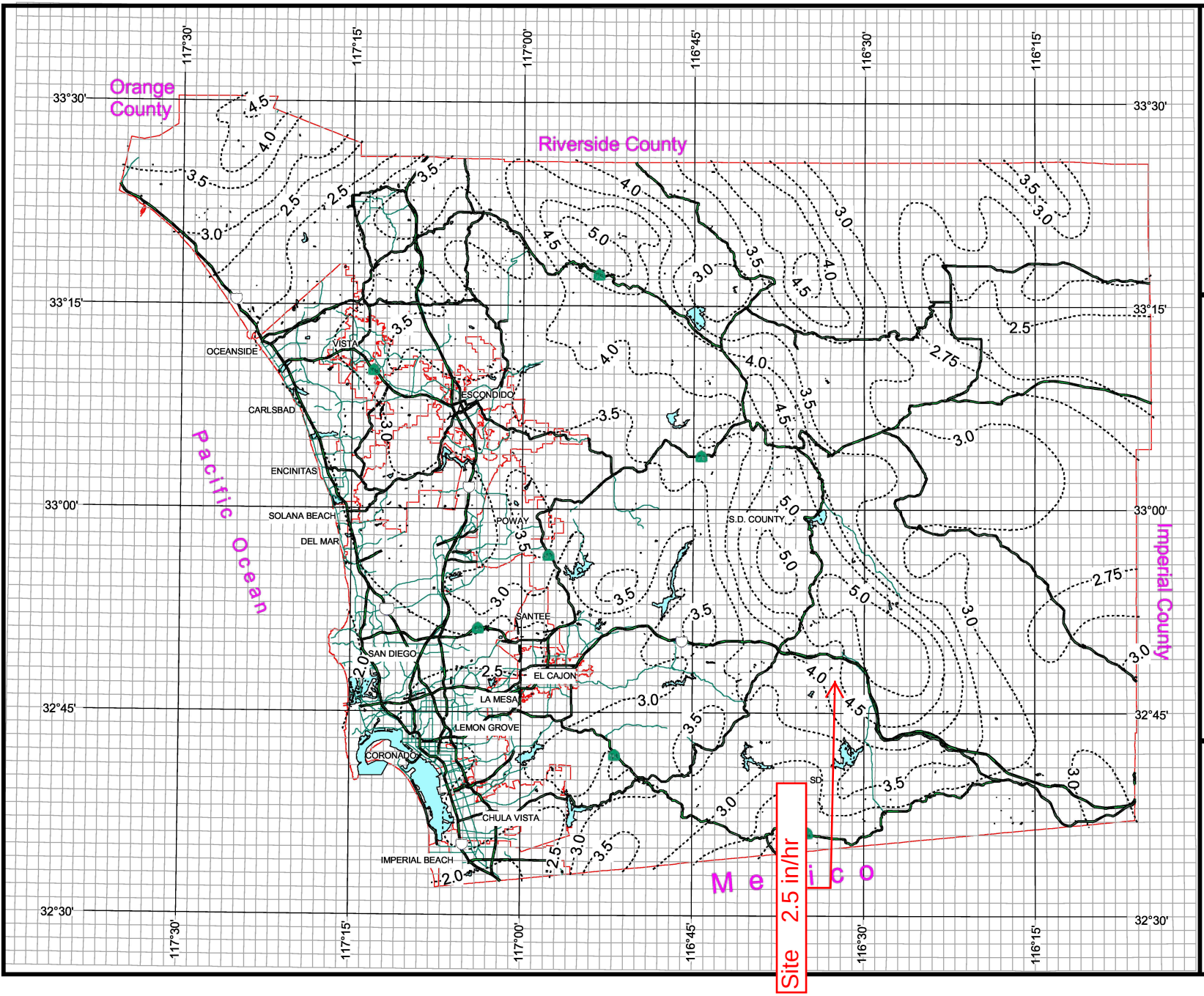
(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

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