BLUE CONSULTING GROUP
BIOLOGY ▪ LAND USE & ▪ ENTITLEMENTS

May 2, 2016

Matthew Gordon
C/O J. David Hawkins
Hawkins + Hawkins Architects, Inc.
141 14th Street
San Diego, CA 92106

Subject: Biological Assessment Letter Report for the Golden Hill Rowhomes; City of San Diego Project # 422242

Mr. Hawkins,

BLUE Consulting Group (BLUE) is pleased to provide this Biological Assessment letter report for the Golden Hill Rowhomes located in the City of San Diego; Project #422242. This report incorporates the results of the previously completed and submitted *Preliminary Wetland Delineation Letter Report, Golden Hill Rowhomes* (BLUE, 2013).

SUMMARY

The proposed infill project is located in the City of San Diego, south-east of Balboa Park in the Golden Hill district. No endemic, rare, or sensitive species or habitats were observed in the study area or within the proposed project footprint. Due to the low quality of the habitat onsite and within the area generally, none are expected to occur. While the area supports a historic canyon, it has been significantly altered through the development of B Street, the manufactured slope supporting it, including a soft bottom flood control system, as well as the adjacent and surrounding high density residential development. There is no natural flow onto the site and the area does not support a USGS 'blue-line' stream, jurisdictional habitat/waters, or a City of San Diego ESL drainage. The vegetation communities within the assessment area include maintained Disturbed Habitat (Tier IV) and Developed land (Holland Code 12000). The Disturbed Habitat supports a created Flood Control system including a headwall, double barrel outlet, and soft bottom channel which re-connects to the pipe at C Street. Due to the disturbed/developed nature of the property, the developed nature of the surrounding area, and the proposed project footprint, no endemic, special status, or rare species were detected or are expected to occur within the project area.

INTRODUCTION, PROJECT DESCRIPTION, LOCATION AND SETTING

The proposed Golden Hill infill Project includes the construction of new residential structures, parking and, access areas. The project site is within the northern portion of Golden Hill in downtown San Diego, south of

Balboa Park and east of Lindbergh International airport. The project site occurs within a developed landscape, abutting high density residential development on all sides. On the immediate eastern and southern Property Lines are road easements (offsite) that are being incorporated into the project footprint. The site is topographically varied, comprised of steep manufactured slopes, existing graded pad areas, and the (non-jurisdictional) maintained soft bottom flood control channel.

BLUE senior biologist, Michael Jefferson, conducted the USACE preliminary wetland delineation within the project area on August 9th, 2013 and on July 6th, and August 6th 2015 completed the full onsite biological resources surveys.

REGIONAL CONTEXT

This project is located within the City of San Diego's Multiple Species Conservation Program (MSCP) Sub-Area; outside of the City of San Diego Multi-Habitat Planning Area (MHPA) and outside of the Coastal Overlay Zone.

The biological resources survey and preliminary protocol USACE Wetland Delineation (WD) was conducted on April 7th, 2015 by BLUE senior biologist, Michael Jefferson (MJ). A confirmation of the original WD results was conducted on July 6th, 2015.

Below is a summary of the survey types, date, times, temperature conditions, sky conditions, and wind speeds during the completed surveys for the Project.

SURVEY DETAILS

Date	Survey Type	Time	Conditions Temp (ºF), Wind (mph) begin and end, Cloud Cover (CC)	Biologists
8-9-13	WD, rare, General	0730- 0930	71º, 0 mph, 10%cc 75º, 0-1 mph, 5%cc	MJ
7-6-15	WD confirm, Rare, General	0800- 0910	71º, 1-5 mph, 15%cc 74º 1-5 mph, 15%cc	MJ
8-6-15	General	1020- 1100	82º, 1-5 mph, 10%cc 82º 1-5 mph, 10%cc	MJ

Vegetation communities were assessed and mapped on a color aerial with topography flown in March 2015 (Google earth). Animal species observed directly or detected from calls, tracks, scat, nests, or other sign were noted. All plant species observed on-site were also noted, and plants that could not be identified in the field were identified later using taxonomic keys.

Limitations to the compilation of a comprehensive faunal and floral checklist were few within the survey area – all of which had been previously, legally, graded. The general quality of graded land and urbanized habitat within the survey area is, as expected, of low quality. While the field visits were conducted in the summer and was likely too late for detection of a number of rare plant and wildlife species (if present), particularly during the ongoing drought and seasonally historic low winter/spring 2014/2015 rains, due to the historic grading of the area as well as the ongoing use and maintenance it was determined that the existing site conditions precluded the recommendation of additional surveys being recommended as a comprehensive checklist was prepared.

Prior to conducting the biological survey, a thorough review of relevant maps, databases, and literature pertaining to biological resources was performed. Recent aerial imagery (Google Earth 2015), topographic maps (USGS 1994), soils maps (USDA 2012), and other maps of the project site and immediate vicinity were acquired and reviewed to obtain updated information on the natural environmental setting. In addition, a query of sensitive species and habitat databases was conducted, including the California Natural Diversity Database (CNDDB; CDFG 2012a), the California Native Plant Society Electronic Inventory (CNPSEI; CNPS 2012), and the Consortium of California Herbarium (Consortium 2012) applications, as well as a review of regional species lists produced by the USFWS (USFWS 2012a) and CDFW (CDFW 2011, 2012a, CDFW 2012b, and 2012c).

The pre-survey investigation also included a verification of whether or not the project site falls within areas designated as final or proposed USFWS Critical Habitat for federally threatened or endangered species (USFWS 2012b).The complete list of sensitive species (CNDDB) and habitats that have been previously recorded within the vicinity of the project site was compiled, and all recorded locations of species and other resources were mapped and overlaid onto aerial imagery using Geographic Information Systems (GIS) software. The CNDDB list of sensitive species included all database results for areas within 9 California USGS 7.5 minute topographic quadrangles.

BLUE biologist Michael Jefferson completed the preliminary USACE jurisdictional wetland delineation. Potential features identified were then investigated further to determine whether they met the criteria of a potentially jurisdictional feature. All features meeting the USACE guidance criteria were delineated. The delineation was conducted once during the drought condition spring. The region received no significant rainfall within the last week before the delineations were conducted. Rainfall patterns were atypical (drought conditions) for that time frame of the surveys.

Delineated boundaries of all features identified within the study area were recorded using a 1”=100’ aerial photograph.

All features identified during the field visit were recorded through routine-level wetland delineation. No jurisdictional wetlands were identified within the survey area.

BLUE's methods for delineating federal wetlands follow the guidelines set forth by the USACE in the *Arid West Manual* (USACE 2008b). The routine onsite determination method can be used to gather field data at potential wetland areas for most projects. Visual observations of vegetation types and hydrology are used to locate areas for evaluation. Then, at each evaluation area, several parameters are considered to determine whether the sample point is within a wetland.

Three criteria normally must be fulfilled in order to classify an area as a jurisdictional USACE wetland: (1) a predominance of hydrophytic vegetation, (2) the presence of hydric soils, and (3) the presence of wetland hydrology. Details of the application of these techniques are described below.

> **Hydrophytic Vegetation.** The hydrophytic vegetation criterion is satisfied at a location if greater than 50% of all the dominant species present within the vegetation unit have a wetland indicator status of obligate (OBL), facultative wetland (FACW), or facultative (FAC) (USACE 1987). An *OBL indicator status* refers to plants that have a 99% probability of occurring in wetlands under natural conditions. A *FACW indicator status* refers to plants that usually occur in wetlands (67 to 99% probability) but are occasionally found elsewhere. A *FAC indicator status* refers to plants that are equally likely to occur in wetlands or elsewhere (estimated probability34 to 66% for each). The wetland indicator status used for this report follows the *National List of Plant Species that Occur in Wetlands: California (Region 0)* (U.S. Fish and Wildlife Service 1988).
>
> **Hydric Soils.** The hydric soil criterion is satisfied at a location if soils in the area can be inferred or observed to have a high groundwater table, if there is evidence of prolonged soil saturation, or if there are any indicators suggesting a long-term reducing environment in the upper 18inches of the soil profile. Reducing conditions are most easily assessed using soil color. Soil colors were evaluated using the *Munsell Soil Color Charts* (Kollmorgen Corporation 1975).
>
> **Wetland Hydrology.** The wetland hydrology criterion is satisfied at a location based upon conclusions inferred from field observations that indicate an area has a high probability of being inundated or saturated (flooded, ponded, or tidally influenced) long enough during the growing season to develop anaerobic conditions in the surface soil environment, especially the root zone (USACE 1987, 2008a, 2008b).

Delineation of Potential Non-Wetland Waters of the U.S.

BLUE methods for the delineation of non-wetland WoUS was based on indicators for OHWM, following established criteria outlined in the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West*

Region (USACE 2008a), and *A Field Guide to the Identification of the OHWM in the Arid West Region of the Western United States* (USACE 2008b).

All jurisdictional features within the study area were determined by the presence of OHWM indicators. This field guide presents a method for delineating the lateral extent of the WoUS in the Arid West using stream geomorphology and vegetation response to the dominant stream discharge. BLUE biologists used this guidance in the field to determine the OHWM for all potentially jurisdictional non-wetland waters.

The field guide describes physical evidence that should be used to ascertain the lateral limits of jurisdiction; generally more than one physical indicator or other means for determining the OHWM is used. The following physical indicators of OHWM were used in the field:

- Natural line impressed on the bank
- Shelving
- Destruction of terrestrial vegetation
- Presence of litter and debris
- Wracking
- Vegetation matted down, bent, or absent
- Sediment sorting
- Leaf litter disturbed or washed away
- Scour
- Deposition
- Bed and banks
- Water staining
- Change in plant community.

Evaluation of SWRCB/RWQCB jurisdiction followed guidance from Section 401 of the CWA and follows the same jurisdictional areas as USACE, unless an isolated water is determined to be present. Isolated water features are not considered jurisdictional under USACE, but are still delineated using the OHWM or wetted area. Isolated water bodies are considered SWRCB/RWQCB jurisdictional under the Porter-Cologne Act.

Delineation of CDFW Jurisdiction

Evaluation of California Fish and Game Code jurisdiction followed the guidance of standard practices by CDFW personnel. CDFW jurisdiction was delineated by measuring the width of top of bank of watercourses, which equaled the bed and bank limits in these small systems, all of which are deeply incised under the currently existing condition. Riparian vegetation was not observed within the study area.

Regulatory Background

The following sections summarize the regulations imposed on each type of jurisdictional feature potentially present onsite.

U.S. Army Corps of Engineers Regulated Activities

USACE-regulated activities under Section 404 of the Clean Water Act (CWA) involve a discharge of dredged or fill material into WoUS. A discharge of fill material includes, but is not limited to, grading, placing riprap for erosion control, pouring concrete, laying sod, and stockpiling excavated material into WoUS. Activities that generally do not involve a regulated discharge (if performed specifically in a manner to avoid discharges) include driving pilings, performing some drainage channel maintenance activities, constructing temporary mining and farm/forest roads, and excavating without stockpiling.

Waters of the U.S.

WoUS, as defined in the Code of Federal Regulations (CFR) title 33, section 328.3, include all waters or tributaries to waters, such as lakes, rivers, intermittent and perennial streams, mudflats, sand flats, natural ponds, wetlands, wet meadows, and other aquatic habitats.

Frequently, a WoUS (with at least intermittently flowing water or tidal influences) is demarcated by the ordinary high-water mark (OHWM), defined in CFR 328.3(e) as: *that line on the shore established by the fluctuations of water and indicated by physical characteristics such as [a] clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*

Where an OHWM is present, waters may be defined as WoUS when connectivity is determined to be present.

Wetlands

According to the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (Federal Interagency Committee for Wetland Delineation 1989), three criteria must be satisfied to classify an area as a jurisdictional wetland: (1) a predominance of plant life that is adapted to life in wet conditions (hydrophytic vegetation); (2) soils that saturate, flood, or pond long enough during the growing season to develop anaerobic conditions in the upper part (hydric soils); and (3) permanent or periodic inundation or soils saturation, at least seasonally (wetland hydrology) (Environmental Laboratory 1987).

USACE will continue to assert jurisdiction over:

1. traditional navigable waters (TNWs) and their adjacent wetlands;
2. non navigable tributaries of TNWs that are relatively permanent (e.g., tributaries that typically flow year-round or have a continuous flow at least seasonally) and wetlands that directly abut such tributaries (e.g., not separated by uplands, berm, dike, or similar feature) (note: relatively permanent waters [RPWs] do not include ephemeral tributaries, which flow only in response to precipitation, and intermittent streams, which do not typically flow year-round or have continuous flow at least seasonally [e.g., typically three months]); and

3. non-RPWs if determined (in a fact-specific analysis) to have a significant nexus with a TNW, including non-navigable tributaries that do not typically flow year-round or have continuous flow at least seasonally, wetlands adjacent to such tributaries, and wetlands adjacent to but not directly abutting a relatively permanent non navigable tributary. Absent a significant nexus, jurisdiction is lacking.

Preliminary Jurisdictional Determination

Under RGL 08-02, dated June 26, 2008, USACE established an alternative to the approved JD process: the "preliminary JD." A preliminary JD is a non-binding written indication that there may be WoUS, including wetlands, on a project site and identifies the approximate location of these features. Preliminary JDs are used when a landowner, permit applicant, or other affected party elects to voluntarily waive or set aside questions regarding CWA jurisdiction over a particular site, usually in the interest of allowing the landowner to move ahead expeditiously to obtain 404 authorization where the party determines that it is in his or her best interest to do so. A preliminary JD is not an official determination regarding the jurisdictional status of potentially jurisdictional features and has no bearing on approved JDs. A preliminary JD cannot be used to confirm the absence of jurisdictional waters or wetlands, is advisory in nature, and cannot be appealed. It is considered "preliminary" because a recipient can later request an approved JD if one is necessary or appropriate.

Finally, although a preliminary JD may be chosen by the applicant, the district engineer reserves the right to use an approved JD where warranted. A preliminary JD is documented using the preliminary JD form, provided as Attachment 1 to RGP 08-02. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD treats all waters and wetlands that would be affected in any way except by the permitted activity as if they are jurisdictional. This report presents a preliminary jurisdictional determination.

2011 Draft Clean Water Act Guidance

On April 27, 2011, USACE and EPA issued draft guidance for determining jurisdiction under the CWA. The guidance supersedes the previous guidance from 2003 regarding *SWANCC* (68 Federal Register 1991–1995) and the 2007 *Rapanos* guidance. This document reiterated the guidance issued under the *Rapanos* decision, asserting that the following waters are protected by the CWA:

- Traditional navigable waters
- Interstate waters
- Wetlands adjacent to either traditional navigable waters or interstate waters
- Non-navigable tributaries to traditional navigable waters that are relatively permanent (meaning they contain water at least seasonally)
- Wetlands that directly abut relatively permanent waters

The guidance further clarifies the criteria for defining TNWs consistent with previous guidance. In addition, a significant nexus evaluation is required for the "other waters" category of the regulations (see item 3 in Section 2.1.1, above). The guidance divides these waters into two categories (i.e., those that are physically proximate to other jurisdictional waters and those that are not) and discusses how each category should be evaluated.

State Water Resources Control Board Regulated Activities/Regional Water Quality Control Board

In California, the SWRCB and nine Regional Water Quality Control Boards (RWQCB) regulate activities within state and federal waters under Section 401 of the CWA and the state Porter-Cologne Act. The SWRCB is responsible for setting statewide policy, coordinating and supporting the RWQCB efforts, and reviewing petitions that contest RWQCB actions. Each semi-autonomous RWQCB sets water quality standards, issues 401 certifications and waste discharge requirements, and take enforcement action for projects occurring within their boundary. However, when a project crosses multiple RWQCB jurisdictional boundaries, the SWRCB becomes the regulating agency for both of these acts and issues project permits.

Section 401 of the Clean Water Act

Section 401 of the CWA requires that any applicant for a federal permit for activities that involve a discharge to waters of the United States shall provide the federal permitting agency a certification from the state in which the discharge is proposed that states that the discharge will comply with the applicable provisions under the federal Clean Water Act.

Therefore, in California, before USACE will issue a Section 404 permit, applicants must apply for and receive a Section 401 water quality certification or waiver from the RWQCB or SWRCB, as applicable. Under Section 401 of the CWA, the SWRCB/RWQCB regulates at the state level all activities that are regulated at the federal level by USACE. Therefore, SWRCB/RWQCB jurisdiction usually matches the jurisdictional boundaries for WoUS (mapped at the OHWM).

However, if waters are determined not to be WoUS, they may still be subject to SWRCB/RWQCB jurisdiction based on the Porter-Cologne Act.

Porter-Cologne Act

The RWQCB regulates activities that would involve "discharging waste, or proposing to discharge waste, within any region that could affect waters of the state" (California Water Code 13260[a]),pursuant to provisions of the state Porter-Cologne Act. Waters of the State (WoS) are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state"(California Water Code 13050 [e]). Such waters may include waters not subject to regulation under Section 404 (i.e., isolated features).

California Department of Fish and Game Regulated Activities

Under recently revised California Fish and Game Code, Sections 1600–1616, CDFW has the authority to regulate work that will substantially divert or obstruct the natural flow—or substantially change or use any material from the bed, channel, or bank—of any river, stream, or lake. CDFW also has the authority to regulate work that will deposit or dispose of debris, wastewater, or other material containing crumbled, flaked, or ground pavement that may pass into any river, stream, or lake. This regulation takes the form of a requirement for a Lake or Streambed Alteration Agreement and is applicable to all work involving state or local government discretionary approvals.

Section 1602 of the California Fish and Game Code

The California Fish and Game Code mandates that it is unlawful for any person to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambeds, without first notifying the department of such activity.

CDFW jurisdiction includes ephemeral, intermittent, and perennial watercourses (including dry washes) and lakes characterized by the presence of (1) definable bed and banks and/or (2) existing fish or wildlife resources. Furthermore, CDFW jurisdiction is often extended to habitats adjacent to watercourses, such as oak woodlands in canyon bottoms or willow woodlands that function hydrologically as part of the riparian system. Historical court cases have further extended CDFW jurisdiction to include watercourses that seemingly disappear but re-emerge elsewhere. Under the CDFW definition, a watercourse need not exhibit evidence of an OHWM to be claimed as jurisdictional.

HABITATS / VEGETATION COMMUNITIES

In order to account for potential revisions to the development plan, vegetation was mapped within the current proposed project impact area and a minimum arbitrary 100-foot buffer. This area is inclusive of the offsite road easement to the east and south. The entirety of the project area occurs on disturbed/developed land (Figure 4).

A list of vegetation communities found within the Biological Assessment area (observed both on and offsite) is located in Table 1. The vegetation communities within the assessment area consist of City of San Diego Tier IV Disturbed Habitat and Developed areas. Representative site photographs (Photographs 1-4) are presented as an attachment.

Table 1
On and Offsite (within Project) Vegetation

Vegetation Type		Onsite	Offsite
DEV	Developed (only offsite impacts)	0.00	0.07 total
DIST	Disturbed Habitat (Tier IV)	0.46	0.12 total
FCC*	Flood Control Channel (FCC) - Created, Soft Bottom (Tier IV)	87' long x 2.5 wide 217 sq. ft (0.004 acres)	31'x2.5' 77.5 Sq. Ft. (0.001 acres)
Total (acres)		**0.46**	**0.19**

- Acreage total within FCC is accounted for as 'Disturbed Habitat'

Disturbed Habitat (Tier IV)

A significant portion of the property has been historically cleared and graded for the surrounding development of B Street (manufactured slopes), infrastructure improvements (soft bottom flood control structure and channel; see below), and the residential pads surrounding the property. Because the natural habitat has been impacted by development including historic grading, hydroseeding and irrigation, the site supports Disturbed Habitat (Tier IV).

This areas contain numerous and varied ornamental and horticultural plantings typically located within residential yards, active-use parklands, and remnant undeveloped lots within the urban settings. The mature tall exotic plantings, such as palm trees (sp.) and eucalyptus trees (*Eucalyptus* sp.) with allelopathic toxins that tend to inhibit understory growth, form well developed, and dense non-native dominated woodlands. Disturbed areas are typically located adjacent to urbanization and contain a mix of primarily weedy species, including non-native forbs, annuals, and grasses, usually found pioneering on recently disturbed soils.

At the base of the manufactured slopes is the concrete outlet for the onsite flood control system outlet and rip-rap. The area was previously maintained with annual mowing and clearing in 2013 when the initial biological surveys and WD was completed. Currently, the area has not been mowed (maintained) since that time (2013) and the onsite manufactured slopes have been hydroseeded and irrigated. As a result the area is much more vegetated, particularily at the base of the manufactured slopes and the mouth of the Flood Control Channel outlet. In addition to native species such as bush mallow (*Malacothamnus fasciculatus),* mulefat (*Baccharis salicifolia)* and black willow (*Salix nigra*) supported by the water from the flood control system hydrology, weedy species include prickly sow thistle (*Sonchus asper*), common sow thistle (*Sonchus oleraceus*), bristly ox-tongue (*Picris echioides*), Russian thistle (*Salsola tragus*), giant reed, hottentot-fig (*Carpobrotus edulis*), wild lettuce (*Lactuca serriola*), tree tobacco (*Nicotiana glauca*), castor-bean (*Ricinus communis*), pampas grass, smooth cat's-ear (*Hypochoeris glabra*), red-stem filaree (*Erodium cicutarium*), short-beak filaree (*Erodium brachycarpum*) and white-stem filaree (*Erodium moschatum*). These urban lands do not typically contain native vegetation or provide essential habitat connectivity; and therefore, tend to have reduced biological value.

- **Non-Jurisdictional/Non-ESL Habitat**

A preliminary protocol ACOE wetland delineation was completed onsite by BLUE senior biologist Michael Jefferson in August of 2013 and confirmed in July of 2015. As indicated on Figure 4, the observed soft bottom Flood Control System, is a non-jurisdictional Feature (F) and Non-ESL wetland. This determination was made because the hydrological regime of the area in question is a result of a created system in which storm water flows are captured, focused and conveyed from a double barrel pipe and headwall system into an excavated channel leading to the continuation of the system in pipes as it re-enters the piped system under C Street.

The observed soft bottom channel is approximately 2.5 feet wide and is approximately 87 feet long as the flows are conveyed through the property. The channel onsite is generally unvegetated or ornamental grass species lined. Hydrophytic species can be observed outside of the channel amongst the palm trees adjacent to the eastern PL and within the road easement. In the original 2013 WD, there was no ongoing construction in the area and regular maintenance was being completed (mowing). There was no water within the channel and there was no erosive cut running downstream directly from the existing double barrel outlet (there was no rip-rap existing at that time, either) to the channel further downstream. Currently, the mowing fire management has not been completed this season and the surrounding manufactured slopes are now irrigated. There is a small circular (18" diameter) area of standing water at the mouth of the outlet structure in a hole presumably carved out by the conveyed storm flows erosive forces. Two large mature chaparral mallow shrubs dominate the center of the property, adjacent to the outlet as well as non-native grasses and ornamental species. Onsite, and immediately downstream of the outlet structure, within and adjacent to the ornamental grass lined eroded channel, is a copse of palm trees, a black willow, upland shrubs, and an understory of non-native turf grasses and trash.

The project site does not support areas considered to be ACOE, CDFW or City jurisdictional wetlands. The area does not support a historic streambed; no blue-line is depicted in USGS maps of this area and no natural channel or flow line leading to or from the concrete outfall structure exists. In addition, onsite hydrology is a result of man-made conditions; storm event flows are piped onsite and no non-permitted filling of wetlands has occurred in this area. Although an isolated willow was observed on-site, vegetation is generally comprised of upland, non-wetland species. Offsite to the south and adjacent to C Street is where stormwater ponding has resulted in the proliferation of hydrophytic species (including willows sp.). However, the surrounding development indicates that these species exist in isolation from larger areas of functional wetland vegetation.

Developed Area

The developed area is comprised of the offsite surrounding paved areas (e.g. sidewalk and structures) and the concrete flood control outfall structure onsite. This area, while not onsite, was analyzed to determine the potential for offsite impacts required by the project.

SENSITIVE BIOLOGICAL RESOURCES

1. Sensitivity Criteria

The subject property is located within the City's Multiple Species Conservation Program (MSCP) area and outside of the Coastal Overlay Zone and Multi-Habitat Planning Area (MHPA) boundary. The sensitive resources on-site shall be protected, preserved, and where damaged, restored according to the Environmentally Sensitive Lands (ESL) Regulations. The proposed project has been designed to meet or exceed those regulations.

State and federal agencies regulate sensitive species and require an assessment of their presence or potential presence to be conducted on-site prior to the approval of any proposed development on a property. For purposes of this report, species will be considered sensitive if they are: (1) listed or proposed for listing by state or federal agencies as threatened or endangered; (2) on List 1B (considered endangered throughout its range) or List 2 (considered endangered in California but more common elsewhere) of the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik 1994); (3) within the Multiple Species Conservation Program (MSCP) list of species evaluated for coverage or list of narrow endemic plant species; or (4) considered fully protected, sensitive, rare, endangered, or threatened by the State of California and Natural Diversity Data Base (NDDB), or other local conservation organizations or specialists. California fully protected is a designation adopted by the State of California prior to the creation of the State Endangered Species Act and is intended as protection from harm or harassment.

Noteworthy plant species are considered to be those which are on List 3 (more information about the plant's distribution and rarity needed) and List 4 (plants of limited distribution) of the CNPS Inventory. Sensitive habitat types are those identified by the NDDB, Holland (1986) and/or those considered sensitive by other resource agencies.

Determination of the potential occurrence for listed, sensitive, or noteworthy species are based upon known ranges and habitat preferences for the species (Zeiner et al.; Skinner and Pavlik; Reiser); species occurrence records from the NDDB (State of California); and species occurrence records from other sites in the vicinity of the project site.

2. Sensitive Plant Communities and Habitats

No sensitive plant community or habitat was observed onsite.

As discussed in the prior *Non-Jurisdictional/Non-ESL Habitat* section, the completed protocol preliminary USACE wetland delineation, completed in August 2013 (BLUE, November), determined that while the area appears to be a natural canyon, it has been significantly altered and there is no natural flow onto the site and the area does not support a USGS 'blue-line' stream or drainage or jurisdictional waters/wetlands. Onsite, at the base of the manufactured slope coming off of B Street, the stormwater flows outlet from a double pipe through a concrete headwall. There is no rip-rap or flow control after the headwall outlet. In a number of areas downstream of the headwall, this has allowed for erosion and a cut bank. Otherwise the seasonal stormwater flows through a grassy swail/depression. The surrounding upland area (disturbed and developed habitat) is mowed and the swail is vegetated by upland landscaping grass (sp.). Downstream and outside of the survey area, immediately north of C Street, the drainage inlet (where the storm water flows re-enters the City stormwater pipe system) appears to be clogged by plant material and debris. This lack of maintenance appears to have created a dam effect where the storm water flows cannot drain offsite as designed. This has created an artificial hydrological regime in which hydrophytic species (willows sp.) now persist.

The WD field survey revealed that there are no naturally occurring hydric soils and no hydrophytic species within the soft bottom stormwater swail. The observed seasonal stormwater course was created by flows coming out of the stormwater pipe. No jurisdictional USACE, CDFW or City of San Diego ESL waters or wetlands were observed onsite. The observed unvegetated soft bottom flood control/stormwater channel does not qualify as City of San Diego ESL wetlands as defined in the *City of San Diego Land Development Manual – Biological Guidelines* (June, 2012) because this is an artificially created environment in a historically non-wetland area. Therefore, potential impacts to the observed non-jurisdictional and non-ESL unvegetated soft bottom flood control/stormwater channel would not represent a significant impact and no additional permitting or specific mitigation would be recommended at this time.

3. Sensitive Plants

a. Observed

No plant species listed as sensitive by the City of San Diego MSCP was observed.

b. Not Observed

Several other sensitive species are known to occur in the vicinity of the project site. However, due to the developed and disturbed/ruderal nature of the property these species are not considered as potentially occurring on-site based on the lack of supporting native vegetation communities. A complete list and assessment of the potential sensitive species status within the project footprint is listed in Table 2; Sensitivity Codes are listed in Table 3.

4. Sensitive Wildlife

a. Observed

No sensitive wildlife was observed or expected to occur onsite.

b. Not Observed

Several other sensitive animals are either known to occur in the vicinity or have a potential to be present on-site. Table 4 lists the sensitive species that could potentially occur on-site based on the ranges and habitat requirements of these species and includes the likelihood of occurrence for these species. No raptors were observed overhead. Overall, there is no potential for sensitive species onsite due to the pre-existing developed and ruderal nature of the property; no appropriate native habitat is present. In regards to potentially nesting raptors, no historic or currently active nests were observed and due to the quality and location of the habitat, none are expected.

Wildlife Movement Corridors

Wildlife movement corridors are defined as areas that connect suitable wildlife habitat areas in a region otherwise fragmented by rugged terrain, changes in vegetation, or human disturbance. Natural features such as canyon drainages, ridgelines, or areas with vegetation cover provide corridors for wildlife travel. Wildlife movement corridors are important because they provide access to mates, food, and water; allow the dispersal of individuals away from high population density areas; and facilitate the exchange of genetic traits between populations (Beier and Loe 1992). Wildlife movement corridors are considered sensitive by resource and conservation agencies.

This property does not support quality habitat, is not adjacent to quality habitat, and does not support a portion of a formal corridor system.

PROJECT IMPACTS

The proposed development of the property includes: grading, construction of new residential structure(s), onsite parking and access will result in permanent impacts to a total of approximately 0.65 acres (Figure 5). This is inclusive of all 0.46 acres onsite as well as 0.19 acres offsite which are proposed to be impacted. The biological impacts of the project were assessed according to guidelines set forth in the City of San Diego's Land Development Code Biology Guidelines (City of San Diego, 2012) and CEQA. Mitigation is required for impacts considered significant under the Land Development Code and CEQA guidelines.

A. City of San Diego Significance Thresholds

Impacts to biological resources are assessed by City staff through the CEQA review process, and through review of the project's consistency with the Environmentally Sensitive Lands (ESL) regulations, the Biology Guidelines (April, 2012) and with the City's MSCP Subarea Plan.

Sensitive biological resources are defined by the City of San Diego Municipal Code as:

- Wetlands (as defined by the Municipal Code, Section 113.0103);
- Lands outside the MHPA that contain Tier I Habitats, Tier II Habitats, Tier IIIA Habitats, or Tier IIIB Habitats as identified in the Biology Guidelines of the Land Development manual;
- Lands supporting species or subspecies listed as rare, endangered, or threatened;
- Lands containing habitats with narrow endemic species as listed in the Biology Guidelines of the Land Development manual; and

- Lands containing habitats of covered species as listed in the Biology Guidelines of the Land Development manual.
- Lands that have been included in the Multi-Habitat Planning Area (MHPA) as identified in the County of San Diego Multiple Species Conservation Program (MSCP) Subarea Plan (City of San Diego, 1997);

B. Plant Communities

The proposed development of the property includes: grading, construction of new residential structure(s), onsite parking and access which will result in permanent impacts to a total of approximately 0.65 acres (Figure 5). This is inclusive of all 0.46 acres onsite (all Disturbed Habitat) as well as 0.19 acres offsite (Developed) which are proposed to be impacted. Table 5 described the proposed impacts on and offsite.

Table 5
Project Footprint
Habitat Impacts

Vegetation Type (Tier)		Onsite (acres)	Onsite Impacts	Offsite Impacts: Sidewalk/Road Easement(s)	Total Impact (acres)
DEV	Developed	0.0	0.0	0.04/0.03 (0.07 total)	**0.19**
DIST	Disturbed Habitat (Tier IV)	0.46	0.46	0.02/0.10 (0.12 total)	**0.65**
FCC*	Flood Control Channel (FCC) – Created, Soft Bottom (Tier IV)	87’x2.5’ - 217.5 sq. ft./ (0.004 acre)	87’x2.5’ - 217.5 sq. ft./ (0.004 acre)	31’x2.5’ 77.5 Sq. Ft. (0.001 acre)	**118’ x 2.5’ 295 Sq. Ft./ (0.006 acre)**
Total (acres)		**0.46**	**0.46**	**0.19**	**0.65**

* Acreage total within FCC is accounted for as ‘Disturbed Habitat’

C. Wildlife

Due to the disturbed/developed condition of the site, while unlikely, some impacts to general wildlife associated with the property may occur through implementation of all project components. Birds have a high mobility and will most likely be displaced off the site during grading. Small mammals, amphibians, and reptiles with low mobility may be inadvertently impacted during the grading of the site. Impacts on general wildlife are considered less than significant. The Project will comply with the Migratory Bird Treaty Act (MBTA); no significant impacts are anticipated.

P.O. Box 501115 San Diego, CA 92150 858.391.8145 Mike@blueconsulting.com

D. Environmentally Sensitive Lands Regulations (ESL)

Multiple Species Conservation Program

The Multiple Species Conservation Program (MSCP) is designed to identify lands that shall conserve habitat for federal and state endangered, threatened, or sensitive species, including the California gnatcatcher. The MSCP is a plan and a process for the local issuance of permits under the federal and state Endangered Species Acts for impacts to threatened and endangered species. Also included in the MSCP are implementation strategies, preserve design, and management guidelines. The City of San Diego prepared a subarea preserve plan to guide implementation of the MSCP Plan within its corporate boundaries. The City of San Diego adopted the MSCP in March 1997.

Sensitivity Criteria

The assessment of the sensitivity of plant communities and species follows the guidelines presented in the MSCP. The Multi-Habitat Planning Area (MHPA) lands are those that have been included within the City's MSCP Subarea Plan for habitat conservation. These lands have been determined to provide the necessary habitat quality, quantity, and connectivity to sustain the unique biodiversity of the San Diego region. The MHPA lands are considered by the City to be a sensitive biological resource.

Under the MSCP, upland plant communities have been divided into four tiers of sensitivity. Upland plant communities that are classified as Tier I, Tier II, or Tier III are considered sensitive by the City. Tier IV plant communities are not considered sensitive. A total of 85 sensitive plant and wildlife species are considered to be adequately protected within MHPA lands. These sensitive species are MSCP covered species and are included in the Incidental Take Authorization issued to the City by federal and state governments as part of the City's MSCP Subarea Plan.

There are 15 plants that are considered to be "narrow endemic species" based on their limited distributions in the region. These narrow endemics are sensitive biological resources. All 15 narrow endemic plants are also MSCP covered species and some are state or federally listed as threatened or endangered species.

All species listed by state or federal agencies as rare, threatened, or endangered or proposed for listing are considered to be sensitive biological resources. The habitat that supports a listed species or a narrow endemic species is also a sensitive biological resource.

Species that are not MSCP covered species, but are on Lists 1B or 2 of the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik 1994), California fully protected species, and California species of special concern are also considered sensitive. Impacts to these species, if considered significant, may require mitigation according to California Environmental Quality Act (CEQA) guidelines.

Assessments for the potential occurrence of sensitive species are based upon known ranges, habitat preferences for the species, species occurrence records from the NDDB, and species occurrence records from other sites in the vicinity of the project site.

The proposed project, which lies outside of any MHPA boundary fully complies with the requirements of ESL. The site is physically suited to support the proposed development and as designed.

Sensitive Plant Communities and Habitats

No sensitive plant community or habitat was observed within the project footprint.

Sensitive Plants

a. Observed

No sensitive plant species were observed during the survey.

b. Not Observed

Several other sensitive species are known to occur in the vicinity and potentially on the project site and listed in Table 2 (attached). Sensitivity Codes are described in Table 3 (attached). However, due to the developed and ruderal nature of the property these species are not considered as potentially occurring on-site based on the lack of supporting native vegetation communities.

Sensitive Wildlife

a. Observed

No sensitive wildlife was observed or expected to occur onsite.

b. Not Observed

Several other sensitive animals are either known to occur in the vicinity or have a potential to be present on-site. Table 4 (attached) lists the sensitive species that could potentially occur on-site based on the ranges and habitat requirements of these species and includes the likelihood of occurrence for these species. Overall, there is no potential for sensitive species onsite due to the pre-existing ruderal nature of the property; no native habitat is present. Although a portion of the site could support nesting birds (with a low potential), the Project will comply with the Migratory Bird Treaty Act (MBTA); no impacts to these species are anticipated.

E. Jurisdictional and ESL Wetlands

As determined by the completed preliminary USACE jurisdictional wetland delineation, (BLUE, 2013) no jurisdictional and/or ESL wetlands were observed onsite. The proposed development does not impact any observed or potential USACE, CDFW jurisdictional and/or City ESL wetlands.

F. Potential Indirect Impacts

The onsite observed mature trees (ornamental trees, palm trees, etc.) and offsite trees (relative to the NE corner of the property) within the portion of the unmaintained Flood Control Channel have a low potential to support nesting birds due to the surrounding high level of use and adjacent active construction. In addition, potential indirect impacts include an increase in urban pollutants entering sensitive water bodies, an increase in night lighting, habitat disturbance, edge effects and pollutants (fugitive dust). As described below, potential indirect impacts resulting from the proposed infill development are unlikely to occur; nonetheless, the Project would avoid and minimize such impacts with the implementation of Project features, such as Best Management Practices (BMP's).

1. Water Quality

Water quality has the potential to be adversely affected by potential surface runoff and sedimentation during the construction and operation of the project; however, BMP's shall be implemented that shall reduce potential impacts to below significance. In general, the proposed project shall provide onsite bioretention treatment areas that will collect the impervious runoff and treat it before it enters the storm drain system. Therefore, the project is not expected to decrease water quality or affect vegetation, aquatic animals, or terrestrial wildlife that depends upon the water resources.

2. Habitat Disturbance

This proposed project is predominantly within a pre-existing developed envelope. Therefore, while there may be an increase in total human activity in the area, the area has already absorbed the biological loss to function and value and it is unlikely (if possible) that the project could lead to further fragmentation of habitat and the degradation of sensitive habitat if people or pets wandered outside the developed area. Additionally, illegal dumping of green waste, trash, or other refuse could occur, which shall negatively impact adjacent habitat.

3. Edge Effects

Edge effects occur when blocks of habitat are fragmented by development. These edges make it easier for non-native plant species to invade native habitats. Edge effects can also make it easier for both native and non-native predators to access prey that may have otherwise have been protected within large, contiguous blocks of habitat. In addition, the disruption of predator-prey, parasite-host, and plant-pollinator relations can occur.

The proposed project shall not lead to significant edge effects. The project's proposed landscape plan shall not include any invasive plant species. It is recommended that steep slopes that rim development areas shall be maintained as the FMZ 2 area and landscaped in native and naturalized plant material and serve as a buffer to the flood control channel offsite. Finally, the project does not affect contiguous blocks of habitat.

4. Night-time Lighting

Development of the project site shall introduce night-time lighting in the form of street and parking lights, car headlights, and residential lights. Night-time lighting on native habitats can provide nocturnal predators with an unnatural advantage over their prey. This could cause an increased loss in native wildlife that could be a significant impact unless mitigated. Nighttime lighting shall be consistent with the City's lighting requirements and shall not cause significant impacts on wildlife habitat.

5. Fugitive Dust

Fugitive dust produced by construction could disperse onto vegetation. Effects on vegetation due to airborne dust could occur adjacent to construction. A continual cover of dust may reduce the overall vigor of individual plants by reducing their photosynthetic capabilities and increasing their susceptibility to pests or disease. This, in turn, could affect animals dependent on these plants (e.g., seed eating rodents or insects or browsing herbivores). Fugitive dust impacts shall not be considered significant because the project shall be required to implement mandatory dust control requirements that ensure dust control and significant impacts shall not occur.

G. Wildlife Movement Corridors

Due to the developed nature of the surrounding area and current use of the property, the property does not maintain an identified wildlife corridor. The proposed project will not significantly impact a wildlife movement corridor. No mitigation will be required.

CUMULATIVE IMPACTS

With the implementation of BMP's and Project features described in Section F, the potential for indirect impacts resulting from the proposed project will be minimized. Project impacts are considered less than significant on a regional scale.

MITIGATION MEASURES

The proposed Project does not directly and/or significantly indirectly impact any sensitive species or habitat. No species or habitat specific mitigation is recommended at this time.

The Project will comply with the MBTA; no significant impacts are anticipated.

Thank you for the opportunity to provide this biological assessment. If you have any questions, please contact us at 858-391-8145.

Sincerely,

Michael Jefferson
BLUE Consulting Group
Senior Biologist

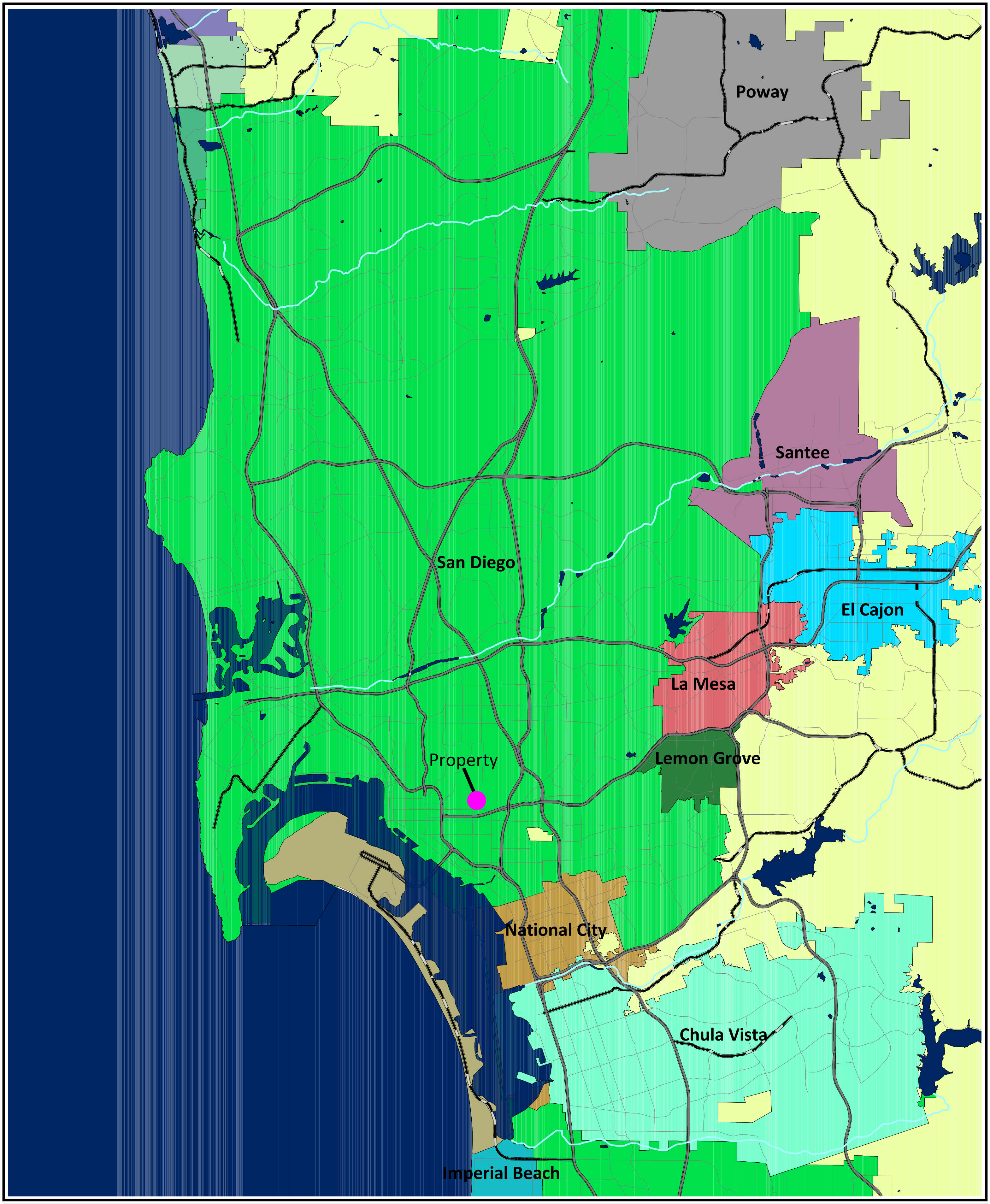
List of Attachments
Attachment A – Figures (5)
Attachment B – Lists of Plants and Animals Detected During Site Assessment
Attachment C – Tables 2-4; Sensitive Species Observed or with the Potential to Occur
Attachment D –Site Photographs (4)
Attachment E – References

Certification/Qualification

The following individual completed the field surveys and preparation of this report:

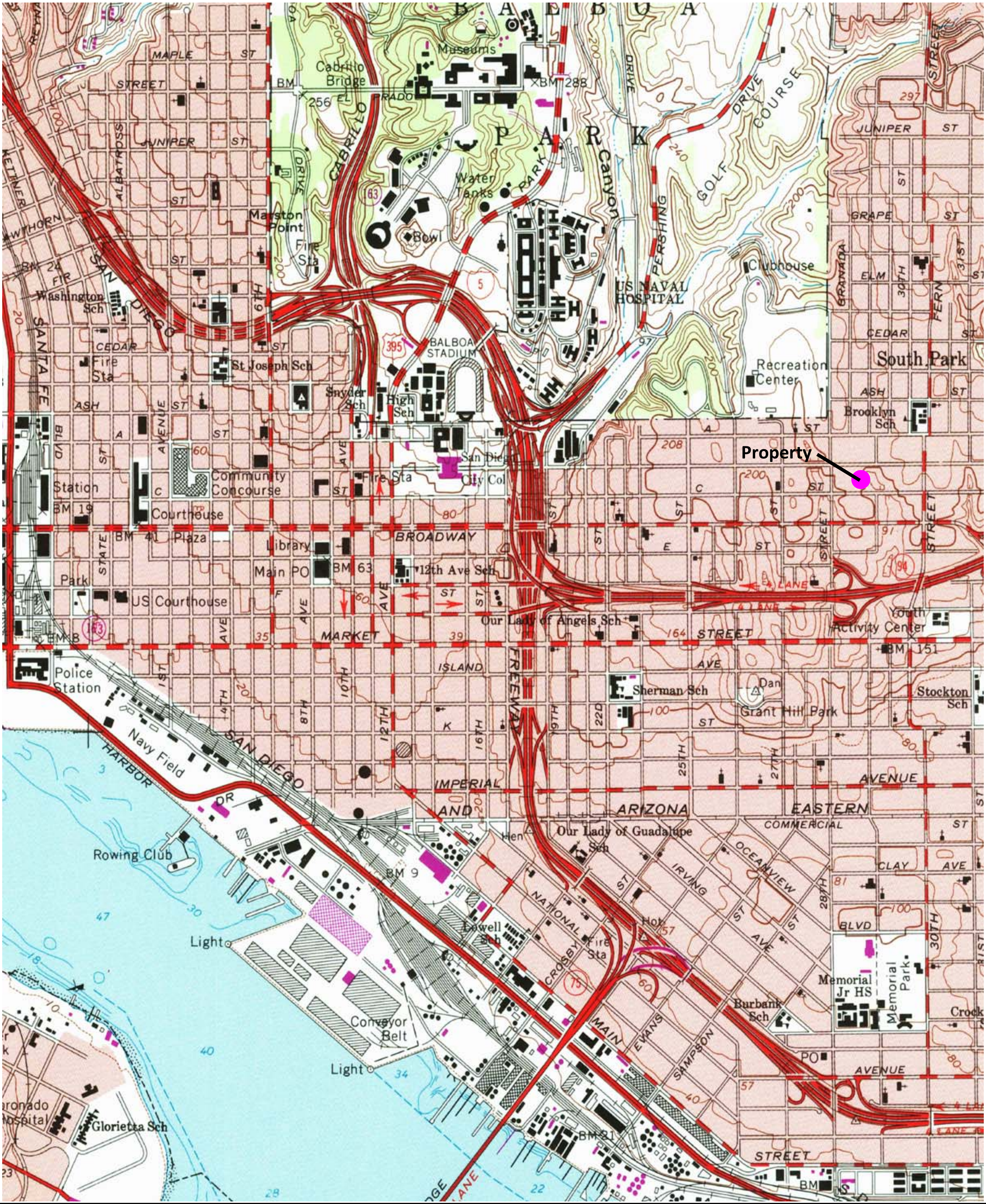
Michael Jefferson; University of California at San Diego, B.A., Biological Anthropology and Socio-Biology, 1996
Qualified County of San Diego Biologist

Attachment A – Figures (5)



Property

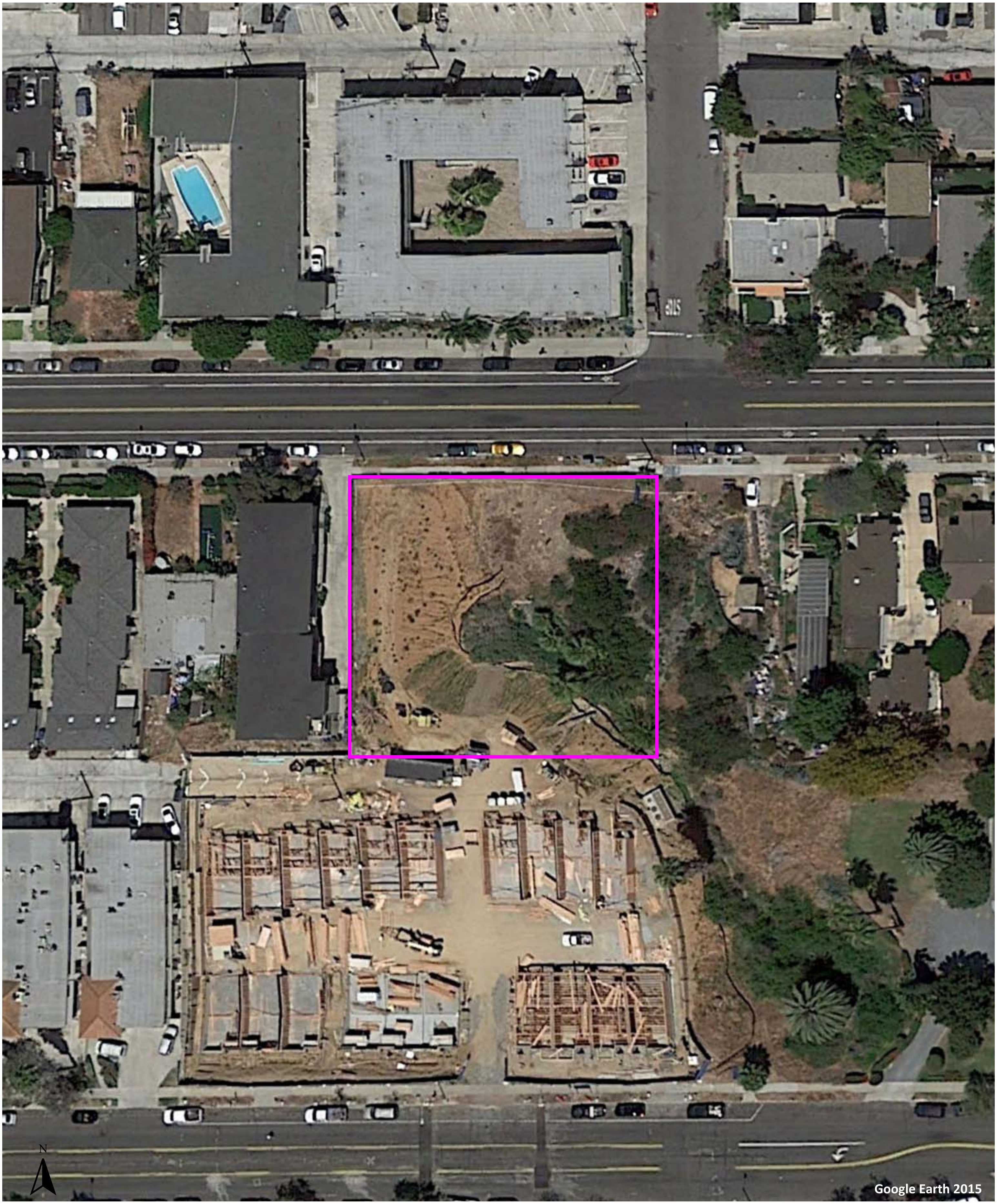
FIGURE 1
Regional Project Location



Property

FIGURE 2

Project Location
USGS Topo Map



Property

FIGURE 3

Property Aerial

Property

MSCP Designation: Disturbed Tier IV

MSCP Designation: Urban Developed

Soft Bottom Flood Control Channel - Tier IV

Outlet Headwall

Rip-Rap

FIGURE 4

Habitat Map

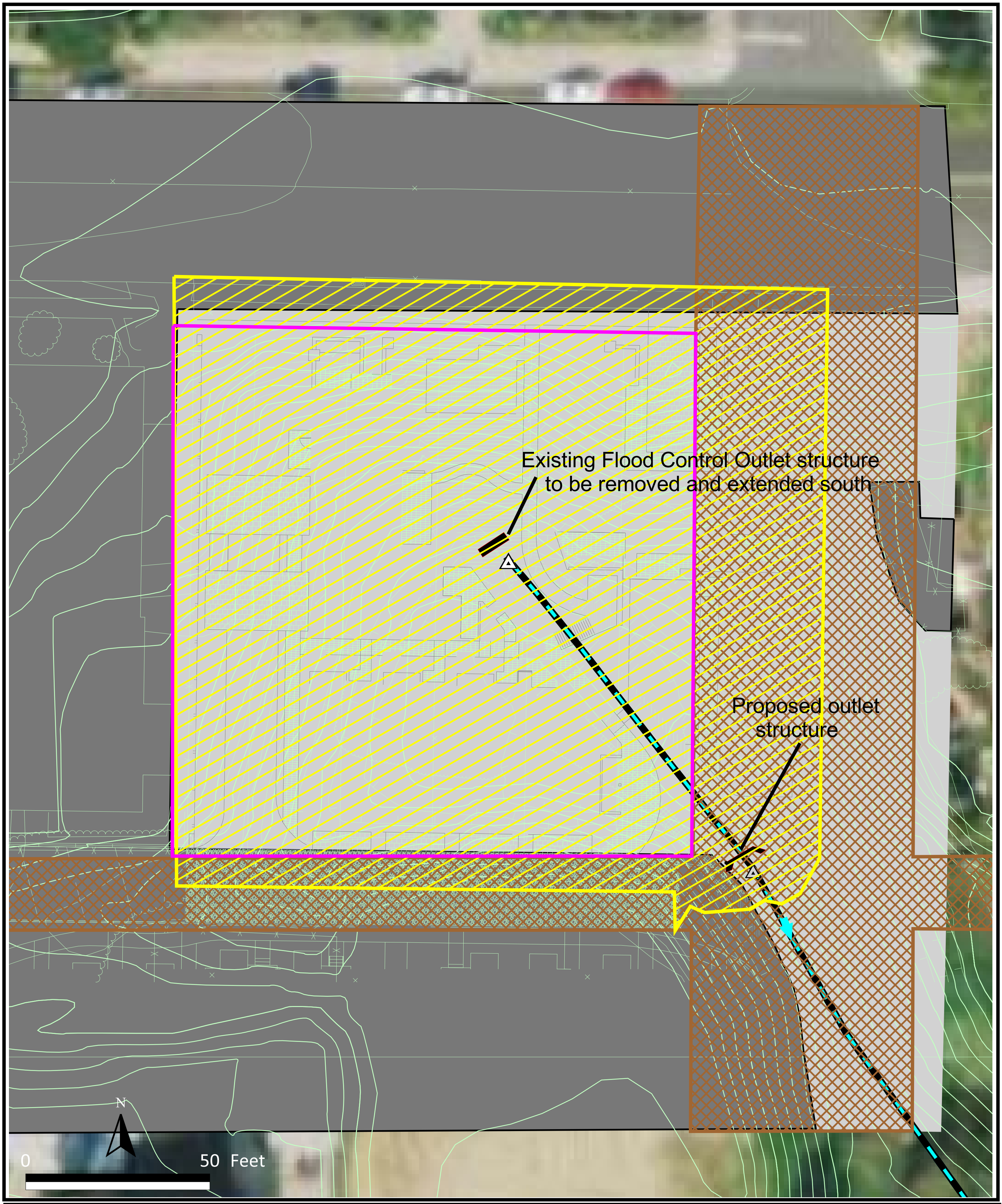


FIGURE 5
Proposed Project
Biological Impact Map

Attachment B – Lists of Plants and Animals Detected During Site Assessment

PLANT SPECIES OBSERVED

Scientific Name	Comon Name	Habitat	Origin
Amsinckia menziesii (Lehm.) Nelson & J.F. Macbr.	Rancher's fireweed	D	N
Anagallis arvensis L.	Scarlet pimpernel	D	I
Arecaceae sp.	Palm tree	D	I
Avenafatua L.	Wild oat	D	I
Brassica nigra (L.) Koch.	Black mustard	D	I
Brassica rapa L.	Field mustard	D	I
Brornus madritensis L. ssp. *rubens* (L.) Husnot	Foxtail chess	D	I
Centaurea melitensis L.	Tocolote, star-thistle	D	I
Datura meteloides	Jimson weed	D	I
Eucalyptus sp.	Eucaluptus	D	I
Foeniculum vulgare Mill.	Fennel	D	I
Malacothamnus fasciculatus	Bush mallow	D	N
Malosma laurina (Nutt.) Abrams	Laurel sumac	D	N
Nicotiana glauca Grah.	Tree tobacco	D	I
Pennisetum setaceum Forsskal	Fountain grass	D	I
Rhus integrifolia (Nutt.) Brewer & Watson	Lemonadeberry	D	N
Rhus ovata Wats.	Sugar bush	D	N
Salix nigra	Black willow	D	N
Salsola tragus L.	Russian thistle, tumbleweed	D	I
Sonchus oleraceus L.	Common sow thistle	D	I