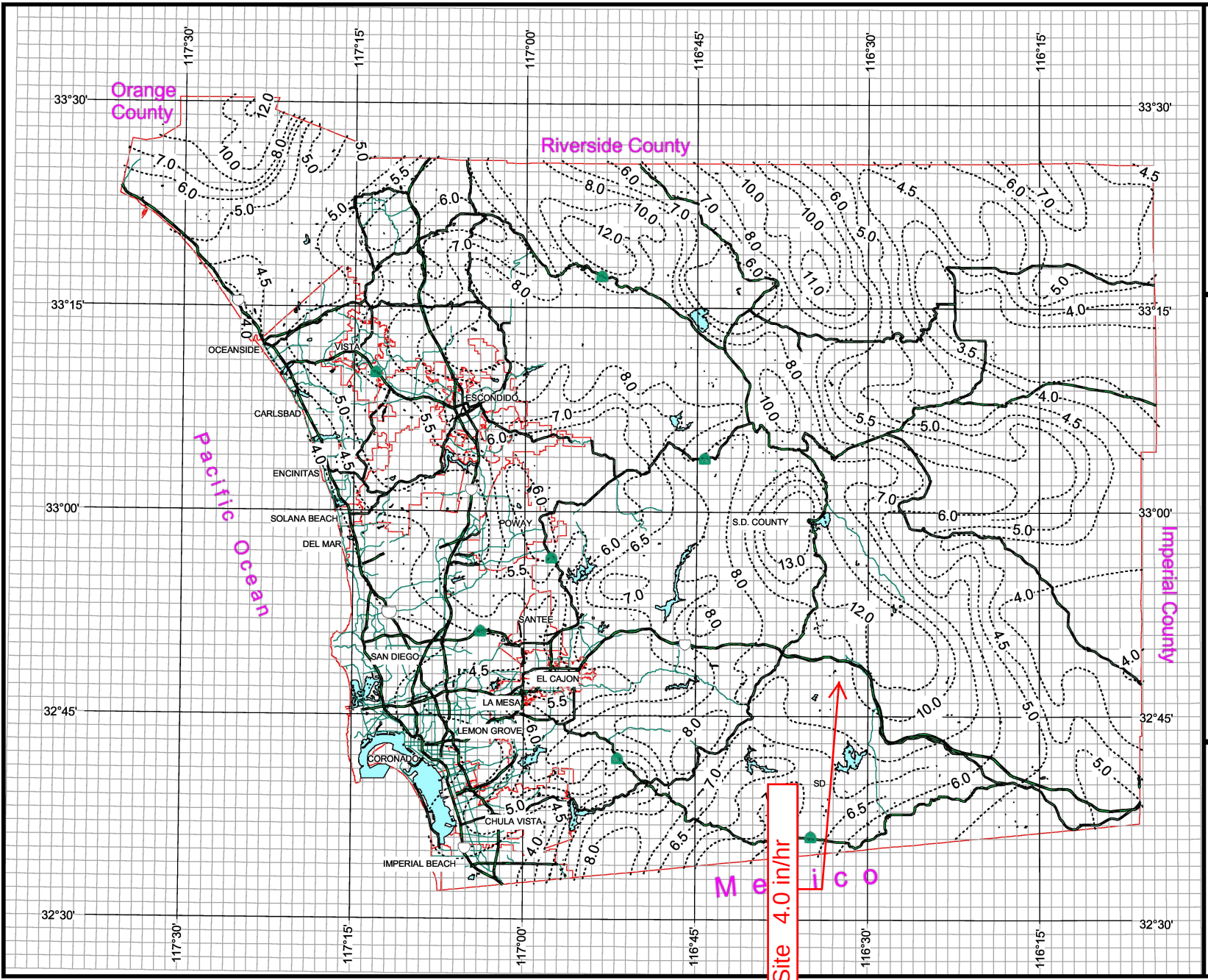
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)



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