HABITATS

D = Disturbed/Developed

OTHER TERMS

N = Native to locality
I = Introduced species from outside locality

WILDLIFE SPECIES OBSERVED/DETECTED

Common Name	Scientific Name	Occupied Habitat	Evidence Of Occurrence
Birds (Nomenclature from American Ornithologists' Union)			
Mourning dove	*Zenaida macroura marginella*	D	O,V
Western scrub-jay	*Aphelocoma californica*	D	O,V
House finch	*Carpodacus mexicanusfrontalis*	D	V

Habitats

D = Urban/developed/disturbed
F = Flying overhead

Evidence of Occurrence

V = Vocalization
O = Observed

Attachment C – Tables 2-4; Sensitive Species Observed or with the Potential to Occur

TABLE 2
SENSITIVE PLANT SPECIES
OBSERVED (†) OR WITH THE POTENTIAL FOR OCCURRENCE

Species	State/Federal Status	City of San Diego Status	CNPS List/Code	Typical Habitat/Comments
Acanthomintha ilicifolia San Diego thornmint	CE/FT	NE, MSCP	1B/2-3-2	Chaparral, coastal sage scrub, valley and foothill grassland/ clay soils. No appropriate habitat, not expected to occur
Ambrosia pumila San Diego ambrosia	–/–	NE, MSCP	1B/3-2-2	Creekbeds, seasonally dry drainages, floodplains. No suitable habitat. no potential to occur.
Arctostaphylos glandulosa ssp. *crassifolia* Del Mar manzanita	–/FE	MSCP	1B/3-3-2	Southern maritime chaparral. No appropriate habitat, not expected to occur
Artemisia palmeri San Diego sagewort	–/–	–	2/2-2-1	Coastal sage scrub, chaparral, riparian. No appropriate habitat, not expected to occur
Baccharis vanessae Encinitas coyote bush	CE/FT	NE, MSCP	1B/2-3-3	Chaparral. No appropriate habitat, not expected to occur
Brodiaea filifolia Thread-leaved brodiaea	CE/FT	MSCP	1B/3-3-3	Valley and foothill grassland, vernal pools. No appropriate habitat, not expected to occur
Brodiaea orcuttii Orcutt's brodiaea	–/–	MSCP	1B/1-3-2	Closed-cone coniferous forest, meadows, cismontane woodland, valley and foothill grassland, vernal pools. No appropriate habitat, not expected to occur
Chorizanthe polygonoides var. *longispina* Long-spined spineflower	–/–	–	1B/2-2-2	Open chaparral, coastal sage scrub, montane meadows, valley and foothill grasslands; vernal pools/clay. No appropriate habitat, not expected to occur
Dichondra occidentalis Western dichondra	–/–	–	4/1-2-1	Chaparral, cismontane woodland, coastal sage scrub, valley and foothill grassland/generally post-burn. No appropriate habitat, not expected to occur

TABLE 2
SENSITIVE PLANT SPECIES
OBSERVED (†) OR WITH THE POTENTIAL FOR OCCURRENCE
(continued)

Species	State/Federal Status	City of San Diego Status	CNPS List/Code	Typical Habitat/Comments
Ferocactus viridescens Coast barrel cactus	–/–	MSCP	2/1-3-1	Chaparral, coastal sage scrub, valley and foothill grassland. No appropriate habitat, not expected to occur
Harpagonella palmeri var. *palmeri* Palmer's grappling hook	–/–	–	2/1-2-1	Chaparral, coastal sage scrub, valley and foothill grassland. No appropriate habitat, not expected to occur
Juncus acutus ssp. leopoldii Spiny rush	–/–	–	4/1-2-1	Coastal dunes (mesic) meadows (alkaline), coastal salt marsh. No appropriate habitat, not expected to occur
Lessingia filaginifolia var. *filaginifolia* (=*Corethrogyne filaginifolia* var. *incana*) San Diego sand aster	–/–	–	1B/2-2-2	Coastal sage scrub, chaparral. No appropriate habitat, not expected to occur
Muilla clevelandii San Diego goldenstar	–/–	MSCP	1B/2-2-2	Chaparral, coastal sage scrub, valley and foothill grassland, vernal pools. No appropriate habitat, not expected to occur
Quercus dumosa Nuttall's scrub oak	–/–	–	1B/2-3-2	Coastal chaparral. No appropriate habitat, not expected to occur
Tetracoccus dioicus Parry's tetracoccus	–/–	MSCP	1B/3-2-2	Chaparral, coastal sage scrub. No appropriate habitat, not expected to occur

NOTE: See Table 3 for explanation of sensitivity codes.

TABLE 3
SENSITIVITY CODES

FEDERAL CANDIDATES AND LISTED PLANTS

FE = Federally listed, endangered
FT = Federally listed, threatened
FPE = Federally proposed endangered
FPT = Federally proposed threatened

STATE LISTED PLANTS

CE = State listed, endangered
CR = State listed, rare
CT = State listed, threatened

CITY OF SAN DIEGO STATUS

MSCP = City of San Diego Multiple Species Conservation Program
NE = Narrow endemic species in MSCP

CALIFORNIA NATIVE PLANT SOCIETY

LISTS

1A = Species presumed extinct.

1B = Species rare, threatened, or endangered in California and elsewhere. These species are eligible for state listing.

2 = Species rare, threatened, or endangered in California but which are more common elsewhere. These species are eligible for state listing.

3 = Species for which more information is needed. Distribution, endangerment, and/or taxonomic information is needed.

4 = A watch list of species of limited distribution. These species need to be monitored for changes in the status of their populations.

R-E-D CODES

R (Rarity)

1 = Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction is low at this time.

2 = Occurrence confined to several populations or to one extended population.

3 = Occurrence limited to one or a few highly restricted populations, or present in such small numbers that it is seldom reported.

E (Endangerment)

1 = Not endangered
2 = Endangered in a portion of its range
3 = Endangered throughout its range

D (Distribution)

1 = More or less widespread outside California
2 = Rare outside California
3 = Endemic to California

TABLE 4
SENSITIVE WILDLIFE SPECIES KNOWN (OR POTENTIALLY OCCURRING)

Species	Status	Habitat	Occurrence/Comments*
Invertebrates			
Quino checkerspot butterfly *Euphydryas editha quino*	FE, MSCP	Open, dry areas in foothills, mesas, lake margins. Larval host plant *Plantago erecta.*	No suitable habitat or host plant present; No potential to occur on-site.
Harbison's dun skipper *Euphyes vestris harbisoni*	MSCP	Riparian habitats. Larval host plant *Carex spissa*.	No suitable habitat or host plant present; No potential to occur on-site.
Amphibians (Nomenclature from Collins 1997)			
Western spadefoot *Spea hammondii*	CSC, MSCP	Vernal pools, floodplains, and alkali flats within areas of open vegetation.	No suitable habitat present; No potential to occur on-site.
Reptiles (Nomenclature from Collins 1997)			
Southwestern pond turtle *Clemmys marmorata pallida*	CSC, FSS, MSCP	Ponds, small lakes, marshes, sNo-moving, sometimes brackish water.	No suitable habitat present; No potential to occur on-site.
San Diego horned lizard *Phrynosoma coronatum blainvillii*	CSC, MSCP, *	Chaparral, coastal sage scrub with fine, loose soil. Partially dependent on harvester ants for forage.	No suitable habitat present; No potential to occur on-site.
Belding's orangethroat whiptail *Cnemidophorus hyperythrus beldingi*	CSC, MSCP	Chaparral, coastal sage scrub with coarse sandy soils and scattered brush.	No suitable habitat present; No potential to occur on-site.
Silvery legless lizard *Anniella pulchra pulchra*	CSC	Herbaceous layers with loose soil in coastal scrub, chaparral, and open riparian habitats. Prefers dunes and sandy washes near moist soil.	No suitable habitat present; No potential to occur on-site.

TABLE 4
SENSITIVE WILDLIFE SPECIES KNOWN (OR POTENTIALLY OCCURRING)
(continued)

Species	Status	Habitat	Occurrence/Comments[*]
Coast patch-nosed snake *Salvadora hexalepis virgultea*	CSC	Grasslands, chaparral, sagebrush, desert scrub. Found in sandy and rocky areas.	No suitable habitat present; No potential to occur on-site.
Red diamond rattlesnake *Crotalus exsul (= C. ruber ruber)*	CSC	Desert scrub and riparian habitats, coastal sage scrub, open chaparral, grassland, and agricultural fields.	No suitable habitat present; No potential to occur on-site.
<u>Birds</u> (Nomenclature from American Ornithologists' Union)			
Great blue heron (rookery site) *Ardea herodias*	*	Bays, lagoons, ponds, lakes. Non-breeding year-round visitor, some localized breeding.	No suitable habitat present; No potential to occur on-site.
Great egret (rookery site) *Ardea alba*	*	Lagoons, bays, estuaries. Ponds and lakes in the coastal Noland. Winter visitor, uncommon in summer.	No suitable habitat present; No potential to occur on-site.
White-tailed kite (nesting) *Elanus leucurus*	CFP, *	Nest in riparian woodland, oaks, sycamores. Forage in open, grassy areas. Year-round resident.	No potential to nest on-site.
Northern harrier (nesting) *Circus cyaneus*	CSC, MSCP	Coastal Noland, marshes, grassland, agricultural fields. Migrant and winter resident, rare summer resident.	No potential to nest on-site.
Sharp-shinned hawk (nesting) *Accipiter striatus*	CSC	Open deciduous woodlands, forests, edges, parks, residential areas. Migrant and winter visitor.	No potential to nest on-site.

TABLE 4
SENSITIVE WILDLIFE SPECIES KNOWN (OR POTENTIALLY OCCURRING)
(continued)

Species	Status	Habitat	Occurrence/Comments*
Cooper's hawk (nesting) *Accipiter cooperii*	CSC, MSCP,HMP	Mature forest, open woodlands, wood edges, river groves. Parks and residential areas. Migrant and winter visitor.	No suitable habitat present; No potential to nest on-site.
Ferruginous hawk (wintering) *Buteo regalis*	CSC	Require large foraging areas. Grasslands, agricultural fields. Uncommon winter resident.	No suitable habitat present; No potential to nest on-site.
Golden eagle (nesting and wintering) *Aquila chrysaetos*	CSC, CFP, BEPA, MSCP	Require vast foraging areas in grassland, broken chaparral, or sage scrub. Nest in cliffs and boulders. Uncommon resident.	No suitable habitat present; No potential to nest on-site.
Merlin *Falco columbarius*	CSC	Rare winter visitor. Grasslands, agricultural fields, occasionally mud flats.	No suitable habitat present; No potential to nest on-site.
Prairie falcon (nesting) *Falco mexicanus*	CSC	Grassland, agricultural fields, desert scrub. Uncommon winter resident. Rare breeding resident. Breeds on cliffs.	No suitable habitat present; No potential to nest on-site.
Western yelNo-billed cuckoo (breeding) *Coccyzus americanus occidentalis*	SE	Large riparian woodlands. Summer resident. Very localized breeding.	Only a few recent sightings in county; not expected to occur. No suitable habitat present.
Western burrowing owl (burrow sites) *Speotyto cunicularia hypugaea*	CSC, MSCP,HMP	Grassland, agricultural land, coastal dunes. Require rodent burrows. Declining resident.	No suitable habitat present; No potential to nest on-site.

TABLE 4
SENSITIVE WILDLIFE SPECIES KNOWN (OR POTENTIALLY OCCURRING)
(continued)

Species	Status	Habitat	Occurrence/Comments*
Southwestern wilNo flycatcher *Empidonax traillii extimus*	SE, FE, FSS, MSCP	Nesting restricted to wilNo thickets. Also occupies other woodlands. Rare spring and fall migrant, rare summer resident. Extremely localized breeding.	No suitable habitat present; No potential to nest on-site.
California horned lark *Eremophila alpestris actia*	CSC	Sandy shores, mesas, disturbed areas, grasslands, agricultural lands, sparse creosote bush scrub.	No suitable habitat present; No potential to nest on-site.
Coastal cactus wren *Campylorhynchus brunneicapillus couesi*	CSC, MSCP, *	Maritime succulent scrub, coastal sage scrub with *Opuntia* thickets. Rare localized resident.	No suitable habitat present; No potential to nest on-site.
Coastal California gnatcatcher *Polioptila californica californica*	FT, CSC, MSCP	Coastal sage scrub, maritime succulent scrub. Resident.	No suitable habitat present; No potential to nest on-site.
Loggerhead shrike *Lanius ludovicianus*	CSC	Open foraging areas near scattered bushes and No trees.	No suitable habitat present.
Least Bell's vireo (nesting) *Vireo bellii pusillus*	SE, FE, MSCP	WilNo riparian woodlands. Summer resident.	No suitable habitat present.
YelNo warbler (nesting) *Dendroica petechia brewsteri*	CSC	Breeding restricted to riparian woodland. Spring and fall migrant, localized summer resident, rare winter visitor.	No suitable habitat present.
YelNo-breasted chat (nesting) *Icteria virens*	CSC, MSCP	Dense riparian woodland. Localized summer resident.	No suitable habitat present.
Southern California rufous-crowned sparrow *Aimophila ruficeps canescens*	CSC, MSCP	Coastal sage scrub, grassland. Resident.	No suitable habitat present.

TABLE 4
SENSITIVE WILDLIFE SPECIES KNOWN (OR POTENTIALLY OCCURRING)
(continued)

Species	Status	Habitat	Occurrence/Comments*
Bell's sage sparrow *Amphispiza belli belli*	CSC, MSCP	Chaparral, coastal sage scrub. Localized resident.	No suitable habitat present.
Tricolored blackbird *Agelaius tricolor*	CSC, MSCP	Freshwater marshes, agricultural areas, lakeshores, parks. Localized resident.	No suitable habitat present; No to marginal potential to nest on-site.
Blue grosbeak (nesting) *Guiraca caerulea*	*	Riparian woodland edges, mule fat thickets. Summer resident, spring and fall migrant, winter visitor.	No suitable habitat present.
Mammals (Nomenclature from Jones et al. 1982)			
Pale big-eared bat *Corynorhinus townsendii pallescens*	CSC	Caves, mines, buildings. Found in a variety of habitats, arid and mesic.	Individual or colonial. Extremely sensitive to disturbance; marginal roosting habitat present; not expected to occur.
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*	CSC, MSCP	Caves, mines, buildings. Found in a variety of habitats, arid and mesic.	Individual or colonial. Extremely sensitive to disturbance; marginal roosting habitat present; not expected to occur.
Western mastiff bat *Eumops perotis californicus*	CSC, MSCP	Woodlands, rocky habitat, arid and semiarid Nolands, cliffs, crevices, buildings, tree holNos.	Marginal roosting habitat present; No potential to occur on-site.
San Diego black-tailed jackrabbit *Lepus californicus bennettii*	CSC, MSCP	Open areas of scrub, grasslands, agricultural fields.	No suitable habitat present.
Pacific little pocket mouse *Perognathus longimembris pacificus*	FE, CSC, MSCP	Open coastal sage scrub; fine, alluvial sands near ocean.	No suitable soils; not expected to occur.

TABLE 4
SENSITIVE WILDLIFE SPECIES KNOWN (OR POTENTIALLY OCCURRING)
(continued)

Species	Status	Habitat	Occurrence/Comments*
Northwestern San Diego pocket mouse *Chaetodipus fallax fallax*	CSC, MSCP	San Diego County west of mountains in sparse, disturbed coastal sage scrub or grasslands with sandy soils.	No suitable habitat present.
San Diego desert woodrat *Neotoma lepida intermedia*	CSC	Coastal sage scrub and chaparral.	No suitable habitat present.

Status Codes

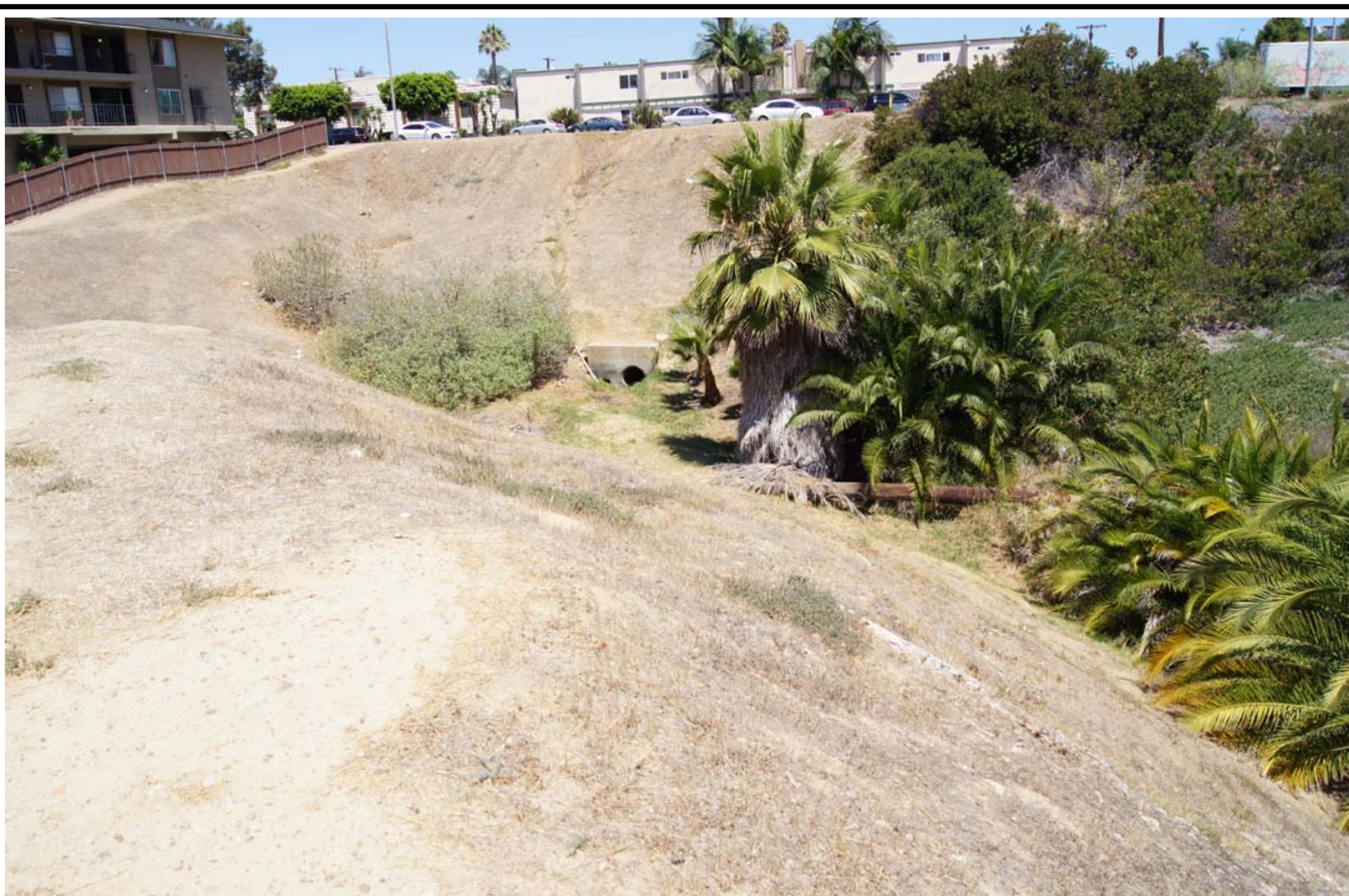
Listed/Proposed
FE = Listed as endangered by the federal government
FT = Listed as threatened by the federal government
SE = Listed as endangered by the state of California

Other
BEPA = Bald and Golden Eagle Protection Act
CFP = California fully protected species
CSC = California Department of Fish and Game species of special concern
FC = Federal candidate for listing (taxa for which the U.S. Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support proposals to list as endangered or threatened; development and publication of proposed rules for these taxa are anticipated)
FSS = Federal (Bureau of Land Management and U.S. Forest Service) sensitive species
MSCP = Multiple Speciea Conservation Program target species list
* = Taxa listed with an asterisk fall into one or more of the folNoing categories:

- Taxa considered endangered or rare under Section 15380(d) of CEQA guidelines
- Taxa that are biologically rare, very restricted in distribution, or declining throughout their range
- Population(s) in California that may be peripheral to the major portion of a taxon's range, but which are threatened with extirpation within California
- Taxa closely associated with a habitat that is declining in California at an alarming rate (e.g., wetlands, riparian, old growth forests, desert aquatic systems, native grasslands)

Attachment D – Site Photographs (4)

Photograph 1 Looking north at the Stormwater Outlet and manufactured slope off of B Street (July, 2013)



Photograph 2 Looking north over the Project Site - Manufactured Slopes and the Stormwater Outlet (July, 2013)

Photograph 3 Looking north at the Stormwater Outlet and manufactured slope off of B Street - at top of slope (Aug, 2015)

Photograph 4 Looking south (from B Street) - Manufactured Slopes and the Stormwater Outlet - below silt fence (Aug. 2015)

Attachment E – References

References Cited

American Ornithologists' Union

1998 *Check-list of North American Birds.* 7th ed. Washington, D.C.

Beier, P., and S. Loe

1992 A Checklist for Evaluating Impacts to Wildlife Movement Corridors. Wildlife Society Bulletin 20:434-440.

California, State of

2013a Special Plants List. Natural Diversity Data Base. Department of Fish and Game. January.

2013b State and Federally Listed Endangered and Threatened Animals of California. The Resources Agency, Department of Fish and Game. January.

2013c Special Animals. Natural Diversity Data Base. Department of Fish and Game. June.

2013 Natural Diversity Data Base. Nongame-Heritage Program, Department of Fish and Game, Sacramento.

Collins, J. T.

1997 Standard Common and Current Scientific Names for North American Amphibians and Reptiles. 4th ed. Herpetological Circular No. 25. Society for the Study of Amphibians and Reptiles, Department of Zoology, Miami University, Oxford, Ohio.

Faber, P. M., E. Keller, A. Sands, and B. M. Massey

1989 The Ecology of Riparian Habitats of the Southern California Coastal Region: A Community Profile. United States Department of Interior, Fish and Wildlife Service Biological Report 85(7.27).

Garrett, Kimball, and Jon Dunn

1981 *Birds of Southern California.* Artisan Press, Los Angeles.

Hall, E. R.

1981 *The Mammals of North America.* 2nd ed. 2 vols. John Wiley & Sons, New York.

Hickman, J. C. (editor)

1993 *The Jepson Manual: Higher Plants of California.* University of California Press, Berkeley and Los Angeles.

Holland, R. F.

2005 Preliminary Descriptions of the Terrestrial Natural Communities of California. Nongame-Heritage Program, California Department of Fish and Game. October.

Jones, J. K., D. C. Carter, H. H. Genoways, R. S. Hoffman, and D. W. Rice
1982 Revised Checklist of North American Mammals North of Mexico. *Occasional Papers of the Museum, Texas Tech University* 80:1-22

Reiser, C. H.
1994 Rare Plants of San Diego County. Aquafir Press, Imperial Beach, California.

San Diego, City
1997 The Multiple Species Conservation Program (MSCP). March.

San Diego, City
2012 Land Development Code; Biology Guidelines. June

San Diego, City
2004 Draft, Significance Determination Thresholds CEQA. November.

Skinner, M., and B. Pavlik
1994 *Inventory of Rare and Endangered Plants of California.* California Native Plant Society Special Publication No. 1, 5th ed. Sacramento.

U. S. Department of Agriculture
1973 *Soil Survey, San Diego Area, California.* Soil Conservation Service and Forest Service. Roy H. Bowman, ed. San Diego. December.

Unitt, P. A.
1984 *Birds of San Diego County.* Memoir No. 13. San Diego Society of Natural History.

November 12, 2013
Matthew Gordon
C/O J. David Hawkins
Hawkins + Hawkins Architects, Inc.
141 14th Street
San Diego, CA 92106

Subject: Preliminary Wetland Delineation Letter Report, Golden Hill Rowhomes;
City of San Diego Project # 341728

Mr. Hawkins:
This letter report documents the results of the completed preliminary Army Corps of Engineers (USACE) protocol wetland delineation. The field survey and this letter report have been prepared by BLUE Consulting Group (BLUE) senior biologist Michael Jefferson, a certified delineator. No state, federal jurisdictional or City Environmentally Sensitive Lands (ESL) waters or habitat(s) were observed during the August 9th, 2013 onsite wetland delineation.

Introduction.
The project survey area is comprised of undeveloped area in the City of San Diego, south-east of Balboa Park in Golden Hill. The project area is bounded by C Street to the south and the northern property line is located at the south end of the 29th Street terminus where it intersects B Street (Figures 1-2). In order to determine the status of potential jurisdictional waters and/or wetlands onsite, a wetland delineation was conducted.

Methodology.
All areas within the proposed project area (Figure 3) were delineated. These areas were field delineated on August 9th, 2013 by the undersigned.

Potential features identified were investigated to determine whether they met the criteria of a potentially jurisdictional feature or a City of San Diego Environmentally Sensitive Land (ESL). All features meeting the USACE and ESL guidance criteria were delineated. The delineation was conducted during the summer (August). The region received no significant rainfall within the last week before the delineations were conducted. Rainfall patterns were not atypical for that time frame of the surveys.

Delineated boundaries of all features identified within the study area were recorded using a 1"=100' aerial photograph.

BLUE's methods for delineating federal wetlands follow the guidelines set forth by the USACE in the *Arid West Manual* (USACE 2008b). The routine onsite determination method can be used to gather field data at potential wetland areas for most projects. Visual observations of vegetation types and hydrology are used to locate areas for evaluation. Then, at each evaluation area, several parameters are considered to determine whether the sample point is within a wetland.

All features identified during the field visit were recorded through routine-level wetland delineation.

Summary of Wetland Regulations.

Wetlands may be regulated by several different agencies or jurisdictions with several different definitions of wetlands. As a result, a particular wetland may have more than one jurisdictional boundary. Federally defined wetlands fall under the jurisdiction of the U.S. Army Corps of Engineers (ACOE), and the Regional Water Quality Control Board (RWQCB) pursuant to Sections 404 and 401 of the Clean Water Act (CWA), respectively. State-defined wetlands fall under the jurisdiction of the California Department of Fish and Wildlife (CDFW) pursuant to Section 1600 of the California Fish and Game Code. Within the City of San Diego, wetlands are defined using guidance and information provided in the City of San Diego's MSCP subarea plan as well as the City's Biology Guidelines - Environmentally Sensitive Lands (ESL) regulations (2012).

Delineation of Potential Wetland Waters of the U.S.

BLUE methods for the delineation of wetland and non-wetland WoUS was based on indicators for OHWM, following established criteria outlined in the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008a), and *A Field Guide to the Identification of the OHWM in the Arid West Region of the Western United States* (USACE 2008b).

All jurisdictional features within the study area were determined by the presence of OHWM indicators. This field guide presents a method for delineating the lateral extent of the WoUS in the Arid West using stream geomorphology and vegetation response to the dominant stream discharge. BLUE biologists used this guidance in the field to determine the OHWM for all potentially jurisdictional nonwetland waters.

The field guide describes physical evidence that should be used to ascertain the lateral limits of jurisdiction; generally more than one physical indicator or other means for determining the OHWM is used. The following physical indicators of OHWM were used in the field:

- Natural line impressed on the bank
- Shelving
- Destruction of terrestrial vegetation
- Presence of litter and debris
- Wracking
- Vegetation matted down, bent, or absent
- Sediment sorting

- Leaf litter disturbed or washed away
- Scour
- Deposition
- Bed and banks
- Water staining
- Change in plant community.

Evaluation of SWRCB/RWQCB jurisdiction followed guidance from Section 401 of the CWA and follows the same jurisdictional areas as USACE, unless an isolated water is determined to be present. Isolated water features are not considered jurisdictional under USACE, but are still delineated using the OHWM or wetted area. Isolated water bodies are considered SWRCB/RWQCB jurisdictional under the Porter-Cologne Act.

U.S. Army Corps of Engineers Regulated Activities

USACE-regulated activities under Section 404 of the Clean Water Act (CWA) involve a discharge of dredged or fill material into WoUS. A discharge of fill material includes, but is not limited to, grading, placing riprap for erosion control, pouring concrete, laying sod, and stockpiling excavated material into WoUS. Activities that generally do not involve a regulated discharge (if performed specifically in a manner to avoid discharges) include driving pilings, performing some drainage channel maintenance activities, constructing temporary mining and farm/forest roads, and excavating without stockpiling.

Waters of the U.S.

WoUS, as defined in the Code of Federal Regulations (CFR) title 33, section 328.3, include all waters or tributaries to waters, such as lakes, rivers, intermittent and perennial streams, mudflats, sand flats, natural ponds, wetlands, wet meadows, and other aquatic habitats.

Frequently, a WoUS (with at least intermittently flowing water or tidal influences) is demarcated by the ordinary high-water mark (OHWM), defined in CFR 328.3(e) as: *that line on the shore established by the fluctuations of water and indicated by physical characteristics such as [a] clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*

Where an OHWM is present, waters may be defined as WoUS when connectivity is determined to be present.

Wetlands

According to the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (Federal Interagency Committee for Wetland Delineation 1989), three criteria must be satisfied to classify an area as a jurisdictional wetland: (1) a predominance of plant life that is adapted to life in wet conditions (hydrophytic vegetation); (2) soils that saturate, flood, or pond long enough during the growing season to develop anaerobic conditions in the upper part (hydric soils); and (3) permanent or periodic inundation or soils saturation, at least seasonally (wetland hydrology) (Environmental Laboratory 1987).

USACE will continue to assert jurisdiction over:

1. traditional navigable waters (TNWs) and their adjacent wetlands;

2. non navigable tributaries of TNWs that are relatively permanent (e.g., tributaries that typically flow year-round or have a continuous flow at least seasonally) and wetlands that directly abut such tributaries (e.g., not separated by uplands, berm, dike, or similar feature) (note: relatively permanent waters [RPWs] do not include ephemeral tributaries, which flow only in response to precipitation, and intermittent streams, which do not typically flow year-round or have continuous flow at least seasonally [e.g., typically three months]); and
3. non-RPWs if determined (in a fact-specific analysis) to have a significant nexus with a TNW, including non navigable tributaries that do not typically flow year-round or have continuous flow at least seasonally, wetlands adjacent to such tributaries, and wetlands adjacent to but not directly abutting a relatively permanent non navigable tributary. Absent a significant nexus, jurisdiction is lacking.

Preliminary Jurisdictional Determination

Under RGL 08-02, dated June 26, 2008, USACE established an alternative to the approved JD process: the "preliminary JD." A preliminary JD is a non-binding written indication that there maybe WoUS, including wetlands, on a project site and identifies the approximate location of these features. Preliminary JDs are used when a landowner, permit applicant, or other affected party elects to voluntarily waive or set aside questions regarding CWA jurisdiction over a particular site, usually in the interest of allowing the landowner to move ahead expeditiously to obtain 404 authorization where the party determines that it is in his or her best interest to do so. A preliminary JD is not an official determination regarding the jurisdictional status of potentially jurisdictional features and has no bearing on approved JDs. A preliminary JD cannot be used to confirm the absence of jurisdictional waters or wetlands, is advisory in nature, and cannot be appealed. It is considered "preliminary" because a recipient can later request an approved JD if one is necessary or appropriate.

Finally, although a preliminary JD may be chosen by the applicant, the district engineer reserves the right to use an approved JD where warranted. A preliminary JD is documented using the preliminary JD form, provided as Attachment 1 to RGP 08-02. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD treats all waters and wetlands that would be affected in any way except by the permitted activity as if they are jurisdictional. This report presents a preliminary jurisdictional determination.

2011 Draft Clean Water Act Guidance

On April 27, 2011, USACE and EPA issued draft guidance for determining jurisdiction under the CWA. The guidance supersedes the previous guidance from 2003 regarding *SWANCC* (68 Federal Register 1991–1995) and the 2007 *Rapanos* guidance. This document reiterated the guidance issued under the *Rapanos* decision, asserting that the following waters are protected by the CWA:

- Traditional navigable waters
- Interstate waters
- Wetlands adjacent to either traditional navigable waters or interstate waters
- Non-navigable tributaries to traditional navigable waters that are relatively permanent (meaning they contain water at least seasonally)
- Wetlands that directly abut relatively permanent waters

The guidance further clarifies the criteria for defining TNWs consistent with previous guidance. In addition, a significant nexus evaluation is required for the “other waters” category of the regulations (see item 3 in Section 2.1.1, above). The guidance divides these waters into two categories (i.e., those that are physically proximate to other jurisdictional waters and those that are not) and discusses how each category should be evaluated.

State Water Resources Control Board Regulated Activities/Regional Water Quality Control Board

In California, the SWRCB and nine Regional Water Quality Control Boards (RWQCB) regulate activities within state and federal waters under Section 401 of the CWA and the state Porter-Cologne Act. The SWRCB is responsible for setting statewide policy, coordinating and supporting the RWQCB efforts, and reviewing petitions that contest RWQCB actions. Each semi-autonomous RWQCB sets water quality standards, issues 401 certifications and waste discharge requirements, and take enforcement action for projects occurring within their boundary. However, when a project crosses multiple RWQCB jurisdictional boundaries, the SWRCB becomes the regulating agency for both of these acts and issues project permits.

Section 401 of the Clean Water Act

Section 401 of the CWA requires that any applicant for a federal permit for activities that involve a discharge to waters of the United States shall provide the federal permitting agency a certification from the state in which the discharge is proposed that states that the discharge will comply with the applicable provisions under the federal Clean Water Act.

Therefore, in California, before USACE will issue a Section 404 permit, applicants must apply for and receive a Section 401 water quality certification or waiver from the RWQCB or SWRCB, as applicable. Under Section 401 of the CWA, the SWRCB/RWQCB regulates at the state level all activities that are regulated at the federal level by USACE. Therefore, SWRCB/RWQCB jurisdiction usually matches the jurisdictional boundaries for WoUS (mapped at the OHWM).

However, if waters are determined not to be WoUS, they may still be subject to SWRCB/RWQCB jurisdiction based on the Porter-Cologne Act.

Porter-Cologne Act

The RWQCB regulates activities that would involve “discharging waste, or proposing to discharge waste, within any region that could affect waters of the state” (California Water Code 13260[a]),pursuant to provisions of the state Porter-Cologne Act. Waters of the State (WoS) are defined as “any surface water or groundwater, including saline waters, within the boundaries of the state”(California Water Code 13050 [e]). Such waters may include waters not subject to regulation under Section 404 (i.e., isolated features).

California Department of Fish and Game Regulated Activities

Under recently revised California Fish and Wildlife Code, Sections 1600–1616, CDFW has the authority to regulate work that will substantially divert or obstruct the natural flow—or substantially change or use any material from the bed, channel, or bank—of any river, stream, or lake. CDFW also has the authority to regulate work that will deposit or dispose of debris, wastewater, or other material containing crumbled, flaked, or ground pavement that may pass into any river, stream, or lake. This regulation takes the form of a requirement for a Lake or Streambed Alteration Agreement and is applicable to all work involving state or local government discretionary approvals.

Section 1602 of the California Fish and Game Code

The California Fish and Game Code mandates that it is unlawful for any person to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambeds, without first notifying the department of such activity. CDFW jurisdiction includes ephemeral, intermittent, and perennial watercourses (including dry washes) and lakes characterized by the presence of (1) definable bed and banks and/or (2) existing fish or wildlife resources. Furthermore, CDFW jurisdiction is often extended to habitats adjacent to watercourses, such as oak woodlands in canyon bottoms or willow woodlands that function hydrologically as part of the riparian system. Historical court cases have further extended CDFW jurisdiction to include watercourses that seemingly disappear but re-emerge elsewhere. Under the CDFW definition, a watercourse need not exhibit evidence of an OHWM to be claimed as jurisdictional.

Results.

While the area appears to be a natural canyon, there is no natural flow onto the site and the area does not support a USGS ‘blue-line’ stream or drainage. Onsite, at the base of the manufactured slope coming off of B Street, the stormwater flows outlet from a double pipe through a concrete headwall. There is no rip-rap or flow control after the headwall outlet. In a number of areas downstream of the headwall, this has allowed for erosion and a cut bank. Otherwise the seasonal stormwater flows through a grassy swail/depression. The surrounding upland area (dominated by upland landscaping grass species, palms and non-native shrubs) is mowed and the swail is vegetated by upland landscaping grass (sp.). Downstream and outside of the survey area, immediately north of C Street, the drainage inlet (where the storm water flows re-enters the City stormwater pipe system) appears to be clogged by plant material and debris. This lack of maintenance appears to have created a dam effect where the storm water flows cannot drain offsite as designed. This has created an artificial hydrological regime in which hydrophytic species (willows sp.) now persist.

The field survey revealed that there are no hydric soils and no hydrophytic species within the soft bottom stormwater swail. The observed seasonal stormwater course was created by flows coming out of the stormwater pipe. No jurisdictional USACE, CDFW or City of San Diego ESL waters or wetlands were observed onsite. The observed unvegetated soft bottom flood control/stormwater channel does not qualify as City of San Diego ESL wetlands as defined in the *City of San Diego Land Development Manual – Biological Guidelines* (June, 2012) because this is an artificially created environment in a historically non-wetland area.

Conclusion.

Potential impacts to the observed non-jurisdictional and non-ESL unvegetated soft bottom flood control/stormwater channel would not represent a significant impact and no additional permitting or specific mitigation would be recommended at this time.

Certification

I, Michael Jefferson, hereby certify that I have written this report, that the statements furnished herein and in the attached exhibits present the data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

Sincerely,

Michael Jefferson
Senior Biologist
BLUE Consulting Group

P.O. BOX 501115 SAN DIEGO, CA 92150 ☎858.391.8145 MIKE@BLUECONSULTING.COM

ATTACHMENTS 1-5

P.O. Box 501115 San Diego, CA 92150 ☎858.391.8145 Mike@blueconsulting.com

References Cited

American Ornithologists' Union

1998 *Check-list of North American Birds.* 7th ed. Washington, D.C.

Beier, P., and S. Loe

1992 A Checklist for Evaluating Impacts to Wildlife Movement Corridors. Wildlife Society Bulletin 20:434-440.

California, State of

2013a Special Plants List. Natural Diversity Data Base. Department of Fish and Game. January.

2013b State and Federally Listed Endangered and Threatened Animals of California. The Resources Agency, Department of Fish and Game. January.

2013c Special Animals. Natural Diversity Data Base. Department of Fish and Game. June.

2013 Natural Diversity Data Base. Nongame-Heritage Program, Department of Fish and Game, Sacramento.

Collins, J. T.

1997 Standard Common and Current Scientific Names for North American Amphibians and Reptiles. 4th ed. Herpetological Circular No. 25. Society for the Study of Amphibians and Reptiles, Department of Zoology, Miami University, Oxford, Ohio.

Faber, P. M., E. Keller, A. Sands, and B. M. Massey

1989 The Ecology of Riparian Habitats of the Southern California Coastal Region: A Community Profile. United States Department of Interior, Fish and Wildlife Service Biological Report 85(7.27).

Garrett, Kimball, and Jon Dunn

1981 *Birds of Southern California.* Artisan Press, Los Angeles.

Hall, E. R.

1981 *The Mammals of North America.* 2nd ed. 2 vols. John Wiley & Sons, New York.

Hickman, J. C. (editor)

1993 *The Jepson Manual: Higher Plants of California.* University of California Press, Berkeley and Los Angeles.

Holland, R. F.
1986 Preliminary Descriptions of the Terrestrial Natural Communities of California. Nongame-Heritage Program, California Department of Fish and Game. October.

Jones, J. K., D. C. Carter, H. H. Genoways, R. S. Hoffman, and D. W. Rice
1982 Revised Checklist of North American Mammals North of Mexico. *Occasional Papers of the Museum, Texas Tech University* 80:1-22

Reiser, C. H.
1994 Rare Plants of San Diego County. Aquafir Press, Imperial Beach, California.

San Diego, City
1997 The Multiple Species Conservation Program (MSCP). March.

San Diego, City
2012 Land Development Code; Biology Guidelines. June

San Diego, City
2004 Draft, Significance Determination Thresholds CEQA. November.

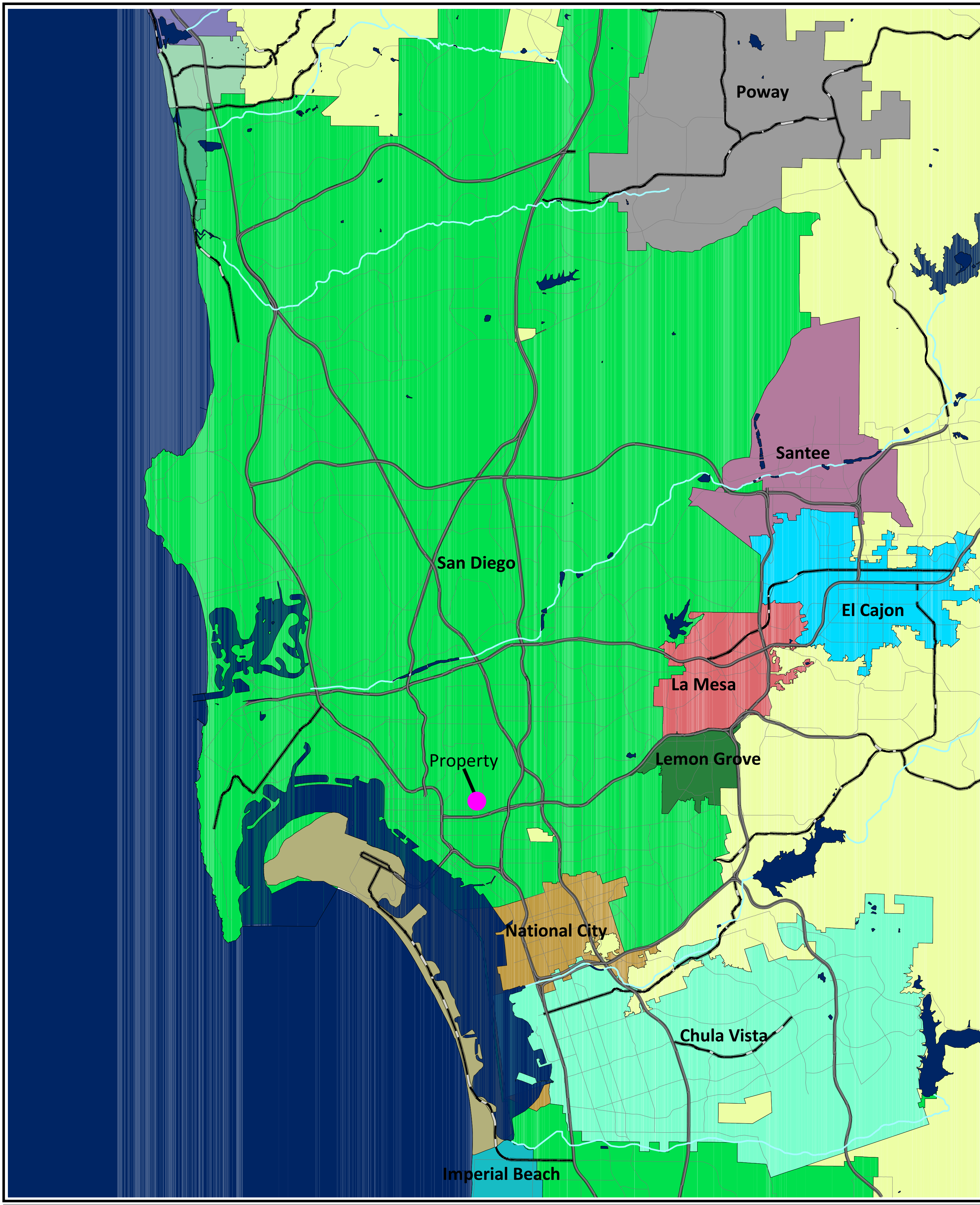
Skinner, M., and B. Pavlik
1994 *Inventory of Rare and Endangered Plants of California.* California Native Plant Society Special Publication No. 1, 5th ed. Sacramento.

U. S. Department of Agriculture
1973 *Soil Survey, San Diego Area, California.* Soil Conservation Service and Forest Service. Roy H. Bowman, ed. San Diego. December.

U.S. Army Corps of Engineers (USACE)
1987 Corps of Engineers Wetlands Delineation Manual. Wetlands Research Program, Technical Report Y-87-1. Department of the Army, Washington, D.C.

Unitt, P. A.
1984 *Birds of San Diego County.* Memoir No. 13. San Diego Society of Natural History.

Attachment 1



Property

FIGURE 1
Regional Project
Location

Attachment 2

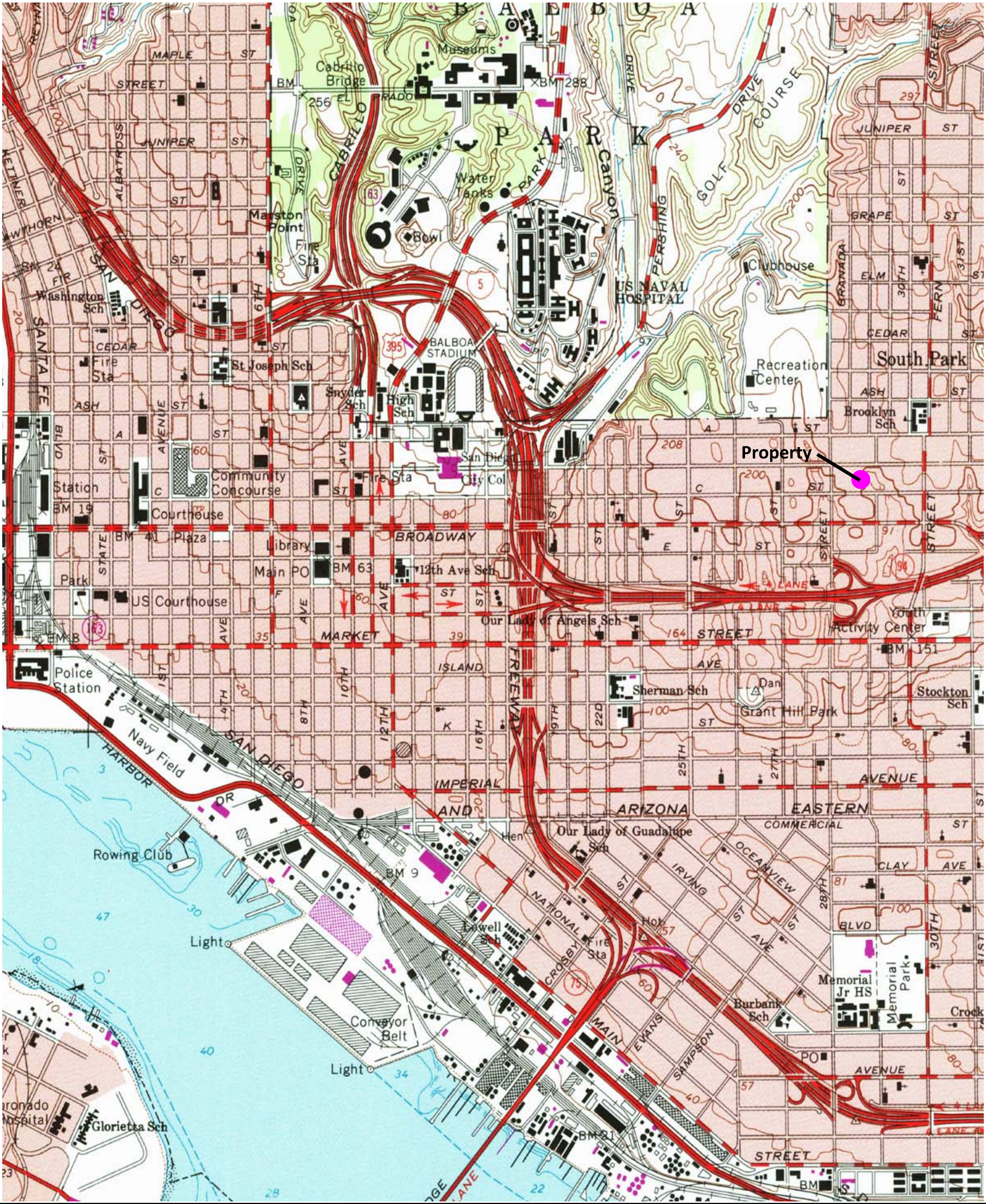


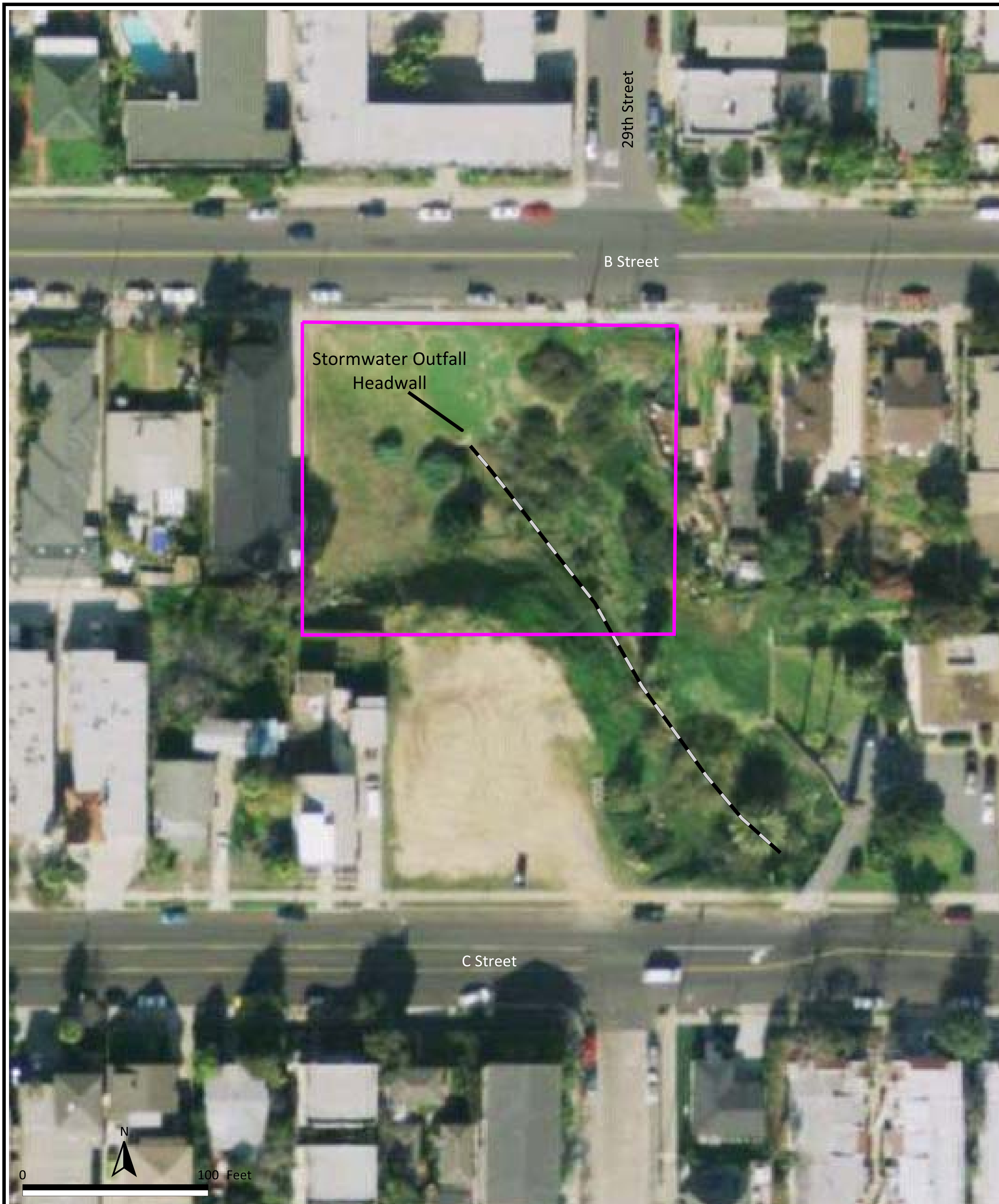
FIGURE 2

Project Location

USGS Topo Map

● Property

Attachment 3



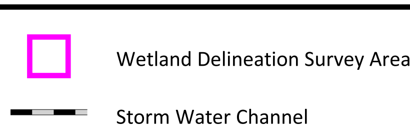


FIGURE 3
Aerial
29th and B Street

Attachment 4

Photograph 1 Looking north at the Stormwater Outlet off of B Street

Photograph 2 Looking north over the survey area and the Stormwater Outlet

Attachment 5

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Golden Hill Rowhomes | City/County: SD/San Diego | Sampling Date: 09 Aug 2013

Applicant/Owner: Jango, LLC | State: CA | Sampling Point: 1

Investigator(s): MKJ | Section, Township, Range: _____

Landform (hillslope, terrace, etc.): natural canyon with graded storm drain system | Local relief (concave, convex, none): concave | Slope (%): 5

Subregion (LRR): Arid West | Lat: 32 43.005N | Long: 117 07.886W | Datum: _____

Soil Map Unit Name: _____ | NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☒, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** **Yes** ☐ **No** ☒
Hydric Soil Present?	Yes ☐ No ☒	
Wetland Hydrology Present?	Yes ☐ No ☒	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	____	____
2. _____	_____	____	____
3. _____	_____	____	____
4. _____	_____	____	____
50% = _____, 20% = _____	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:_____)			
1. _____	_____	____	____
2. _____	_____	____	____
3. _____	_____	____	____
4. _____	_____	____	____
5. _____	_____	____	____
50% = _____, 20% = _____	0	= Total Cover	
Herb Stratum (Plot size:_____)			
1. *landscaping grass*	50	yes	UPL
2. _____	_____	____	____
3. _____	_____	____	____
4. _____	_____	____	____
5. _____	_____	____	____
6. _____	_____	____	____
7. _____	_____	____	____
8. _____	_____	____	____
50% = _____, 20% = _____	50	= Total Cover	
Woody Vine Stratum (Plot size:_____)			
1. _____	_____	____	____
2. _____	_____	____	____
50% = _____, 20% = _____	0	= Total Cover	
% Bare Ground in Herb Stratum 50	% Cover of Biotic Crust 0		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0	(A/B)

Prevalence Index worksheet:

	Total % Cover of :	Multiply by:	
OBL species	_____	x1 =	_____
FACW species	_____	x2 =	_____
FAC species	____	x3 =	____
FACU species	_____	x4 =	_____
UPL species	50	x5 =	250
Column Totals:	50 (A)		250 (B)

Prevalence Index = B/A = 5.0

Hydrophytic Vegetation Indicators:

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ☐ **No** ☒

Remarks: Graded open storm water channel at bottom of manufactured slope and headwall - area is maintained and dry. Even at the outlet pipe where there is a depression where water would be expected to typically pond. Street runoff erosion and fines observed around outlet

Project Site: Golden Hill Rowhomes

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (Moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5 v3c4						fine	Sand like
3-15	7.5 v5c4						medium fine	Sand/cobble

[1]Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (**LRR C**)
- ☐ 1 cm Muck (A9) (**LRR D**)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR C)**
- ☐ 2 cm Muck (A10) **(LRR B)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (Inches): _____

Hydric Soils Present? **Yes** ☐ **No** ☒

Remarks: soil appears to be very slightly moist, lots of root material - no redux. Lots of trash material in substrate; looks to be street debirs etc.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1) **(Nonriverine)**
- ☐ Sediment Deposits (B2) **(Nonriverine)**
- ☐ Drift Deposits (B3) **(Nonriverine)**
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) **(Riverine)**
- ☐ Sediment Deposits (B2) **(Riverine)**
- ☐ Drift Deposits (B3) **(Riverine)**
- ☒ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	☐	No	☒	Depth (inches): _____
Water Table Present?	Yes	☐	No	☒	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes	☐	No	☒	Depth (inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: NA

Remarks: No field indications

GEOTECHNICAL UPDATE
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

HETHERINGTON ENGINEERING, INC.

HETHERINGTON ENGINEERING, INC.
SOIL & FOUNDATION ENGINEERING • ENGINEERING GEOLOGY • HYDROGEOLOGY

April 24, 2015
Project 7603.1
Log No. 17400

Janco, LLC
P.O. Box 231446
Encinitas, California 92033

Attention: Mr. Matthew Gordon

Subject: GEOTECHNICAL UPDATE
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

References: Attached

Dear Mr. Gordon:

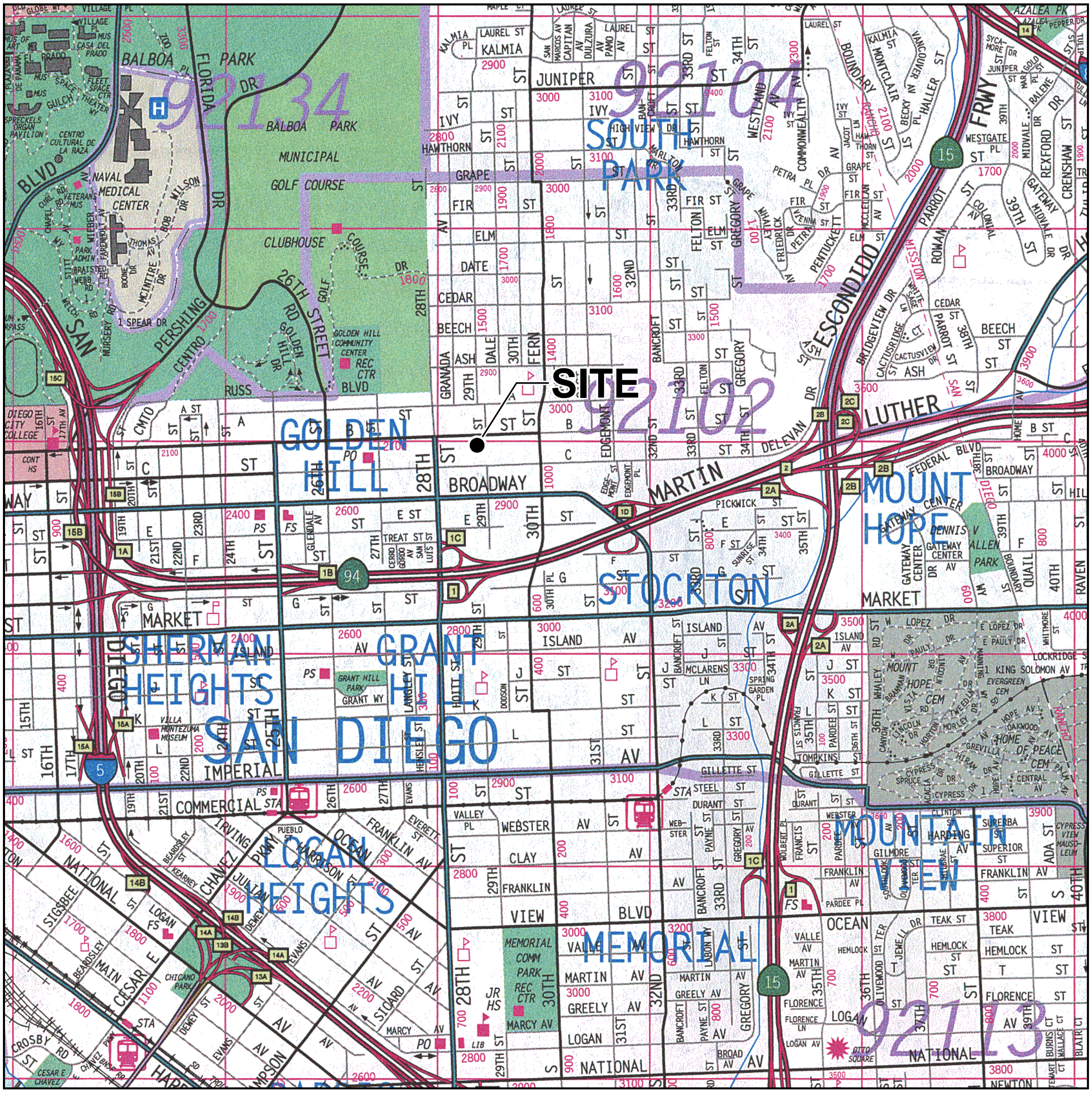
In accordance with your request, Hetherington Engineering, Inc. has prepared this geotechnical update for the subject site. Our work was performed in March and April 2015. The purpose of the geotechnical update was to evaluate the reported geologic and soil conditions at the site, and to provide updated grading and foundation recommendations for the proposed development. We were provided with a "Tentative Map, Preliminary Grading Plan…" (Reference 11) that has been used as the base map for the attached Geologic Map, Plate 1. With the above in mind, our scope of work included the following:

- Research and review of available plans, reports and geologic literature pertinent to the subject site and vicinity (see References).
- Engineering and geologic analysis.
- Preparation of this report providing our findings, conclusions and recommendations.

SITE DESCRIPTION

The subject site is located on the south side of "B" Street and west of 29th Street in the City of San Diego, California (see Location Map, Figure 1). The site consists of an unimproved rectangular shaped property. Soil stockpiles currently exist along the northwest, west and south sides of the site.

Topographically, the site consists of a southeasterly trending unnamed drainage, with ascending slopes on all sides. The drainage has been modified by prior grading and the



ADAPTED FROM: The Thomas Guide, San Diego County, 2006 Edition, Page 1289

SCALE: 1" - 2000'
(1 Grid = 0.5 x 0.5 miles)

LOCATION MAP

HETHERINGTON ENGINEERING, INC. GEOTECHNICAL CONSULTANTS	Golden Hill "B" Street San Diego, California
	PROJECT NO. 7603.1 — FIGURE NO. 1

construction of "B" Street in the mid 1920's that filled a portion of the drainage and included a storm drain that outlets at approximately mid-property (Reference 13). Prior grading to the west included a fill slope that descends from the adjacent multi-family residential building to the subject property (Reference 5). Grading of the parcel to the south was completed in 2014 (References 14 and 15). Remedial grading for the property to the south partially extended onto the subject site.

The site is bounded by an existing multi-family residential structure to the west, by an unimproved parcel to the east, by "B" Street to the north, and by the Golden Hill Rowhomes on "C" Street to the south (currently under construction).

PROPOSED DEVELOPMENT

The referenced "Tentative Map, Preliminary Grading Plan…" indicates that the proposed development consists of eleven, single-family residential townhomes in five buildings. The buildings will be three-story with partial subterranean lower levels that will incorporate retaining walls up to 10-feet high to facilitate grade changes within the building footprint. Appurtenant improvements include retaining walls to a maximum height of approximately 10-feet, concrete driveways and flatwork, and landscaping. The existing storm drain will be extended from the current outlet to the southeast portion of the site.

Building loads are expected to be typical for this type of relatively light construction. Proposed site grading includes fill to a maximum designed depth of 18-feet. Import soil will be required. New slopes are proposed to a maximum height of approximately 14-feet at 2:1 (horizontal to vertical) slope ratios.

PREVIOUS GEOTECHNICAL INVESTIGATIONS

Robert Prater Associates performed a geotechnical investigation of the subject property in 1980 (Reference 22). The scope of work included three borings, five test pits and laboratory testing. The approximate locations of the exploratory borings and test pits are indicated on the attached Geologic Map, Plate 1. The Exploratory Boring Logs, Exploratory Test Pit Logs and laboratory test data are included in the attached Appendix A.

Allied Earth Technology performed a geotechnical investigation on the subject and adjacent property to the south in 2001 (Reference 2). The scope of work included exploratory test pits and laboratory testing. The approximate locations of the exploratory test pits are indicated on the attached Geologic Map, Plate 1. The Trench Log Sheets by

Allied Earth Technology are included in the attached Appendix B. No laboratory testing was performed on soils from the two test pits on the subject site.

SOIL AND GEOLOGIC CONDITIONS

1. Geologic Setting

   The subject site is located near the western margin of the coastal plain region of the Peninsular Ranges Geomorphic Province in San Diego, California, within an elevated level plateau, located approximately 2-miles east of San Diego Bay. The site is located within the northeast portion of the USGS Point Loma 7-1/2 minute quadrangle.

   This region of San Diego is characterized mainly by elevated plateaus cut by south trending drainage channels into Pleistocene and Pliocene, marine and non-marine sediments, discharging ultimately into San Diego Bay.

   Based on the results of the prior investigations and our recent grading observations on the property to the south, the subject site is underlain by undocumented and compacted fill, undifferentiated alluvium/colluvium and bedrock of the Linda Vista Formation. The approximate limits of these geologic units are depicted on the attached Geologic Map, Plate 1 and Geologic Cross-Sections, Figures 2 through 5.

2. Geologic Units

   a. Undocumented Fill - The site is immediately underlain by several generations of fill. Recently stockpiled fill soils exists along the northwest, west, and south sides of the site. The topography on the attached Geologic Map, Plate 1 does not reflect the stockpiled fill.

      Fill associated with the construction of "B" Street underlies the northern portion of the site to depths that likely approach 25±-feet along the north property line. Undocumented fill is not considered suitable to support new fill or proposed improvements.

   b. Compacted Fill - Fill observed and tested by Alpha Laboratories, Inc. extends onto the west side of the subject site to estimated depths of 5 to 10-feet (Reference 5).

Fill observed and tested by Hetherington Engineering, Inc. exists along the southern portion of the property (References 14 and 15). These fill soils consist of silty to clayey sand. The compacted fill is considered suitable to support new fill and proposed improvements.

c. Undifferentiated Alluvium/Colluvium - Undifferentiated alluvium/colluvium was encountered in the Robert Prater Associates borings EB-1 and EB-3 and test pits TP-1, TP-2, TP-3, TP-4 and TP-5; and in the Allied Earth Technology Trench Nos. 4 and 5. These soils consist of silty to clayey sand with gravel and cobbles. The thickness of these soils is expected to vary from 3-feet on the side slopes to 25-feet or more under the undocumented fill. Previous removals of alluvium/colluvium along the southern portion of the property extended to elevation 159.4-feet near the southeast corner to 169.3-feet near the southwest corner of the site. These soils are not considered suitable to support new fill or proposed improvements.

d. Bedrock (Linda Vista Formation) - Bedrock underlies the fill and alluvium/colluvium at depths estimated to vary from approximately 10 to 30-feet below existing site grades and consists generally of silty fine to coarse sandstone, which is moist, dense to very dense, poorly cemented, slightly friable and massive.

3. Groundwater

Groundwater was not encountered in the prior exploratory borings and test pits to the maximum depths explored. Fluctuations in the amount and level of groundwater are expected to occur due to the existing drainage channel and variations in rainfall, irrigation, and other factors that might not have been evident at the time of our field investigation.

SEISMICITY

The site is located within the seismically active southern California region. There are, however, no known active or potentially active faults presently mapped that pass through the site nor is the site located within the presently defined limits of an Alquist-Priolo Earthquake Fault Zone. Active or potentially active fault zones within the site region include the Rose Canyon, Coronado Bank and Elsinore (Julian Segment). Strong ground motion could also be expected from earthquakes occurring along the San Jacinto and San Andreas fault zones, which lie northeast of the site at greater distances, as well as a number of other offshore faults. The Texas Street Fault is mapped by the city of San Diego approximately 300-feet west of the site.

The following table lists the known active faults that would have the most significant impact on the site.

Fault	Maximum Probable Earthquake (Moment Magnitude)	Slip Rate (mm/year)
Rose Canyon (1-mile/1.6 kilometers) SW	7.0	1.5
Coronado Bank (14-miles/22.5 kilometers) SW	7.3	3.0
Elsinore (Julian Segment) (32-miles/51.5 kilometers) NE	7.3	3.0

SEISMIC EFFECTS

1. Ground Accelerations

   The most significant probable earthquake to effect the site would be a 7.0 magnitude earthquake on the Rose Canyon fault zone. Based on Section 1803.5.12 of the 2013 California Building Code, peak ground accelerations of about 0.505g are possible for the design earthquake.

2. Ground Cracks

   The risk of fault surface rupture due to active faulting is considered low due to the absence of known active faulting on site. Ground cracks due to shaking from seismic events in the region are possible, as with all of southern California.

3. Landsliding

   At the completion of site grading, slopes will consist of compacted fill slopes to a maximum height of approximately 15-feet inclined at 2:1 (horizontal to vertical) slope ratios. The risk of seismically induced landsliding is considered negligible.

4. Liquefaction

   Liquefaction is a phenomenon in which earthquake induced cyclic stresses generate excess pore water pressure in cohesionless soils, causing a temporary loss of shear strength. Due to the dense underlying Linda Vista formation, proposed compacted fill and lack of shallow groundwater, liquefaction is not considered a site hazard.

5. Tsunamis

   Due to the site elevation and distance from the coast, tsunami inundation is not considered a site hazard.

CONCLUSIONS AND RECOMMENDATIONS

1. General

   The proposed development is considered feasible from a geotechnical standpoint. Grading and foundation plans should take into account the appropriate geotechnical features of the site. The proposed construction is not anticipated to adversely impact the adjacent properties from a geotechnical standpoint, provided the recommendations presented in this report and good construction practices are implemented during design and construction.

2. Seismic Parameters for Structural Design

   Seismic considerations that may be used for structural design at the site include the following:

   a. Ground Motion - The proposed structures should be designed and constructed to resist the effects of seismic ground motions as provided in Section 1613 of the 2013 California Building Code.

      Site Address: "B" Street at 29th Street, San Diego, California

      Latitude: 32.717º

      Longitude: -117.132º

b. Spectral Response Accelerations - Using the location of the property and data obtained from the U.S.G.S. Earthquake Hazard Program, short period Spectral Response Accelerations S_s (0.2 second period) and S_1 (1.0 second period) are:

$S_s = 1.151g$
$S_1 = 0.442g$

c. Site Class - In accordance with Chapter 20 of ASCE 7-10, a Site Class D is considered appropriate for the subject property.

d. Site Coefficients F_a and F_v - In accordance with Tables 1613.3.3 and considering the values of S_s and S_1, Site Coefficients for a Class D site are:

$F_a = 1.04$
$F_v = 1.558$

e. Spectral Response Acceleration Parameters Sm_s and Sm_1 - In accordance with Section 1613.3.3 and considering the values of S_s and S_1, and F_a and F_v, Spectral Response Acceleration Parameters for Maximum Considered Earthquake are:

$Sm_s = (F_a)(S_s) = 1.196g$
$Sm_1 = (F_v)(S_1) = 0.689g$

f. Design Spectral Response Acceleration Parameters Sd_s and Sd_1 - In accordance with Section 1613.3.4 and considering the values of Sm_s and Sm_1, Design Spectral Response Acceleration Parameters for Maximum Considered Earthquake are:

$Sd_s = 2/3\ Sms = 0.798g$
$Sd_1 = 2/3\ Sm_1 = 0.459g$

g. Long Period Transition Period - A Long Period Transitional Period of TL = 8 seconds is provided for use in San Diego County.

h. Seismic Design Category – In accordance with Tables 1604.5, 1613.3.5 and ASCE 7-10, a Risk Category II and a Seismic Design Category D are considered appropriate for the subject site.

3. Slope Stability

   Cut and fill slopes should be constructed at a slope ratio of 2:1 (horizontal to vertical) or flatter.

4. Site Grading

   Prior to grading, existing improvements, vegetation and miscellaneous debris within the limits of the proposed grading and construction should be removed to an appropriate offsite disposal area. Holes resulting from the removal of buried obstructions, which extend below finished site grades, should be replaced with compacted fill. In the event that abandoned cesspools, septic tanks or storage tanks are discovered during the excavation of the site, they should be removed and backfilled in accordance with local regulations. Existing utility lines to be abandoned should be removed and capped in accordance with the local requirements.

   In the areas proposed for grading, the existing undocumented fill, undifferentiated alluvium/colluvium and other material deemed unsuitable by the Geotechnical Consultant should be removed to expose approved compacted fill or bedrock. Removals of 5 to 35-feet (or more) below existing grades are anticipated. If a bedrock/fill transition exists within the footprint of any building pad, additional removals should be performed to provide a minimum depth of compacted fill of 5-feet below proposed grades. The Geotechnical Consultant should determine final removal depths during site grading.

   Due to the required removals, "B" Street improvements will require shoring to facilitate removals. Alternatively, the existing undocumented fill and undifferentiated alluvium/colluvium can be entirely removed down to a 1:1 (horizontal to vertical) projection extended downward from the "B" Street property line to the bedrock contact, and the remaining undocumented fill and undifferentiated alluvium/colluvium densified in-place by compaction grouting. Additionally, the existing storm drain may require removals below the existing flow line. This will require excavation in sections, protecting the storm drain in place or removal and replacement of the storm drain. Actual depths of removals in the vicinity of the existing storm drain are not known.

   After the removal of unsuitable soils and any additional required over excavation have been made, all areas to receive fill should be scarified to a depth of 6 to 8-inches, brought to near optimum moisture conditions and compacted to at least 90-percent relative compaction (ASTM: D 1557).

Fill soils should be moisture conditioned to about optimum moisture content and compacted by mechanical means in uniform horizontal lifts of 6 to 8-inches in thickness. All fill should be compacted to a minimum relative compaction of 90-percent (ASTM: D 1557). The on-site materials are considered suitable for use as compacted fill. Rock fragments over 6-inches in dimension and other perishable or unsuitable materials should be excluded from the fill. All grading and compaction should be observed and tested as necessary by the Geotechnical Consultant.

Any import soil should be approved by the Geotechnical Consultant prior to import. Any imported soil to be used as structural fill should have an expansion index of 20 or less and the expansion index should be verified by the Geotechnical Consultant prior to site delivery.

5. Shoring

If the entire removal of the undocumented fill and undifferentiated alluvium/colluvium is planned to the "B" Street property line, shoring will be necessary to protect off-site property and create a safe condition for workers during construction. The design, installation, and performance of the shoring system are considered the responsibility of the contractor and designer. Geotechnical recommendations necessary for the shoring design are included under the "Foundations and Slabs" section of this report. The shoring plan should be reviewed by the Geotechnical Consultant to confirm conformance with the recommendations presented herein and to provide additional comments as necessary.

6. Foundations and Slabs

The following recommendations are considered geotechnical minimums and may be increased by structural requirements or by the soils conditions exposed at the completion of grading.

The proposed structures may be supported by conventional continuous/spread footings founded at least 18-inches into compacted fill or bedrock. Continuous footings should be at least 12-inches wide and reinforced with a minimum of four #5 bars, two top and two bottom. Foundations located adjacent to utility trenches should extend below a 1:1 plane projected upward from the bottom of the trench. Foundations located on or adjacent to slopes should provide a horizontal distance of at least H/3, where H is the slope height, from the bottom of the footing to the face of the slope. Foundations bearing as recommended may be designed for a dead plus live load bearing value of 2000-pounds-per-square-foot. This value may be increased by one-third for loads including wind and seismic forces. A lateral bearing value of 150-pounds-per-square-foot per foot of depth to a maximum value of 2000-pounds-per-square-foot and a coefficient of friction between foundation soil and concrete of 0.25 may be assumed. These values assume that footings will be placed neat against the foundation soils. Footing excavations should be observed by the Geotechnical Consultant prior to the placement of reinforcing steel in order to verify that they are founded in suitable bearing materials.

Total and differential settlement of the proposed structures due to foundation loads is considered to be less than 3/4 and 3/8-inch, respectively, for footings founded as recommended.

Drilled piers associated with the shoring should extend at least 5-feet into approved bedrock and should have a minimum diameter of 24-inches. Drilled piers founded as recommended may be designed for a dead plus live load end bearing capacity of 4000-pounds-per-square-foot. This value may be increased by one-third for wind and seismic forces. A skin friction value of 150-pounds-per-square-foot may be assumed in bedrock. Piers may resist lateral loads by a passive pressure of 400-pounds-per-square-foot per foot of depth in bedrock to a maximum value of 4000-pounds-per-square-foot. The passive resistance may be calculated over two pier diameters.

Drilled piers should be observed by the Geotechnical Consultant at the time of drilling to ensure that the appropriate bearing materials have been encountered.

Slab-on-grade floors should have a minimum thickness of 5-inches and should be reinforced with #4 bars spaced at 18-inches, center-to-center, in two directions, and supported on chairs so that the reinforcement is at mid-height in the slab. A 4-inch layer of clean sand should underlie slabs with at least a 10-mil polyvinyl chloride moisture vapor retarder placed at mid-height in the sand. The vapor retarder should be placed in accordance with ASTM: E 1643. Slab subgrade soils should be thoroughly moistened prior to vapor retarder placement.

Vapor retarders are not intended to provide a waterproofing function. Should moisture vapor sensitive floor coverings be planned, a qualified consultant/contractor should be consulted to evaluate moisture vapor transmission rates and to provide recommendations to mitigate potential adverse impacts of moisture vapor transmissions on the proposed flooring.

7. Retaining Walls

Retaining wall foundations supported in compacted fill or bedrock should be designed in accordance with the previous building foundation recommendations provided in this report. Retaining walls free to rotate (cantilevered walls) should be designed for an active earth pressure of 35-pounds-per-cubic-foot (equivalent fluid pressure) assuming level backfill consisting of the on-site soils. Walls restrained from movement at the top should be designed for an at-rest earth pressure of 60-pounds-per-cubic-foot (equivalent fluid pressure) assuming level backfill consisting of the on-site soils. Any additional surcharge pressures behind the walls should be added to these values.

Retaining walls should be provided with adequate drainage to prevent buildup of hydrostatic pressure and should be adequately waterproofed. The subdrain system behind retaining walls should consist at a minimum of 4-inch diameter Schedule 40 (or equivalent) perforated (perforations down) PVC pipe embedded in at least 1-cubic-foot of 3/4-inch crushed rock per lineal foot of pipe all wrapped in approved filter fabric. Other subdrain systems that may be contemplated for use behind retaining walls due to the ultimate wall designs and construction methodology will be addressed on a case-by-case basis. Recommendations for wall waterproofing should be provided by the Project Architect and/or Structural Engineer consistent with Section 1805.3 of the 2013 California Building Code. Unrestrained (cantilever) retaining walls should be anticipated to experience some minor rotation and improvements placed behind the walls should be designed and constructed to accommodate this movement.

The lateral pressure on retaining walls due to earthquake motions (dynamic lateral force) should be calculated as $P_A = 3/8\ \gamma\ H^2 k_h$ where

P_A	=	dynamic lateral force (lbs/ft)
γ	=	unit weight = 130 pcf
H	=	height of wall (feet)
k_h	=	seismic coefficient = 0.17g

The dynamic lateral force is in addition to the static force and should be applied using a triangular distribution with the resultant applied at 0.3H above the base of the retaining wall. Any retaining walls that are less than 6-feet high do not require design to resist the additional earth pressure caused by seismic ground shaking.

8. Concrete Flatwork

   Concrete flatwork should be at least 5-inches thick (actual) and reinforced with No. 4 bars spaced at 18-inches on-center (two directions) and placed on chairs so that the reinforcement is in the center of the slab. Slab subgrade should be maintained at or slightly above optimum moisture content prior to placement of concrete. Contraction joints should be provided at 10-feet spacing (maximum). Joints should create square panels where possible. For rectangular panels (where necessary) the long dimension should be no more than 1.5 times the short dimension. Joint depth should be at least 0.25 times the flatwork thickness. Expansion joints should be thoroughly sealed to prevent the infiltration of water into the underlying soils.

9. Corrosivity Testing

   Due to the need for import soils at the site, corrosivity testing should be performed at the completion of grading. Pending the results of this testing, the onsite soils should be considered severely corrosive to concrete and buried metals.

10. Temporary Slopes

    Temporary slopes may be excavated vertically up to 5-feet and at a slope ratio no steeper than 1:1 (horizontal to vertical) over 5-feet in height. Field observations by the Engineering Geologist during grading of temporary slopes are recommended and considered necessary to confirm anticipated conditions and provide revised recommendations if necessary.

11. Retaining Wall and Utility Trench Backfill

    All retaining wall and utility trench backfill should be compacted to at least 90-percent relative compaction (ASTM: D 1557). Backfill should be tested and observed by the Geotechnical Consultant.

12. Site Drainage

    The following recommendations are intended to minimize the potential adverse effects of water on the structures and appurtenances.

    a. Consideration should be given to providing the structures with roof gutters and downspouts that discharge to an area drain system and/or to suitable locations away from the structure.

b. All site drainage should be directed away from the structures and not be allowed to flow over slopes.

c. No landscaping should be allowed against the structures. Moisture accumulation or watering adjacent to foundations can result in deterioration of building materials and may effect foundation performance.

d. Irrigated areas should not be over-watered. Irrigation should be limited to that required to maintain the vegetation. Additionally, automatic systems must be seasonally adjusted to minimize over-saturation potential particularly in the winter (rainy) season.

e. All yard and roof drains should be periodically checked to verify they are not blocked and flow properly. This may be accomplished either visually or, in the case of subsurface drains, by placing a hose at the inlet and checking the outlet for flow.

13. Recommended Observation and Testing During Construction

The following tests and/or observations by the Geotechnical Consultant are recommended:

a. Observation and testing of grading.

b. Shoring installation.

b. Foundation excavations prior to placement of forms and reinforcement.

c. Utility trench backfill.

d. Retaining wall subdrains and backfill.

e. Concrete flatwork subgrade.

14. Grading and Foundation Plan Review

Grading and foundation plans should be reviewed by the Geotechnical Consultant to confirm conformance with the recommendations presented herein or to modify the recommendations as necessary.

LIMITATIONS

The analyses, conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our investigation and further assume the excavations to be representative of the subsurface conditions throughout the site. If different subsurface conditions from those encountered during our exploration are observed or appear to be present in excavations, the Geotechnical Consultant should be promptly notified for review and reconsideration of recommendations.

Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the conclusions and professional advice included in this report.

This opportunity to be of service is sincerely appreciated. If you have any questions, please call this office.

Sincerely,
HETHERINGTON ENGINEERING, INC.

Paul A. Bogseth
Professional Geologist 3772
Certified Engineering Geologist 1153
Certified Hydrogeologist [illegible]
(expires 3/31/16)

CERTIFIED ENGINEERING GEOLOGIST
PAUL A. BOGSETH
E.G. 1153
Exp.
STATE OF CALIFORNIA

Mark D. Hetherington
Civil Engineer 30488
Geotechnical Engineer 397
(expires 3/31/16)

REGISTERED PROFESSIONAL ENGINEER
MARK D. HETHERINGTON
No. 397
Exp. Date
GEOTECHNICAL
STATE OF CALIFORNIA

Attachments:	Location Map	Figure 1
	Geologic Cross-Sections	Figures 2 through 5
	Geologic Map	Plate 1
	Robert Prater Associates Data	Appendix A
	Allied Earth Technology Data	Appendix B

Distribution: 6-Addressee
1-via e-mail (Gordon.matthew0@gmail.com)
1-via e-mail (chris@h2asandiego.com)

REFERENCES

1. Albert & Hoy Engineering, Inc., "Grading Plan for 8-Unit Condominium Project on South Side of "B" Street Between 28th and 29th Street (2861 "B" Street)," dated "AsBuilt" December 2, 1981.

2. Allied Earth Technology, "Geotechnical Investigation, Proposed 46-Unit Townhome Site, West Side of 29th Street Between B Street and C Street, San Diego, California," dated May 10, 2001.

3. Allied Earth Technology, "Update of Geotechnical Investigation Report, Proposed Golden Hills Rowhomes Site, West Side of 29th Street, Between B Street and C Street, San Diego, California," dated May 15, 2013.

4. Alpha Laboratories, Inc., "Report of Preliminary Soils Investigation for 2861 B Street, San Diego, California," dated January 28, 1980.

5. Alpha Laboratories, Inc., "Report of Compacted Fill for 2861 "B" Street, San Diego, California," dated September 23, 1981.

6. American Society of Civil Engineers, "Minimum Design Loads for Buildings and other Structures, ASCE 7-10," dated 2010.

7. California Building Standards Commission, "California Building Code," 2013 Edition.

8. California Division of Mines and Geology, "Planning Scenario for a Major Earthquake, San Diego – Tijuana Metropolitan Area," Special Publication 100, dated 1990.

9. California Emergency Agency, "Tsunami Inundation Map for Emergency Planning, National City Quadrangle," dated June 1, 2009.

10. Cao, Tianging, et al, "The Revised 2002 California Probabilistic Seismic Hazard Maps," dated June 2003.

11. Christensen Engineering and Surveying, "Tentative Map, Preliminary Grading Plan, B Street Rowhomes, San Diego, CA," undated.

12. City of San Diego Development Services, "Seismic Safety Study, Geologic Hazards and Faults, Grid Tile 17," dated April 3, 2008.

13. City of San Diego Operating Department, "Plans for the improvement of B St. between the east line of 29th St and a line parallel to and distant 200' west from the west line of 29th St…," dated March 26, 1928.

REFERENCES

14. Hetherington Engineering, Inc., "Supplemental Geotechnical Investigation, Golden Hill Rowhomes, North Side of C Street, West of 29th Street, San Diego, California," dated January 7, 2014.

15. Hetherington Engineering, Inc., "As-Graded Geotechnical Report, Golden Hill Rowhomes, North Side of C Street, West of 29th Street, San Diego, California, PTS No. 339446," dated September 23, 2014.

16. ICBO, "Maps of Known Active Faults Near-Source Zones in California and Adjacent Portions of Nevada," dated February 1998.

17. Jennings, Charles W., "Fault Activity Map of California and Adjacent Areas," California Data Map Series, Map No. 6, dated 1994.

18. Kennedy, Michael P., "Geology of the San Diego Metropolitan Area, California," California Division of Mines and Geology, Bulletin 200, dated 1975.

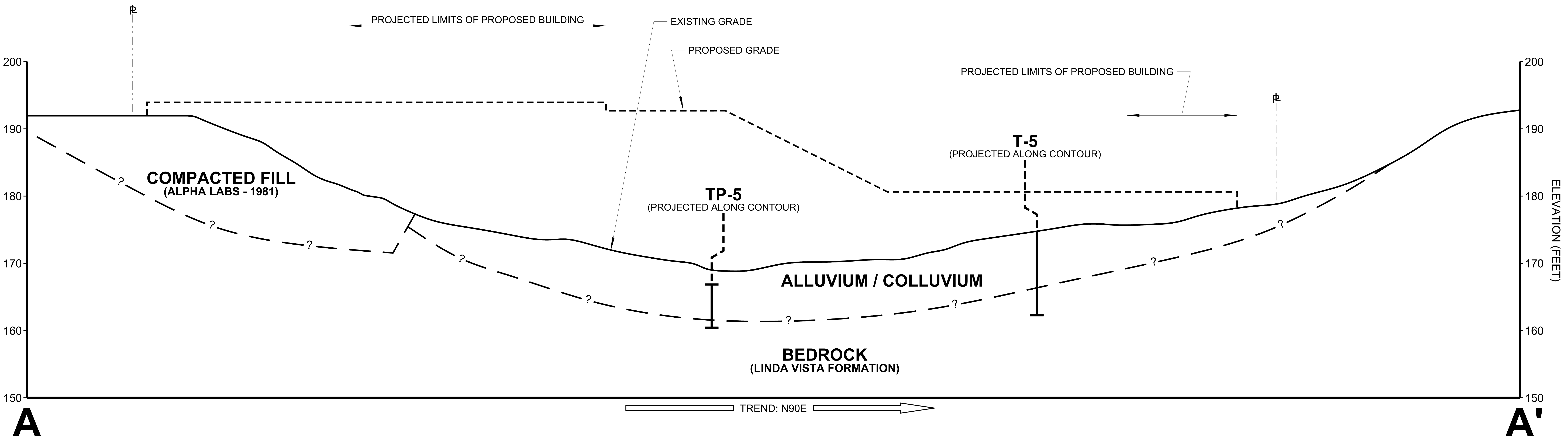
19. Kennedy, Michael P., et al., "Character and Recency of Faulting, San Diego Metropolitan Area, California," Special Report 123, dated 1975.

20. Peterson, M., Beeby, W., Bryant, W., et al., "Seismic Shaking Hazard Maps of California," California Division of Mines and Geology, Map Sheet 48, dated 1999.

21. Petersen, Mark P., "Documentation for the 2008 Update of the United States National Seismic Hazards Maps," USGS Open File Report 2008-1128, dated 2008.

22. Robert Prater Associates, "Soil Investigation, 29th & B Streets Condominiums, San Diego, California," dated December 30, 1980.

23. 2007 Working Group on California Earthquake Probability, "The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF-2)," USGS Open File Report 2007-1437 and CGS Special Report 203, dated 2008.



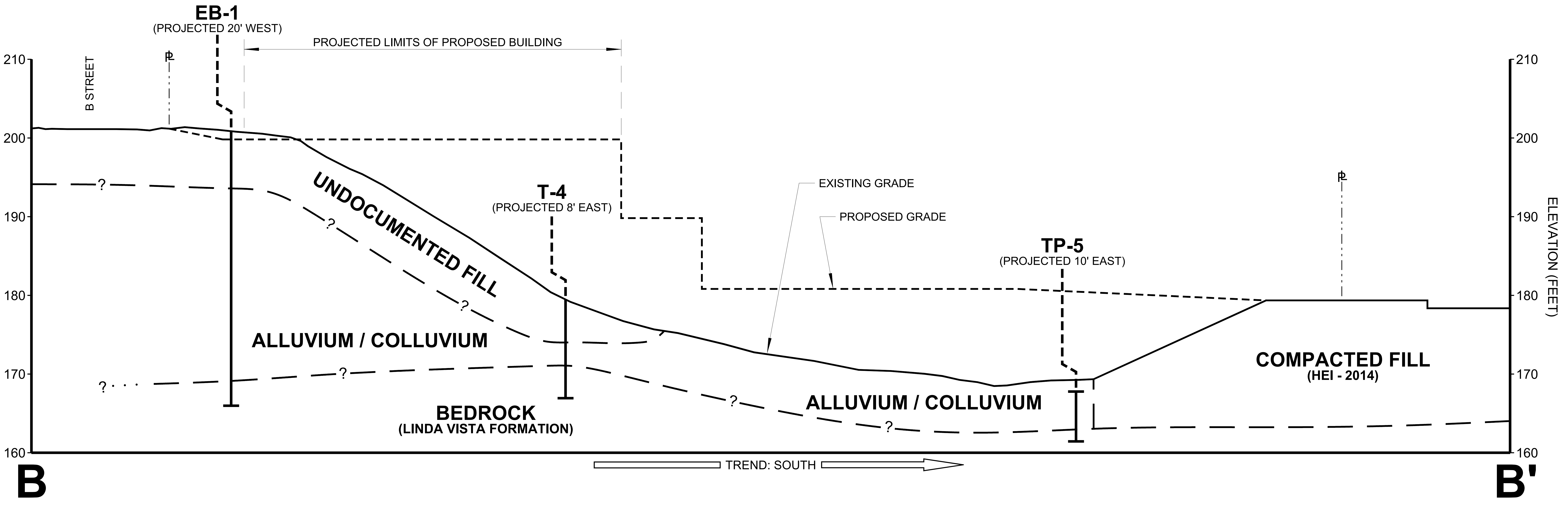
SCALE: 1" = 10'

0 1 2

0 5 10 15 20

NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

GEOLOGIC CROSS-SECTION	
HETHERINGTON ENGINEERING, INC. GEOTECHNICAL CONSULTANTS	Golden Hill "B" Street San Diego, California
	PROJECT NO. 7603.1 | FIGURE NO. 2



SCALE: 1" = 10'

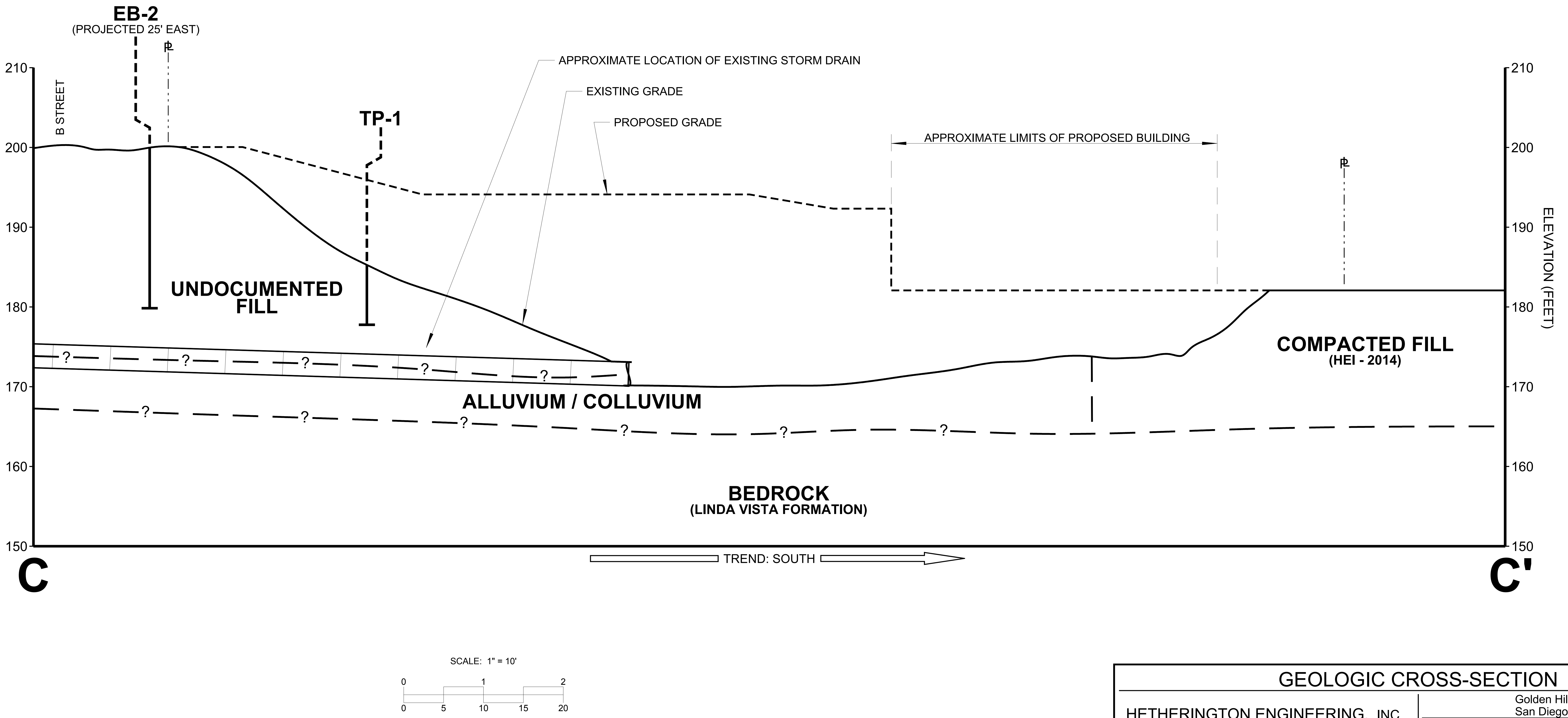
0 1 2

0 5 10 15 20

NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC. GEOTECHNICAL CONSULTANTS	Golden Hill "B" Street San Diego, California
	PROJECT NO. 7603.1 FIGURE NO. 3



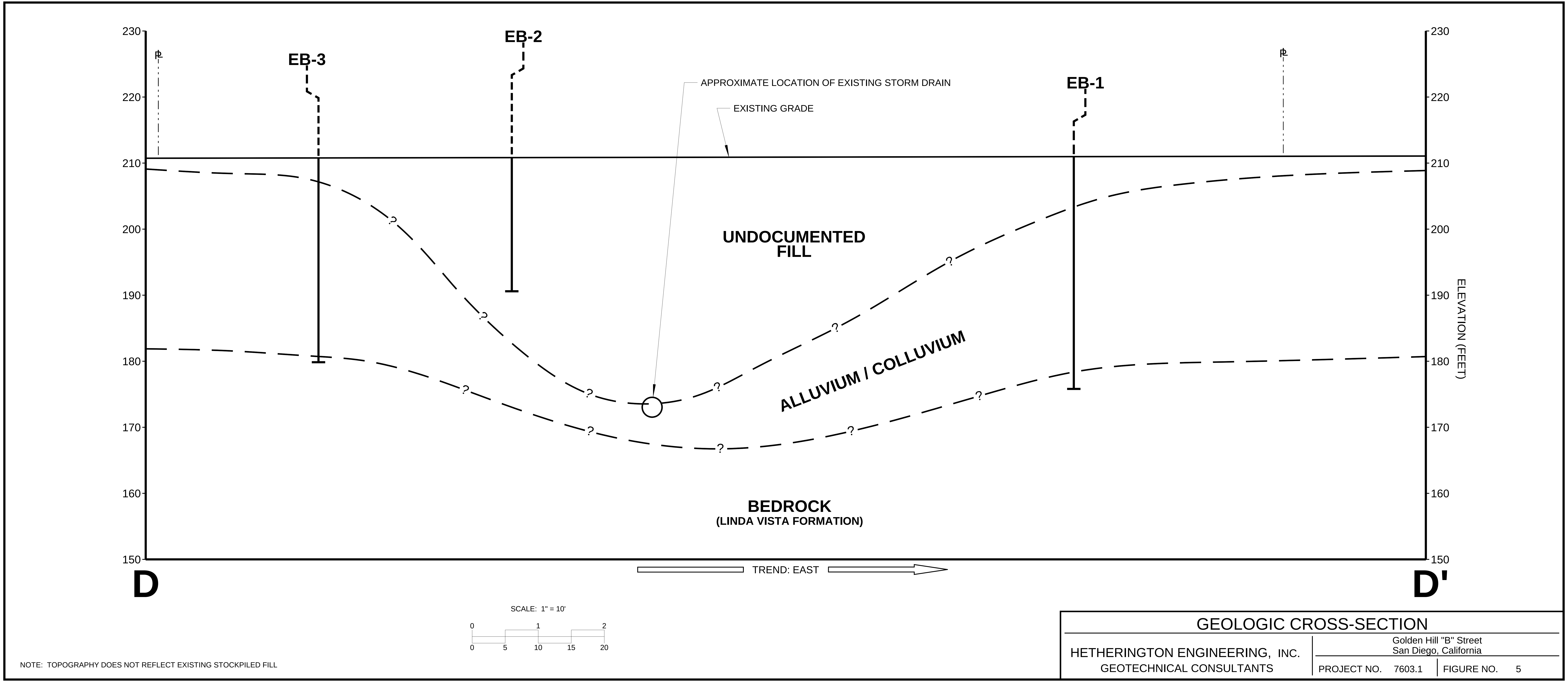
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

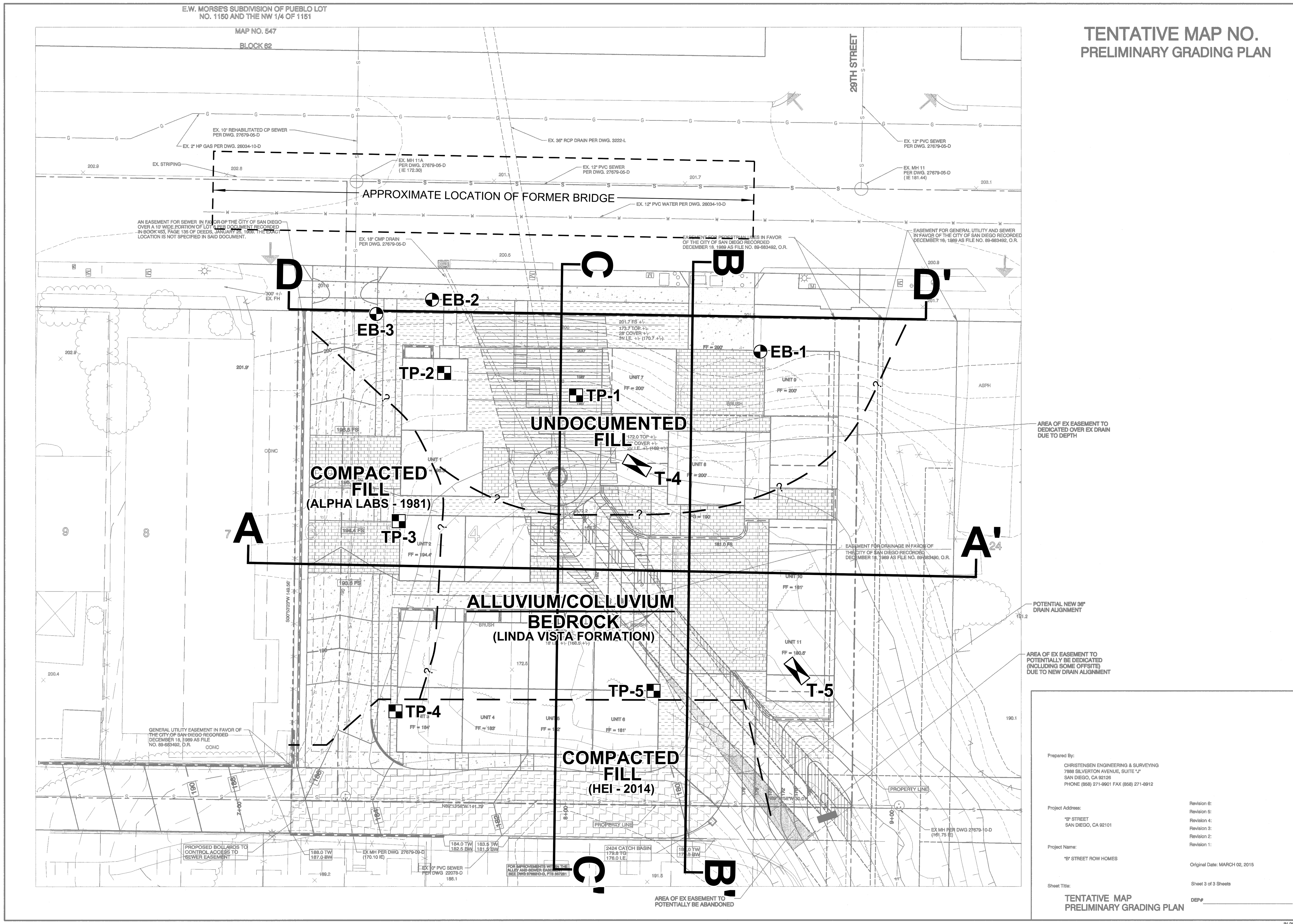
GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | FIGURE NO. 4


EB-3
EB-2
EB-1
APPROXIMATE LOCATION OF EXISTING STORM DRAIN
EXISTING GRADE
UNDOCUMENTED FILL
ALLUVIUM / COLLUVIUM
BEDROCK
(LINDA VISTA FORMATION)
230
220
210
200
190
180
170
160
150
ELEVATION (FEET)
TREND: EAST
D
D'
SCALE: 1" = 10'
0 1 2
0 5 10 15 20
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL
GEOLOGIC CROSS-SECTION
HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS
Golden Hill "B" Street
San Diego, California
PROJECT NO. 7603.1
FIGURE NO. 5



NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

LEGEND

T-5	APPROXIMATE LOCATION OF TEST PIT BY ALLIED EARTH TECHNOLOGY (2001)
EB-3	APPROXIMATE LOCATION OF BORING BY ROBERT PRATER ASSOCIATES (1980)
TP-5	APPROXIMATE LOCATION OF TEST PIT BY ROBERT PRATER ASSOCIATES (1980)
?	APPROXIMATE LOCATION OF GEOLOGIC CONTACT (QUERRIED WHERE UNCERTAIN)
B B'	GEOLOGIC CROSS-SECTION

SCALE: 1" = 20'

N

0 1 2

0 10 20 30 40

GEOLOGIC MAP

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | PLATE NO. 1

APPENDIX A
Robert Prater Associates Data

02 11 2000

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION 196 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	BORING DIAMETER 6 Inches	DATE DRILLED 11/19/80

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
GRAVEL AND COBBLES, with pieces of asphalt and concrete rubble		grayish brown	loose	GP	1					
					2					
Note: "x" denotes jar sample taken from auge. cuttings.					3	x				
					4					
					5					
FILL					6					
INTERBEDDED SILTY AND CLAYEY SAND, with lenses of gravel and cobbles		reddish & grayish brown	medium dense	SM/SC	7					
					8–9		21	6		
					10					
					11					
					12					
					13					
					14–15		16	7		
					16					
					17					
					18					
					19–20		27			
(continued)										

ROBERT PRATER ASSOCIATES
Consulting Soil, Foundation & Geological Engineers

EXPLORATORY BORING LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	BORING NO.
132-34	December 1980	1 (pg. 1)

02 11 2000

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION 196 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	BORING DIAMETER 6 Inches	DATE DRILLED 11/19/80

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
INTERBEDDED SILTY AND CLAYEY SAND, with lenses of gravel and cobbles		reddish & grayish brown	medium dense	SM/SC	21–32					
					29–30	X	67	13		
SILTY SAND, formational sandstone		grayish brown	very dense	SM	32–35		50/6"			
Bottom of Boring = 35 Feet					35					

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil, Foundation & Geological Engineers

EXPLORATORY BORING LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	BORING NO
132-34	December 1980	1 (Pg. 2)

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION 195 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	BORING DIAMETER 6 Inches	DATE DRILLED 11/19/80

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
SILTY SAND, with occasional gravel and cobbles (FILL)		yellowish brown	loose	SM	0–10					
Note: "x" denotes jar sample taken from auger cuttings.					3	x				
					8	x		5		
CLAYEY SAND (FILL)		grayish brown	loose-medium dense	SC	10–20					
					15	x		14		
Bottom of Boring = 20 Feet					20					

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil, Foundation & Geological Engineers

EXPLORATORY BORING LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	BORING NO.
132-34	December 1980	2

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION 195 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	BORING DIAMETER 6 Inches	DATE DRILLED 11/19/80

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
SILTY SAND		yellowish brown	loose	SM	0–3					
					2	x		7		
FILL										
CLAYEY SAND		reddish brown	medium dense	SC	3					
Notes: 1) "x" denotes jar sample taken from auger cuttings.					8	x		6		
2) "s" denotes sack sample taken from auger cuttings.					10–11.5		10			
		dark reddish brown			15	s				
(continued)					20					

EXPLORATORY BORING LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	BORING NO
132-34	December 1980	3 (pg. 1)

ROBERT PRATER ASSOCIATES
Consulting Soil, Foundation & Geological Engineers

DRILL RIG	Continuous Flight Auger	SURFACE ELEVATION	195 (approx.)	LOGGED BY	LTJ
DEPTH TO GROUNDWATER	None	BORING DIAMETER	6 Inches	DATE DRILLED	11/19/80

DESCRIPTION AND CLASSIFICATION					DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONS'ST	SOIL TYPE						
CLAYEY SAND		dark reddish brown	medium dense	SC	21		14			
					22					
					23					
					24					
					25					
					26					
					27					
					28					
SILTY SAND, formational sandstone		grayish brown	very dense	SM	29		40			
					30					
Bottom of Boring = 30 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

EXPLORATORY BORING LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO	DATE	BORING NO
132-34	December 1980	3 (pg. 2)

02 11 2000

RIG Case 580-C Backhoe	SURFACE ELEVATION 185 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	Test pit excavated with a 24-inch bucket on 11/19/80	

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	Dry Density (pcf)
SILTY AND CLAYEY SAND with gravel, cobbles, asphalt, and concrete rubble		brown	loose	SM/SC	1	x				
					2					
Notes: 1) "x" denotes jar sample taken from cuttings.		yellowish brown			3	x				
2) "s" denotes sack sample taken from cuttings.					4	s		9		98.3
FILL					5			8		100.3
SILTY SAND-POORLY GRADED SAND, with gravel and cobbles		light grayish brown	medium dense	SM-SP	6					
					7	x		2		
					8					
Bottom of Test Pit = 8 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

EXPLORATORY TEST PIT LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	TEST PIT NO.
132-34	December 1980	1

02 11 2000

RIG Case 580-C Backhoe	SURFACE ELEVATION 185 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	Test pit excavated with a 24-inch bucket on 11/19/80	

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	Dry Density (pcf)
SILTY AND CLAYEY SAND, with asphalt and concrete rubble		brown	loose	SM/SC	1					
Notes: 1) "x" denotes jar sample taken from cuttings.					2	x		8		101.1
2) "s" denotes sack sample taken from cuttings.		yellowish brown and brown			3			9		87.0
3) "⊠" denotes hand driven tube sample.					4					
					5	x		5		
					6					
					7	s				
					8					
					9	x				
FILL					10					
CLAYEY SAND-POORLY GRADED SAND		reddish brown	medium dense	SC-SP	11	x		6		
SILTY SAND, formational sandstone		yellowish brown	dense	SM	12					
					13	⊠				
					14	x				
Bottom of Test Pit = 15 Feet					15					

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

EXPLORATORY TEST PIT LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	TEST PIT NO.
132-34	December 1980	2

RIG Case 580-C Backhoe	SURFACE ELEVATION 177(approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	Test excavated with a 24-inch bucket on 11/19/80	

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
SILTY AND CLAYEY SAND Note: "x" denotes jar sample taken from cuttings.		grayish brown	loose	SM/SC	1	x				
					2					
SILTY SAND, with some scattered gravel and cobbles		reddish brown	medium dense	SM	3					
					4					
					5	x				
					6					
					7					
POORLY GRADED SAND AND GRAVEL		yellowish gray	medium dense	SP/GP	8	x		2		
SILTY SAND, formational sandstone		yellowish brown	dense	SM	9	x		7		
					10					
Bottom of Test Pit = 10 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

EXPLORATORY TEST PIT LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	TEST PIT NO.
132-34	December 1980	3

RIG Case 580-C Backhoe	SURFACE ELEVATION 168(approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	Test pit excavated with a 24-inch bucket on 11/19/80	

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
SILTY AND CLAYEY SAND Note: "x" denotes jar sample taken from cuttings.		grayish brown	loose	SM/SC	1	x				
					2					
SILTY SAND		reddish brown	medium dense	SM	3					
					4	x		10		
					5					
					6					
SILTY SAND, formational sandstone		yellowish brown	dense	SM	7	x				
					8					
Bottom of Test Pit = 8 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

EXPLORATORY TEST PIT LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	TEST PIT NO.
132-34	December 1980	4

02 11 2000

RIG Case 580-C Backhoe	SURFACE ELEVATION 161 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	Test Pit excavated with a 24-inch bucket on 11/19/80	

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
SILTY AND CLAYEY SAND, with some scattered cobbles		dark grayish brown.	loose	SM/SC	1					
					2					
Notes: 1) "s" denotes sack sample taken from cuttings.					3	s				
2) "x" denotes jar sample taken from cuttings.					4					
SILTY SAND-POORLY GRADED SAND, formational sandstone		yellowish brown	dense	SM-SP	5					
						x		12		
					6					
Bottom of Test Pit = 6 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

EXPLORATORY TEST PIT LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

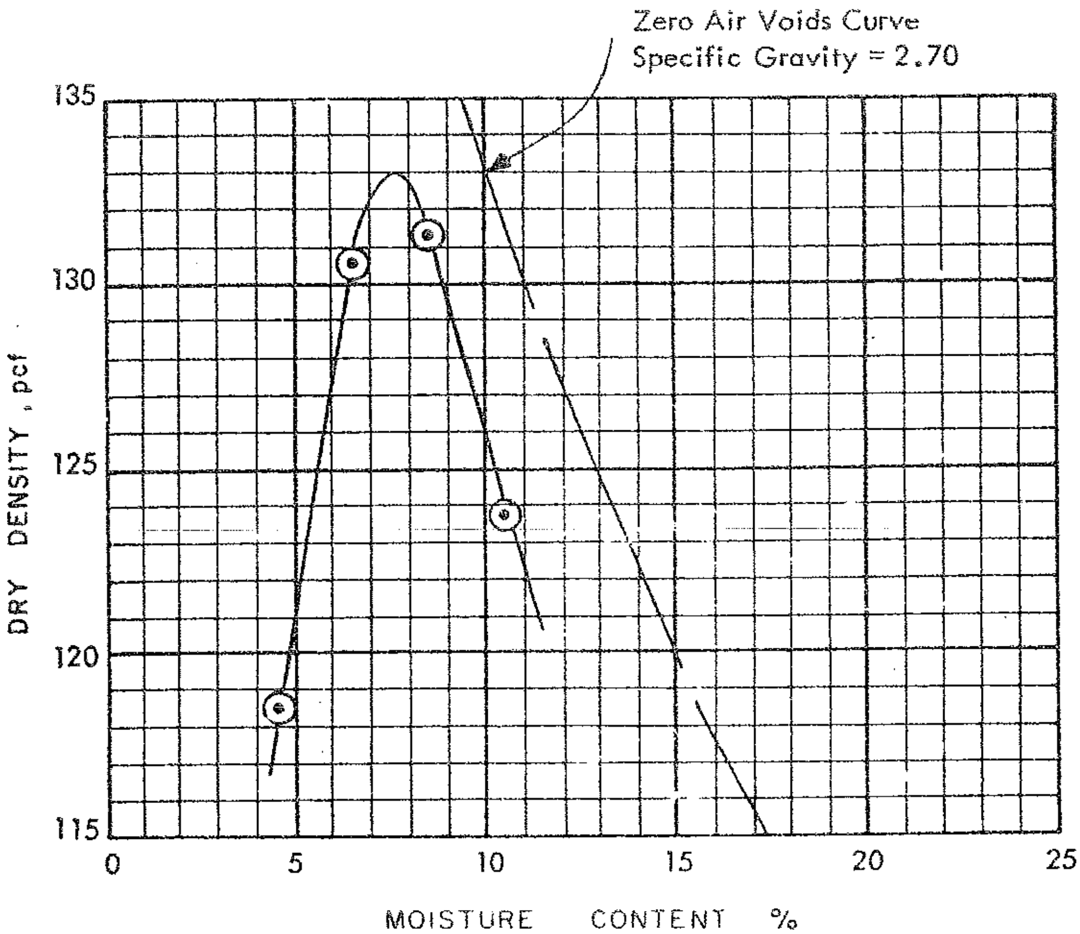
PROJECT NO.	DATE	TEST PIT NO.
132-34	December 1980	5

TABLE B-1

RESULTS OF NO. 200 SIEVE TESTS

Exploratory Boring/Test Pit No.	Sample Depth (Feet)	Sample Description	Percent Passing No. 200 Sieve
EB-1	9	SILTY SAND (SM), reddish brown	24
EB-1	29	CLAYEY SAND (SC), grayish brown	20
EB-3	15	CLAYEY SAND (SC), dark brown	32
TP-1	7	SILTY SAND-POORLY GRADED SAND (SM-SP), light grayish brown	8
TP-2	11	CLAYEY SAND-POORLY GRADED SAND (SC-SP), reddish brown	8
TP-3	8	POORLY GRADED SAND (SP), yellowish gray	4
TP-3	9	SILTY SAND (SM), yellowish brown	17
TP-5	5-1/2	SILTY SAND-POORLY GRADED SAND (SM-SP), yellowish brown	8

SAMPLE NO	DEPTH (FT.)	SAMPLE DESCRIPTION	SPECIFIC GRAVITY	LIQUID LIMIT (%)	PLASTIC INDEX
EB-3	15	CLAYEY SAND (SC), dark reddish brown	---	---	---



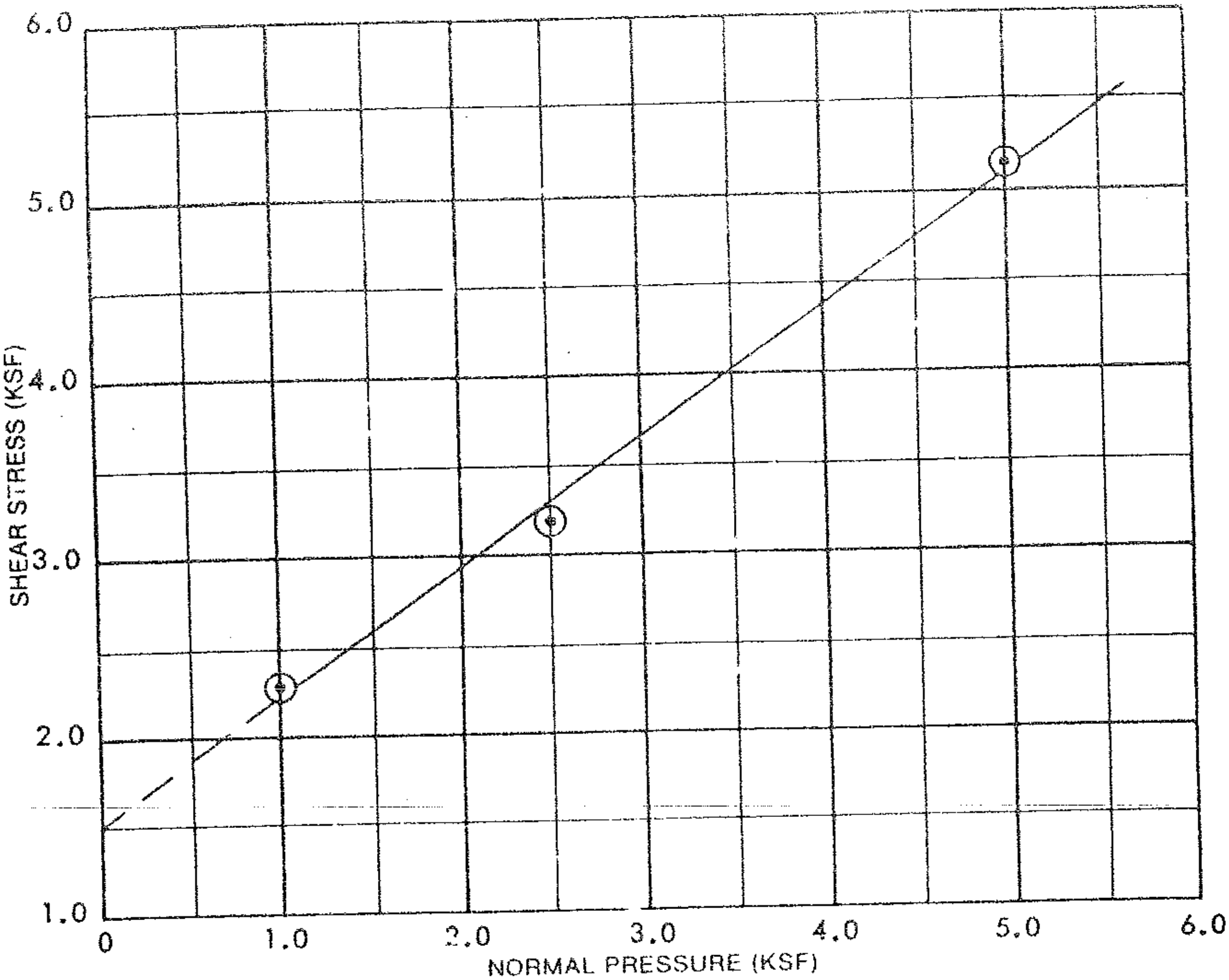
OPTIMUM WATER CONTENT %	7.7
MAXIMUM DRY DENSITY, pcf	133.0
TEST DESIGNATION	ASTM D 1557-78

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

COMPACTION TEST RESULTS

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO	DATE	FIGURE
132-34	December 1980	B-1

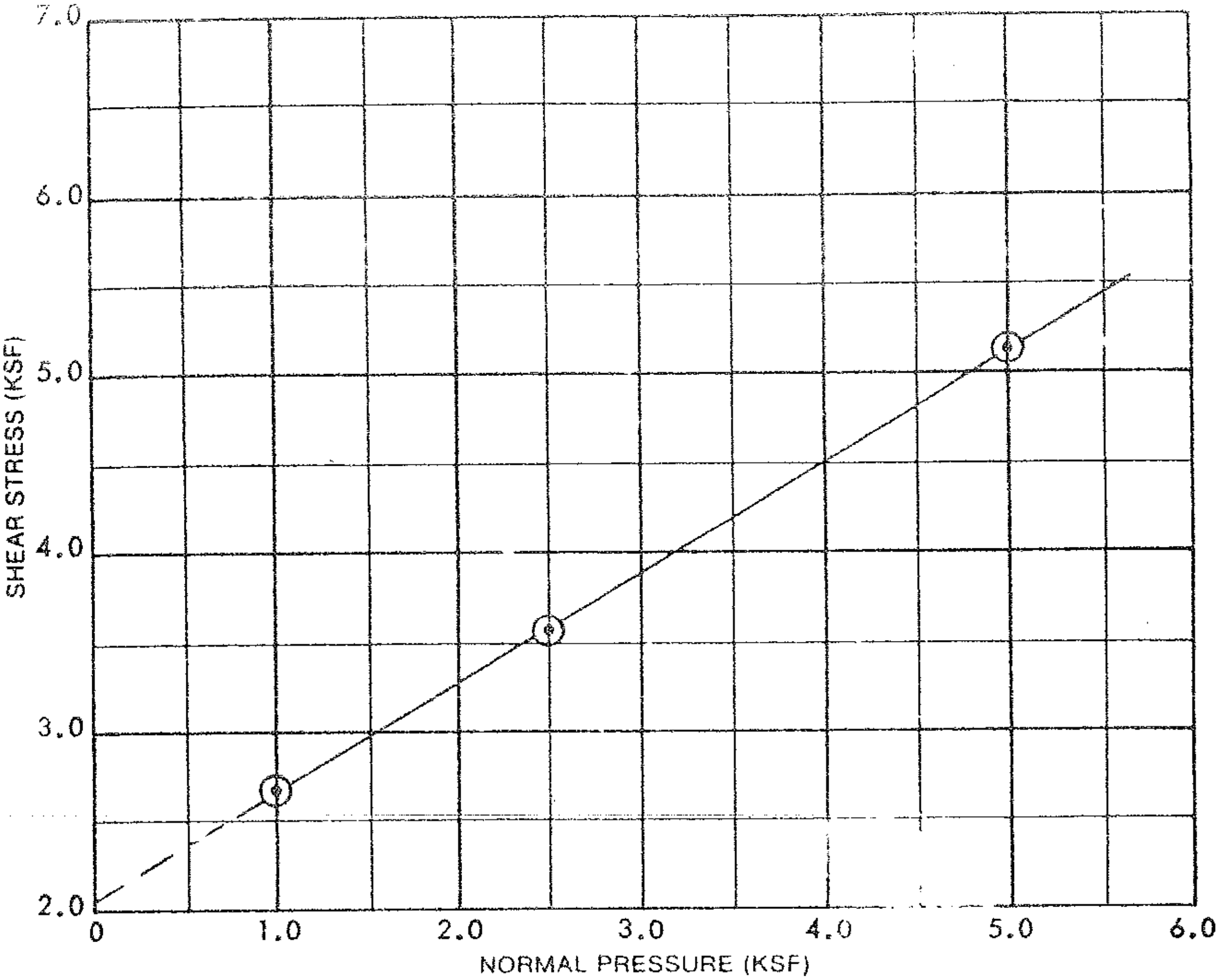


SAMPLE DATA			
DESCRIPTION	SILTY SAND (SM), reddish brown		
BORING NO	1		
DEPTH (ft)	9	ELEVATION (ft)	---
TEST RESULTS			
APPARENT COHESION (C)	1.50 ksf		
APPARENT ANGLE OF INTERNAL FRICTION (Φ)	35°		

TEST DATA				
TEST NUMBER	1	2	3	4
NORMAL PRESSURE (KSF)	1.00	2.50	5.00	
SHEAR STRENGTH (KSF)	2.28	3.19	5.15	
INITIAL H_2O CONTENT (%)	6	6	6	
FINAL H_2O CONTENT (%)	---	---	---	
INITIAL DRY DENSITY (PCF)	111.5	111.5	111.5	
FINAL DRY DENSITY (PCF)	---	---	---	
STRAIN RATE	0.02 inches/minute (approx.)			

Note: Test was performed on a sample recovered with a California sampler.

ROBERT PRATER ASSOCIATES Consulting Soil Foundation & Geological Engineers	DIRECT SHEAR TEST DATA		
	29TH & B STREETS CONDOMINIUMS San Diego, California		
	PROJECT NO 132-34	DATE December 1980	Figure B-2

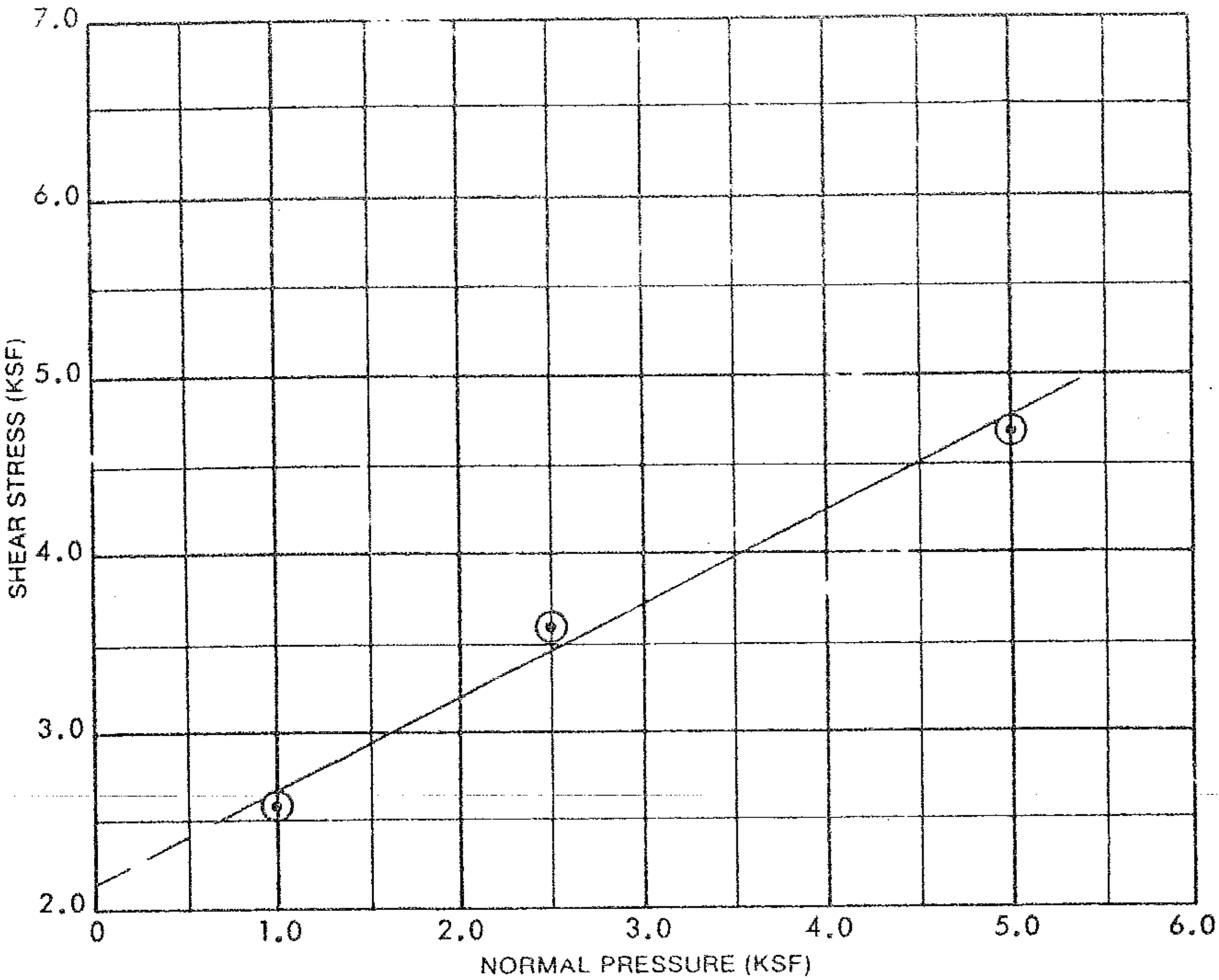


SAMPLE DATA			
DESCRIPTION	CLAYEY SAND (SC), grayish brown		
BORING NO	1		
DEPTH (ft.)	29	ELEVATION (ft)	---
TEST RESULTS			
APPARENT COHESION (C)	2.05 ksf		
APPARENT ANGLE OF INTERNAL FRICTION (Φ)	31°		

TEST DATA				
TEST NUMBER	1	2	3	4
NORMAL PRESSURE (KSF)	1.00	2.50	5.00	
SHEAR STRENGTH (KSF)	2.69	3.57	5.12	
INITIAL H_2O CONTENT (%)	13	13	13	
FINAL H_2O CONTENT (%)	---	---	---	
INITIAL DRY DENSITY (PCF)	119.3	119.3	119.3	
FINAL DRY DENSITY (PCF)	---	---	---	
STRAIN RATE	0.02 inches/minute (approx.)			

Note: Test was performed on a sampler recovered with a California sampler.

ROBERT PRATER ASSOCIATES Consulting Soil Foundation & Geological Engineers	DIRECT SHEAR TEST DATA		
	29TH & B STREETS CONDOMINIUMS San Diego, California		
	PROJECT NO	DATE	Figure B-3
	132-34	December 1980	



SAMPLE DATA	
DESCRIPTION:	CLAYEY SAND (SC), dark reddish brown
BORING NO.	3
DEPTH (ft)	15
ELEVATION (ft)	---
TEST RESULTS	
APPARENT COHESION (C)	2.15 ksf
APPARENT ANGLE OF INTERNAL FRICTION (Φ)	27°

TEST DATA				
TEST NUMBER	1	2	3	4
NORMAL PRESSURE (KSF)	1.00	2.50	5.00	
SHEAR STRENGTH (KSF)	2.58	3.60	4.66	
INITIAL H_2O CONTENT (%)	9	9	9	
FINAL H_2O CONTENT (%)	---	---	---	
INITIAL DRY DENSITY (PCF)	119.0	119.0	119.0	
FINAL DRY DENSITY (PCF)	---	---	---	
STRAIN RATE	0.02 inches/minute (approx.)			

Note: Test was performed on a sample remolded to approximately 90 percent of the laboratory maximum density.

ROBERT PRATER ASSOCIATES Consulting Soil Foundation & Geological Engineers	DIRECT SHEAR TEST DATA		
	29TH & B STREETS CONDOMINIUMS San Diego, California		
	PROJECT NO 132-34	DATE December 1980	Figure B-4

APPENDIX B
Allied Earth Technology Data

TRENCH LOG SHEET

TRENCH NO. 4

FT	DESCRIPTION	SOIL TYPE
0 1 2 3 4 5	Brown, damp, loose (undocumented fill) Broken pieces of concrete and asphalt, pebbles to 4" dia. Pockets of clayey sand	SILTY FINE SAND (SM)
6 7 8	Light grayish brown, moist. Loose to slightly dense Gravel and cobbles (alluvium/colluvium)	SILTY SAND (SM)
9 10 11 12	Yellowish brown, moist, dense Slightly cemented (San Diego Formation)	SILTY SAND (SM)

BOTTOM OF TRENCH (No Refusal)

Project No. 01-1289E3

Figure No. 6

TRENCH LOG SHEET

TRENCH NO. 5

FT	DESCRIPTION	SOIL TYPE
0 1 2 3 4 5	Dark grayish brown, damp, loose Some scattered cobbles Pockets of clayey sand (alluvium/colluvium) 1	SILTY FINE SAND (SM)
6 7 8	Yellowish brown, moist, dense Gravel and cobbles (alluvium/colluvium)	SILTY SAND (SM)
9 10 11 12	Yellowish brown, moist, dense Slightly cemented (San Diego Formation)	SILTY SAND (SM)

BOTTOM OF TRENCH (No Refusal)

ADDENDUM TO GEOTECHNICAL UPDATE
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

HETHERINGTON ENGINEERING, INC.

HETHERINGTON ENGINEERING, INC.
SOIL & FOUNDATION ENGINEERING • ENGINEERING GEOLOGY • HYDROGEOLOGY

May 21, 2015
Project 7603.1
Log No. 17697

Janco, LLC
P.O. Box 231446
Encinitas, California 92033

Attention: Mr. Matthew Gordon

Subject: ADDENDUM TO GEOTECHNICAL UPDATE
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

Reference: "Geotechnical Update, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated April 24, 2015.

Dear Mr. Gordon:

In accordance with your request, Hetherington Engineering, Inc. has prepared this addendum to the referenced "Geotechnical Update..." for the subject site. Our work was performed in April and May 2015 and included subsurface exploration, laboratory testing, and the preparation of this addendum report. The purpose of the additional work was to investigate the undocumented fill and undifferentiated alluvium/colluvium in the vicinity of "B" Street and to revise, confirm or update the geotechnical recommendations provided in the "Geotechnical Update...". The "Geotechnical Update..." includes data not duplicated in this report.

FIELD EXPLORATION

One hollow-stem auger boring was drilled on April 27, 2015, adjacent to "B" Street, to obtain bulk and relatively undisturbed soil samples, to perform Standard Penetration tests (ASTM: D 1586), and for geologic logging. The approximate location of the boring is shown on the attached Updated Geologic Map, Plate 1.

The subsurface exploration was supervised by an Engineering Geologist from this office, who visually classified the soil and bedrock materials, and obtained bulk and relatively undisturbed samples for laboratory testing. The soils were visually classified according to the Unified Soil Classification System. Classifications are shown on the attached Boring Log, Figures 1 and 2.

LABORATORY TESTING

Laboratory testing was performed on samples obtained during the subsurface exploration. Tests performed consisted of the following:

- Dry Density/Moisture Content (ASTM: D 2216)

- One-Dimensional Swell or Collapse of Soils (ASTM: D 4546)

Results of the dry density and moisture content determinations are presented on the Boring Log, Figures 1 and 2. The remaining laboratory test results are presented on the attached Laboratory Test Results, Figure 3.

SUBSURFACE CONDITIONS

The boring confirmed the existence of undocumented fill as reported by others. The boring also confirmed the existence of undifferentiated alluvium/colluvium that, based on our laboratory testing, exhibits hydroconsolidation (collapse) potential. The bedrock encountered was consistent with San Diego Formation sandstone, consequently, the attached Updated Geologic Map, Plate 1 and Geologic Cross-Sections, Figures 4 through 7, have been modified to reflect this bedrock nomenclature and to reflect minor changes in geologic contacts.

No seepage was encountered in the boring to the total depth explored.

CONCLUSIONS AND RECOMMENDATIONS

Based on our field exploration and laboratory testing, the undifferentiated alluvium/colluvium exhibits hydroconsolidation (collapse) potential which could result in an estimated 6-inches (maximum) of settlement upon wetting.

We conclude that the recommendations for temporary slopes, removals, and compaction grouting presented in the "Geotechnical Update..." remain applicable. Geologic Cross-Sections B-B', C-C' and D-D' have been updated to reflect our recommendations adjacent to "B" Street.

LIMITATIONS

The analyses, conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our investigation and further assume the excavations to be representative of the subsurface conditions throughout the site. If different subsurface conditions from those encountered during our exploration are observed or appear to be present in excavations, the Geotechnical Consultant should be promptly notified for review and reconsideration of recommendations.

Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the conclusions and professional advice included in this report.

This opportunity to be of service is sincerely appreciated. If you have any questions, please call this office.

Sincerely,

HETHERINGTON ENGINEERING, INC.

Paul A. Bogseth
Professional Geologist 3772
Certified Engineering Geologist 1153
Certified Hydrogeologist 591
(expires 3/31/16)

CERTIFIED ENGINEERING GEOLOGIST
PAUL A. BOGSETH
E.G. 1153
Exp.
STATE OF CALIFORNIA

Mark D. Hetherington
Civil Engineer 30488
Geotechnical Engineer 397
(expires 3/31/16)

REGISTERED PROFESSIONAL ENGINEER
MARK HETHERINGTON
No. 397
Exp. Date
GEOTECHNICAL
STATE OF CALIFORNIA

Attachments:	Boring Logs	Figures 1 and 2
	Laboratory Test Results	Figure 3
	Updated Geologic Cross-Sections	Figures 4 through 7
	Updated Geologic Map	Plate 1

Distribution: 6-Addressee
1-via e-mail (Gordon.matthew0@gmail.com)
1-via e-mail (chris@h2asandiego.com)

DRILLING COMPANY: **Scott's Drilling** RIG: **Hollow Stem Auger** DATE: **04/27/15**

BORING DIAMETER: **8"** DRIVE WEIGHT: **140 lbs.** DROP: **30"** ELEVATION: **' ±**

BORING NO. **B-1**

DEPTH (FEET)	BULK SAMPLE	DRIVE SAMPLE	BLOWS/FOOT	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	SOIL CLASS. (U.S.C.S.)	SOIL DESCRIPTION
0.0						GP SM	**FILL:** Brown silty sand with numerous gravel/cobbles; dry to damp, loose, difficult drilling @ 0 to 4'; asphalt concrete fragments
			17	102	5.1		@ 4': Less gravel and cobbles, damp, medium dense
5.0			(SPT) 3/6" 6/6" 7/6"				
			18	112	5.1	SM ML	**ALLUVIUM/COLLUVIUM:** Red brown silty sand; damp, loose, easy drilling
10.0			(SPT) 3/6" 4/6" 3/6"				@ 10 - 12': Gravelly layer
			12				@ 12': Sample on rock - no recovery
			(SPT) 1/6" 2/6" 3/6"				@ 14': Red brown sandy silt/silty sand, moist, soft to firm/loose
15.0			9	99	6.3		
			(SPT) 2/6" 2/6" 2/6"				@ 18': Red brown sandy silt/silty sand, soft/loose
20.0			11	111	6.9		
			(SPT) 6/6" 7/6" 10/6"				@ 22': Thin gravel layer in SPT @ 23': Drilling tighter
			17	105	11.1	CL SC	Brown to tan gravelly sandy clay to clayey sand; moist, stiff/medium dense
25.0							

BORING LOG

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. **7603.1** FIGURE NO. **1**

DRILLING COMPANY: **Scott's Drilling** RIG: **Hollow Stem Auger** DATE: **04/27/15**

BORING DIAMETER: **8"** DRIVE WEIGHT: **140 lbs.** DROP: **30"** ELEVATION: ' ±

BORING NO. B-1

DEPTH (FEET)	BULK SAMPLE	DRIVE SAMPLE	BLOWS/FOOT	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	SOIL CLASS. (U.S.C.S.)	SOIL DESCRIPTION
25.0			(SPT) 4/6" 5/6" 8/6"				
			20	101	13.5		@ 28': Brown gravelly clay; moist; firm, rock in tip of sampler
30.0			(SPT) 13/6" 10/6" 14/6"				@ 30': Not much recovery, rock in sampler
			85/9"	108	9.1		**BEDROCK (San Diego Formation):** Light brown sandstone; moist, very dense
35.0			(SPT) 17/6" 25/6" 40/6"				
							Total depth 35.5-feet No seepage
40.0							
45.0							
50.0							

BORING LOG

HETHERINGTON ENGINEERING, INC.

GEOTECHNICAL CONSULTANTS

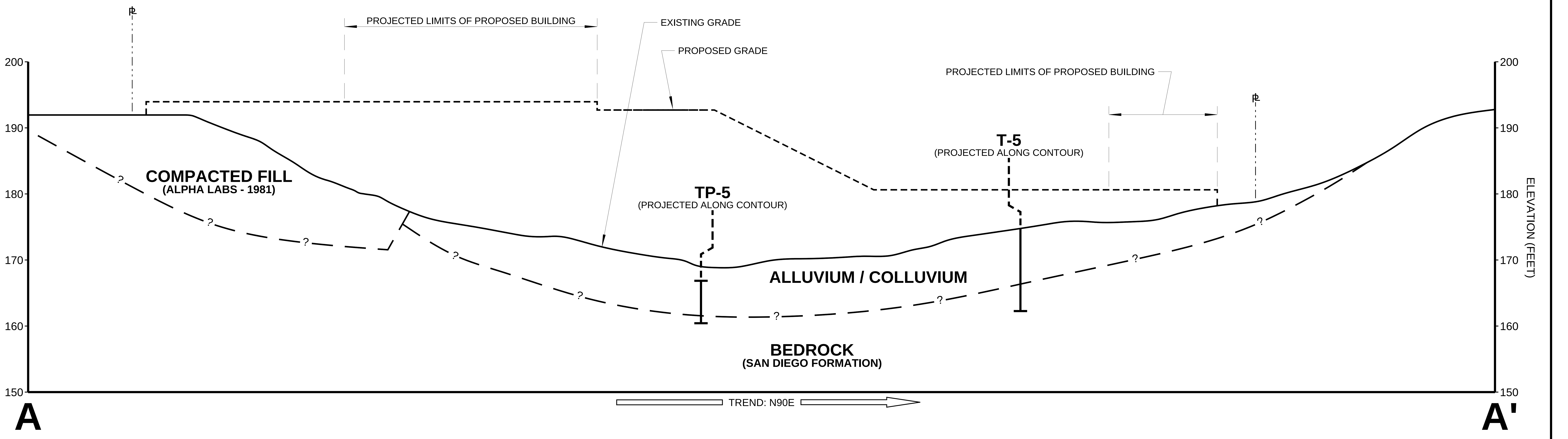
Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 FIGURE NO. 2

LABORATORY TEST RESULTS

ONE-DIMENSIONAL SWELL OR COLLAPSE OF SOILS (ASTM: D 4546)		
Sample Location	**Normal Stress at Saturation (psf)**	**% Swell (+) or % Consolidation (-) When Water Added**
B-1 @ 4'	429	-1.63
B-1 @ 8'	901	-1.22
B-1 @ 16	1760	-4.16
B-1 @ 20'	2243	-2.84
B-1 @ 24'	2716	-2.09
B-1 @ 28'	3176	-1.15

FIGURE 3
Project No. 7603.1
Log No. 17697



SCALE: 1" = 10'

0 1 2

0 5 10 15 20

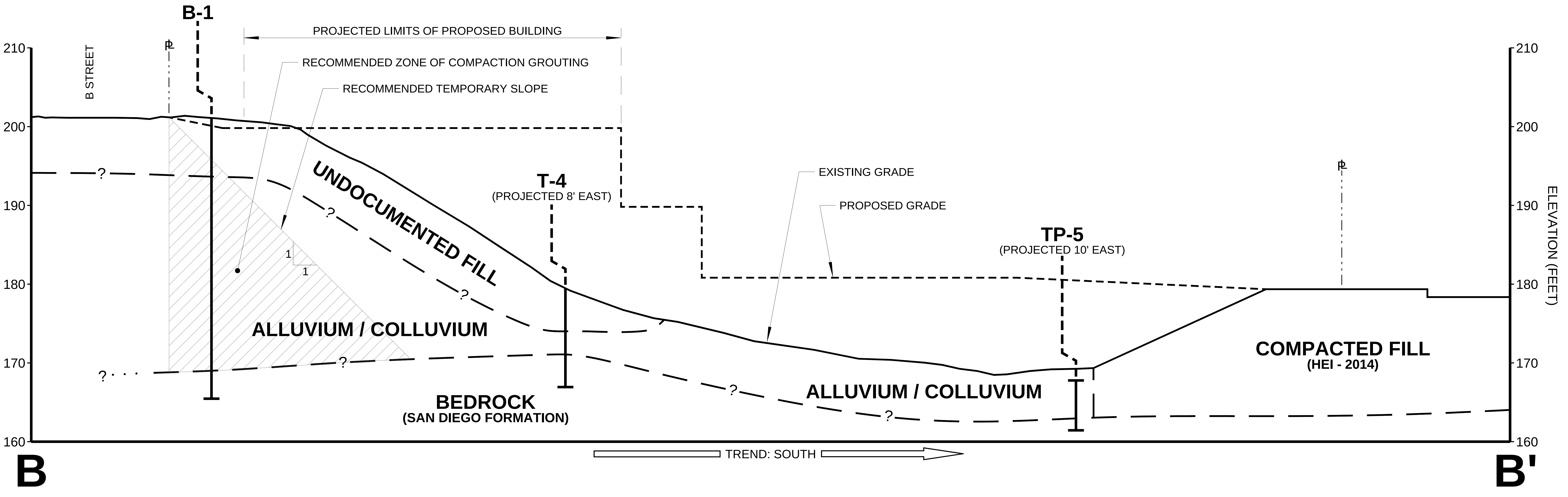
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

UPDATED GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | FIGURE NO. 4



SCALE: 1" = 10'

0 1 2

0 5 10 15 20

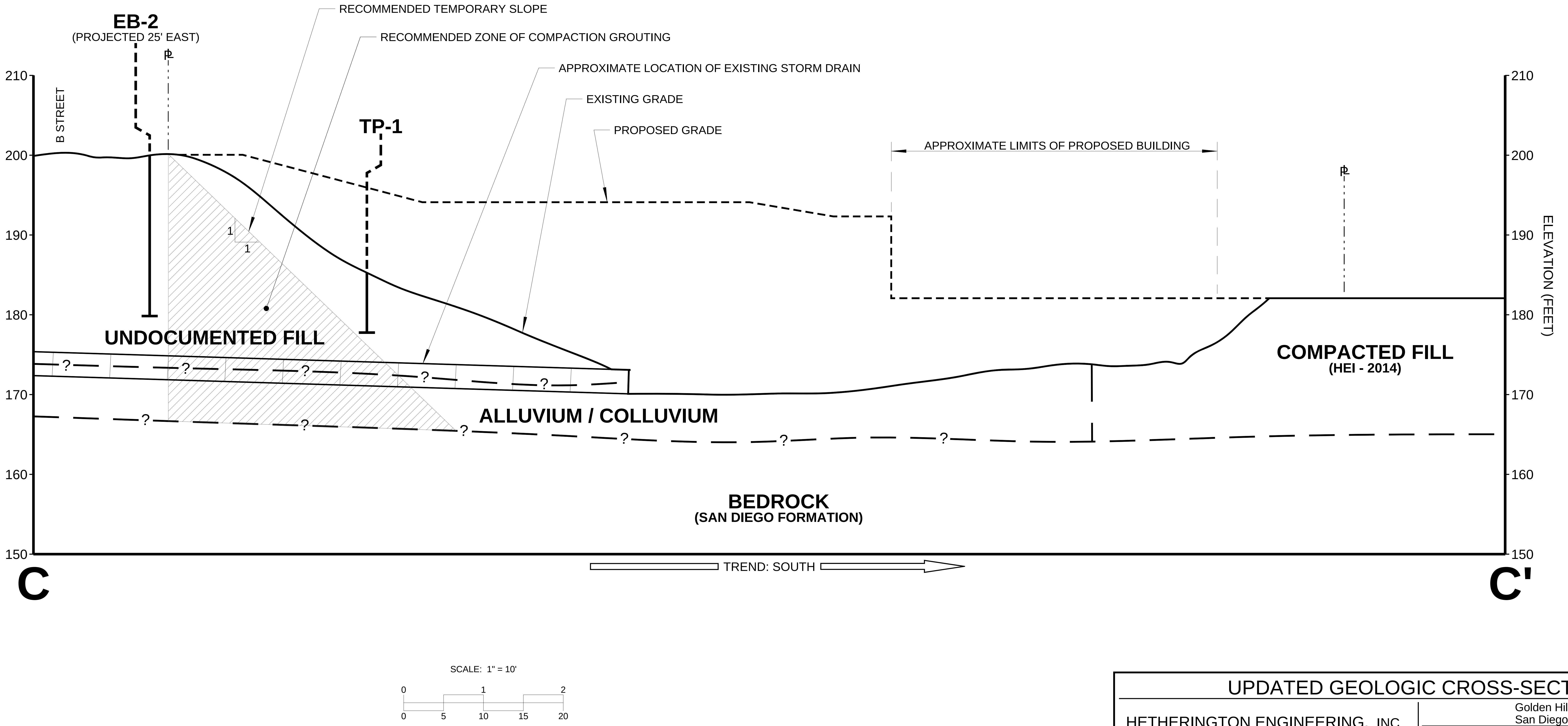
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

UPDATED GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | FIGURE NO. 5



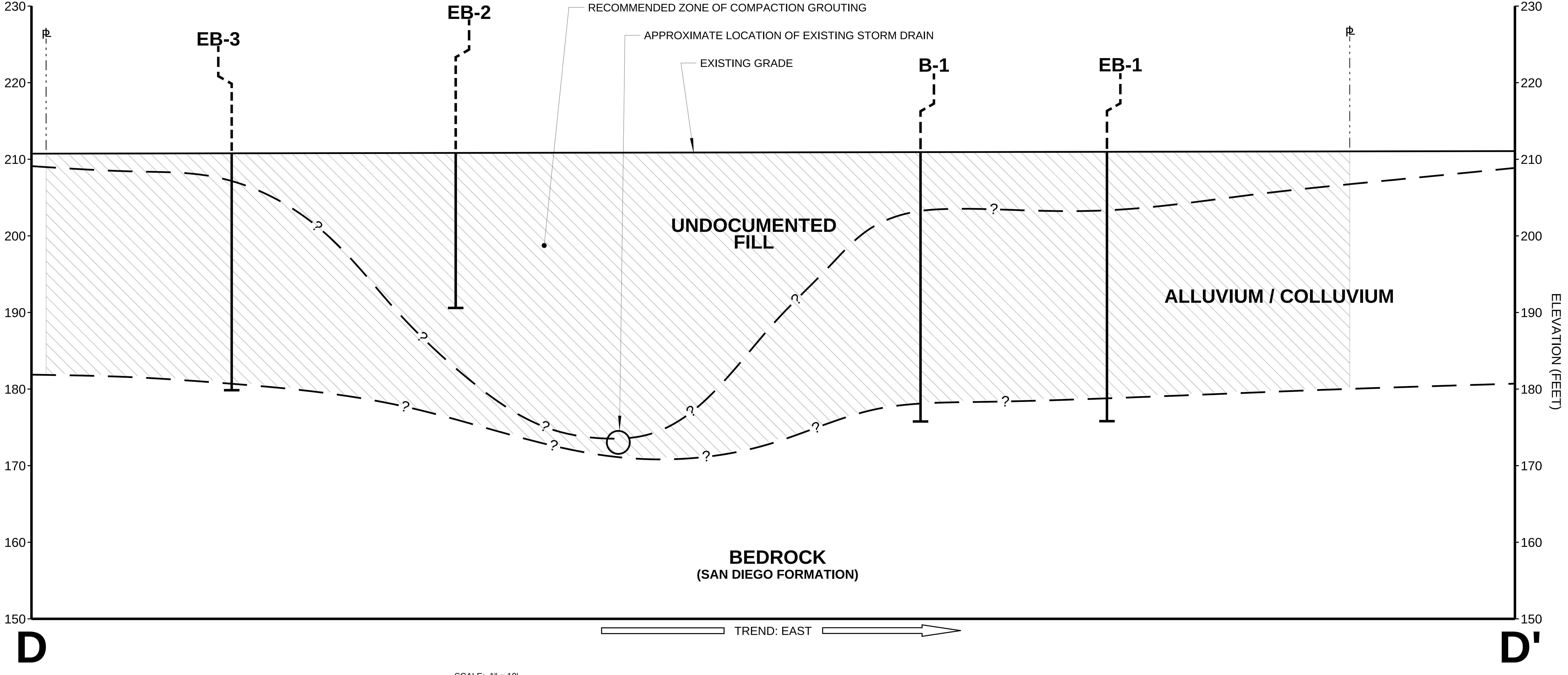
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

UPDATED GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | FIGURE NO. 6



SCALE: 1" = 10'

0 1 2

0 5 10 15 20

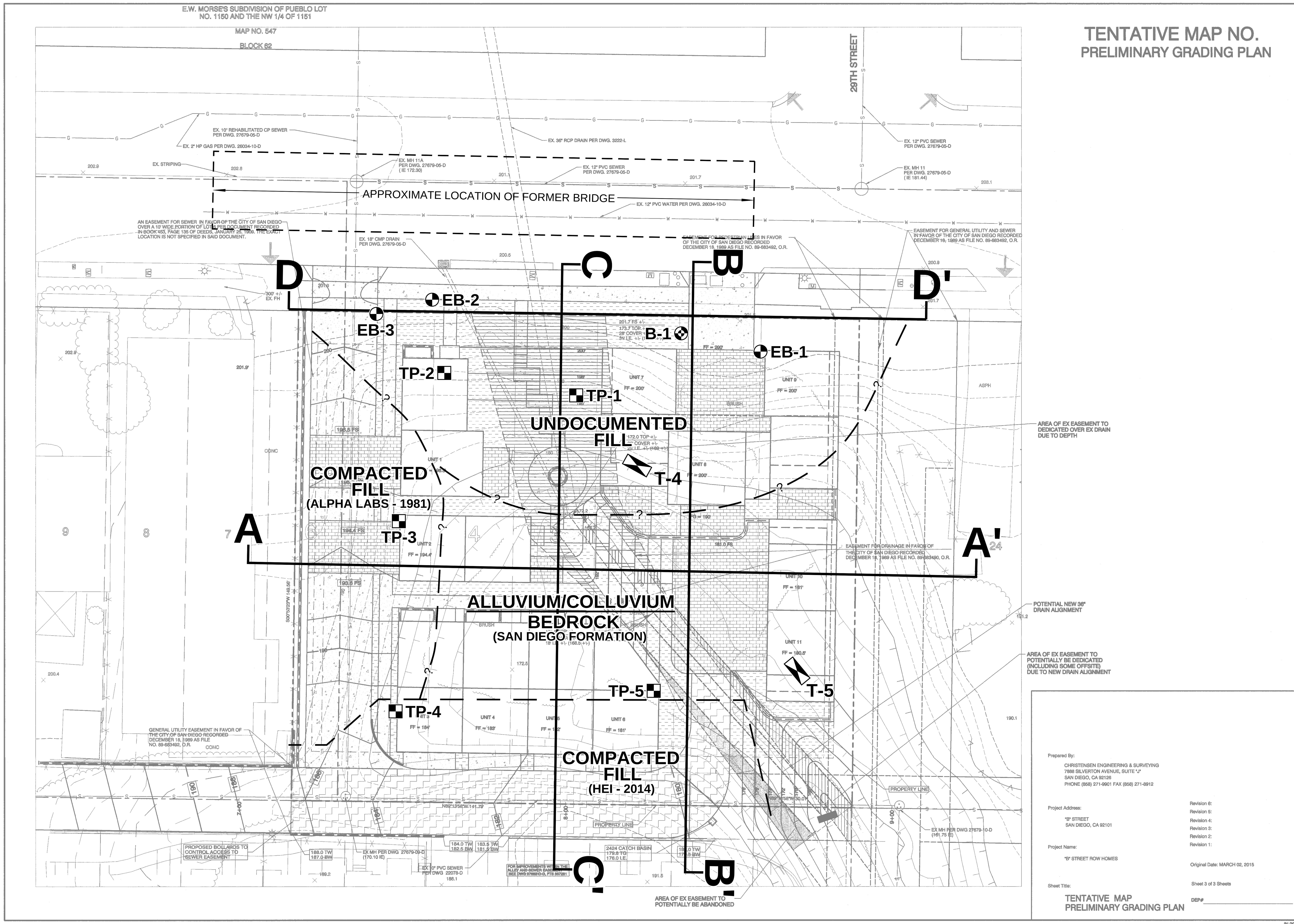
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

UPDATED GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

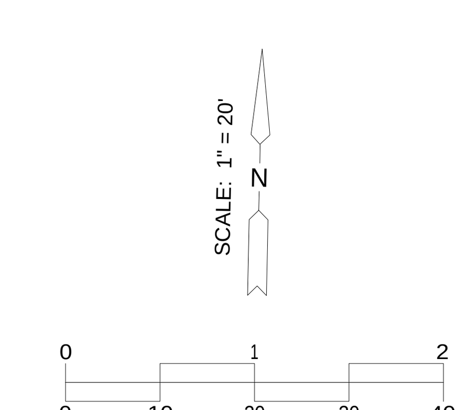
PROJECT NO. 7603.1 FIGURE NO. 7



NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

LEGEND

T-5	APPROXIMATE LOCATION OF TEST PIT BY ALLIED EARTH TECHNOLOGY (2001)
EB-3	APPROXIMATE LOCATION OF BORING BY ROBERT PRATER ASSOCIATES (1980)
TP-5	APPROXIMATE LOCATION OF TEST PIT BY ROBERT PRATER ASSOCIATES (1980)
B-1	APPROXIMATE LOCATION OF BORING BY HETHERINGTON ENGINEERING, INC. (2015)
?	APPROXIMATE LOCATION OF GEOLOGIC CONTACT (QUERRIED WHERE UNCERTAIN)
B B'	GEOLOGIC CROSS-SECTION



UPDATED GEOLOGIC MAP

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | PLATE NO. 1

HETHERINGTON ENGINEERING, INC.
SOIL & FOUNDATION ENGINEERING • ENGINEERING GEOLOGY • HYDROGEOLOGY

July 17, 2015
Project No. 7603.1
Log No. 17805

Janco, LLC
P.O. Box 231446
Encinitas, California 92033

Attention: Mr. Matthew Gordon

Subject: RESPONSE TO CITY OF SAN DIEGO GEOLOGY REVIEW
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

References: Attached

Dear Mr. Gordon:

In response to the request of Mr. Chris Varone, we are providing the following response to the geotechnical comment included in the geology review (Reference 3). Our numbering corresponds to that utilized by the reviewer.

3. From a geotechnical standpoint, storm water infiltration or percolation on site through permeable pavement or any other device is not recommended due to the increased potential for adverse geotechnical impacts to proposed improvements and/or adjacent properties.

This opportunity to be of service is appreciated. If you have any questions, please contact our Carlsbad office.

Sincerely,
HETHERINGTON ENGINEERING, INC.

Mark D. Hetherington
Civil Engineer 30488
Geotechnical Engineer 397
(expire 3/31/16)

Paul A. Bogseth
Professional Geologist 3772
Certified Engineering Geologist 1153
Certified Hydrogeologist 591
(expires 3/31/16)

Distribution: 5- Addressee
1-via e-mail (Gordon.matthew0@gmail.com)
1-via e-mail (chris@h2asandiego.com)

REFERENCES

1) “Geotechnical Update, Proposed Townhomes, Golden Hill “B” Street, San Diego, California,” by Hetherington Engineering, Inc., dated April 24, 2015.

2) “Addendum to Geotechnical Update, Proposed Townhomes, Golden Hill “B” Street, San Diego, California,” by Hetherington Engineering, Inc., dated May 21, 2015.

3) “Geology Review,” by the City of San Diego, Development Services, L64A-003A, dated June 20, 2015.

HETHERINGTON ENGINEERING, INC.
SOIL & FOUNDATION ENGINEERING • ENGINEERING GEOLOGY • HYDROGEOLOGY

August 15, 2016
Project No. 7603.1
Log No. 18472

Janco, LLC
P.O. Box 231446
Encinitas, California 92033

Attention: Mr. Matthew Gordon

Subject: RESPONSE TO CITY OF SAN DIEGO GEOLOGY REVIEW
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

References: Attached

Dear Mr. Gordon:

In response to the request of Mr. David Hawkins, we are providing the following responses to the geotechnical comments included in the geology review (Reference 7). Our numbering corresponds to that utilized by the reviewer.

5. Acknowledged, we will review the construction plans (grading plans and foundation plan and details) when provided.

6. Acknowledged, we will prepare an as-graded geotechnical report when grading is completed.

10. No response necessary.

11. See attached revised I-8 form.

12. See attached revised I-8 form.

13. See attached revised I-8 form.

5365 Avenida Encinas, Suite A • Carlsbad, CA 92008-4369 • (760) 931-1917 • Fax (760) 931-0545
327 Third Street • Laguna Beach, CA 92651-2306 • (949) 715-5440 • Fax (949) 715-5442
www.hetheringtonengineering.com

This opportunity to be of service is sincerely appreciated. If you have any questions, please call this office.

Sincerely,

HETHERINGTON ENGINEERING, INC.

Mark D. Hetherington Civil Engineer 30488 Geotechnical Engineer 397 (expires 3/31/18)	Paul A. Bogseth Professional Geologist 3772 Certified Engineering Geologist 1153 Certified Hydrogeologist 591 (expires 3/31/18)

REGISTERED PROFESSIONAL ENGINEER
MARK D. HETHERINGTON
No. 397
Exp. Date
GEOTECHNICAL
STATE OF CALIFORNIA

Attachment: Revised I-8 Form

Distribution: 1-via e-mail (Gordon.matthew0@gmail.com)
1-via e-mail (david@h2asandiego.com)
1-via e-mail (Sirma@h2asandiego.com)
1-via e-mail (Luis@rec-consultants.com)
1-via e-mail (CEandS@aol.com)

REFERENCES

1. "Geotechnical Update, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated April 24, 2015.

2. "Addendum to Geotechnical Update, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated May 21, 2015.

3. "East Property Line Geotechnical Exploration, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated January 8, 2016.

4. "City of San Diego, Transportation and Storm Water, Storm Water Standards, Part 1: BMP Design Manual, January 2016 Edition".

5. "Drainage Management Area Exhibit, Site Development, Preliminary Grading Plan, "B" Street Row Homes," by Christensen Engineering and Surveying, original date April 6, 2015.

6. "Infiltration Testing, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated July 13, 2016.

7. "LDR-Geology Review," by the City of San Diego, Development Services, L644-003A, dated August 1, 2016.

Categorization of Infiltration Feasibility Condition		Form I-8	
Part 1 - Full Infiltration Feasibility Screening Criteria Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: Infiltration testing of the compacted fill in the previously graded alley at the rear of the site has been performed (see attached "Infiltration Testing..."). The remainder of the site has not been graded and requires import (source unknown) to achieve finished grades. We recommend that the import have infiltration rates no less than 0.17 in/hr (average of infiltration rates in alley) and that infiltration testing of the import be performed when the import source is known to confirm the infiltration rates. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: Geotechnical recommendations to mitigate potential geotechnical hazards due to storm water infiltration to acceptable levels are provided in the attached "Geotechnical Update..." and "Addendum to Geotechnical Update...". Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Form I-8 Page 2 of 4			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: No infiltration rates greater than 0.5 in/hr have been measured at the site. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: No infiltration rates greater than 0.5 in/hr have been measured at the site. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2	Possible Partial Infiltration	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by the City Engineer to substantiate findings

Form I-8 Page 3 of 4			
Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	
Provide basis: Two tests using Open Pit Falling Head test method have been performed. Results were 0.22 in/hr and 0.12 in/hr without safety factors. For design considerations, the following infiltration values will be used: 0.11 in/hr for IMP-A (as 0.22 in/hr test is closest to IMP-A and a Safety Factor of 2 is used); an average value of 0.17 in/hr divided by 2 = 0.085 in/hr will be used for IMP-B and IMP-C. As both are located in fill conditions, a requirement to use soils with an infiltration capacity no less than 0.17 in/hr will be included. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: Geotechnical recommendations to mitigate potential geotechnical hazards due to storm water infiltration to acceptable levels are provided in the attached "Geotechnical Update..." and "Addendum to Geotechnical Update...". Please refer to answer 5. A gravel layer under the french drain with a thickness calculated in accordance to the requirements of the BLP Manual and in accordance to the infiltration results displayed in answer 5 will be included. A french drain is also added above that gravel thickness for safety reasons, in case the soil does not infiltrate as expected. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			

Form I-8 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Mounding concerns should be minor as a french drain system is added in the IMPs once the water exceeds a certain minimum depth in the gravel layer. Storm water pollutant concerns are unknown at this time but the expected little infiltration has a low risk of mobilizing potential pollutants that could be present in the soil, especially considering the depth of the ground water as a boring with a depth of 35 ft failed to find the water table. Infiltrated water will travel at least 35 ft before reaching the water table, so the water will be filtered by then. In addition we are not aware of any known soil contamination present at the site. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: It is not known at this point the status of the downstream water rights. In addition, this question requires the expertise of water-rights lawyers to determine if any violation can be expected downstream by reducing the runoff slightly via infiltration of the water into the IMPs. Due to the location of the project in a highly urbanized area, it is unlikely that violation of water rights might occur; however, the Civil Team is not responsible for potential violations in water rights that could occur. Infiltration has been included on the project as part of the Water Board strategy of reducing runoff, and as a request of the City. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.	Partial Infiltration	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by the City Engineer to substantiate findings

Factor of Safety and Design Infiltration Rate Worksheet				Form I-9	
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) $p = w \times v$
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.00
B	Design	Level of pretreatment/ expected sediment loads	0.5	1	0.50
		Redundancy/resiliency	0.25	2	0.50
		Compaction during construction	0.25	3	0.75
		Design Safety Factor, $S_B = \Sigma p$			1.75
Combined Safety Factor, $S_{total} = S_A \times S_B$				1.75 (use 2.0)	
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)				0.22 & 0.12	
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$				0.11 & 0.06	
Supporting Data					

Briefly describe infiltration test and provide reference to test forms: Two open pit falling head tests were performed (see attached "Infiltration Testing...").

GEOTECHNICAL UPDATE
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

HETHERINGTON ENGINEERING, INC.

HETHERINGTON ENGINEERING, INC.

SOIL & FOUNDATION ENGINEERING • ENGINEERING GEOLOGY • HYDROGEOLOGY

April 24, 2015
Project 7603.1
Log No. 17400

Janco, LLC
P.O. Box 231446
Encinitas, California 92033

Attention: Mr. Matthew Gordon

Subject: GEOTECHNICAL UPDATE
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

References: Attached

Dear Mr. Gordon:

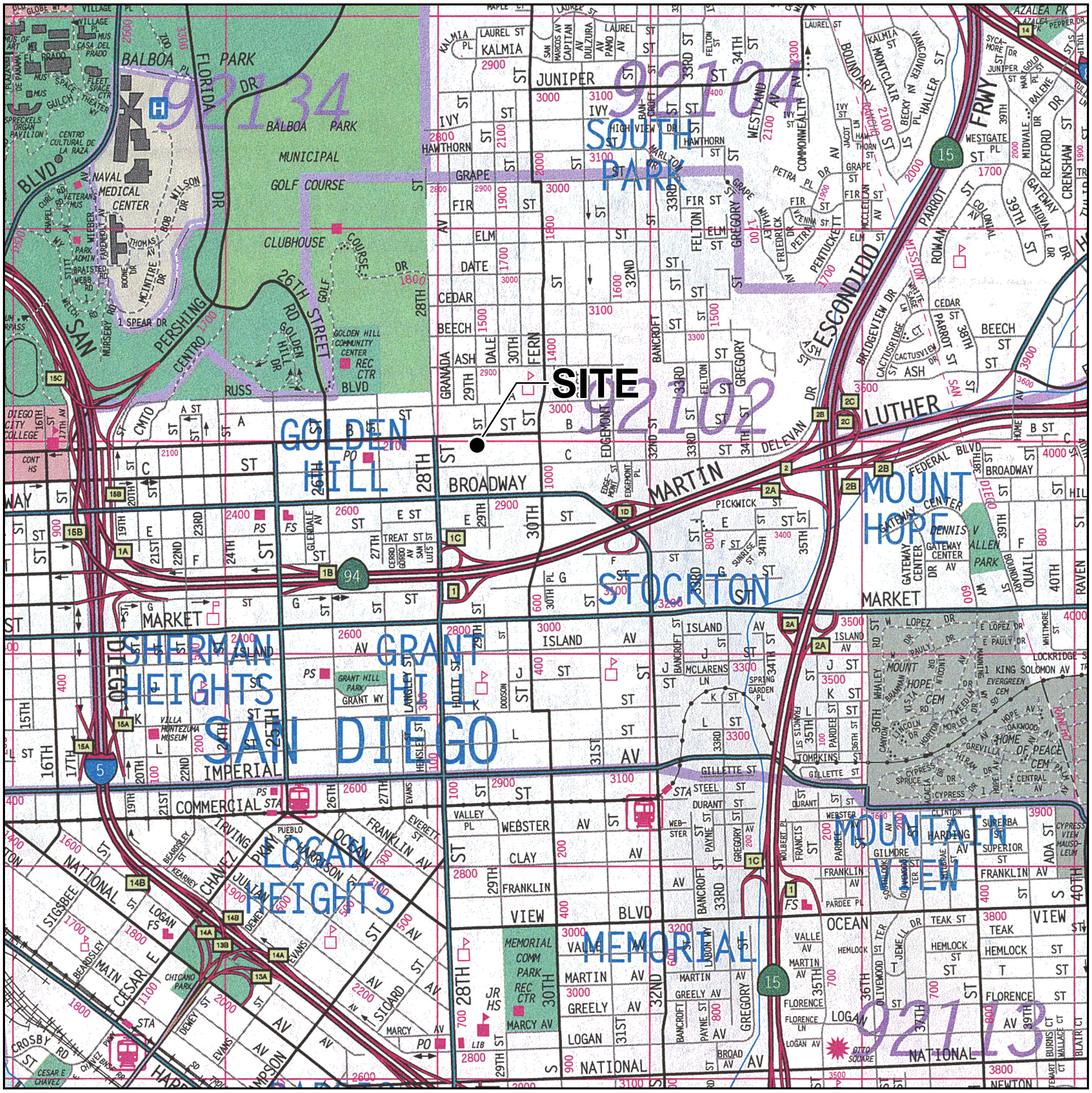
In accordance with your request, Hetherington Engineering, Inc. has prepared this geotechnical update for the subject site. Our work was performed in March and April 2015. The purpose of the geotechnical update was to evaluate the reported geologic and soil conditions at the site, and to provide updated grading and foundation recommendations for the proposed development. We were provided with a "Tentative Map, Preliminary Grading Plan…" (Reference 11) that has been used as the base map for the attached Geologic Map, Plate 1. With the above in mind, our scope of work included the following:

- Research and review of available plans, reports and geologic literature pertinent to the subject site and vicinity (see References).
- Engineering and geologic analysis.
- Preparation of this report providing our findings, conclusions and recommendations.

SITE DESCRIPTION

The subject site is located on the south side of "B" Street and west of 29th Street in the City of San Diego, California (see Location Map, Figure 1). The site consists of an unimproved rectangular shaped property. Soil stockpiles currently exist along the northwest, west and south sides of the site.

Topographically, the site consists of a southeasterly trending unnamed drainage, with ascending slopes on all sides. The drainage has been modified by prior grading and the



ADAPTED FROM: The Thomas Guide, San Diego County, 2006 Edition, Page 1289

SCALE: 1" - 2000'
(1 Grid = 0.5 x 0.5 miles)

LOCATION MAP

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | FIGURE NO. 1

construction of “B” Street in the mid 1920’s that filled a portion of the drainage and included a storm drain that outlets at approximately mid-property (Reference 13). Prior grading to the west included a fill slope that descends from the adjacent multi-family residential building to the subject property (Reference 5). Grading of the parcel to the south was completed in 2014 (References 14 and 15). Remedial grading for the property to the south partially extended onto the subject site.

The site is bounded by an existing multi-family residential structure to the west, by an unimproved parcel to the east, by “B” Street to the north, and by the Golden Hill Rowhomes on “C” Street to the south (currently under construction).

PROPOSED DEVELOPMENT

The referenced “Tentative Map, Preliminary Grading Plan…” indicates that the proposed development consists of eleven, single-family residential townhomes in five buildings. The buildings will be three-story with partial subterranean lower levels that will incorporate retaining walls up to 10-feet high to facilitate grade changes within the building footprint. Appurtenant improvements include retaining walls to a maximum height of approximately 10-feet, concrete driveways and flatwork, and landscaping. The existing storm drain will be extended from the current outlet to the southeast portion of the site.

Building loads are expected to be typical for this type of relatively light construction. Proposed site grading includes fill to a maximum designed depth of 18-feet. Import soil will be required. New slopes are proposed to a maximum height of approximately 14-feet at 2:1 (horizontal to vertical) slope ratios.

PREVIOUS GEOTECHNICAL INVESTIGATIONS

Robert Prater Associates performed a geotechnical investigation of the subject property in 1980 (Reference 22). The scope of work included three borings, five test pits and laboratory testing. The approximate locations of the exploratory borings and test pits are indicated on the attached Geologic Map, Plate 1. The Exploratory Boring Logs, Exploratory Test Pit Logs and laboratory test data are included in the attached Appendix A.

Allied Earth Technology performed a geotechnical investigation on the subject and adjacent property to the south in 2001 (Reference 2). The scope of work included exploratory test pits and laboratory testing. The approximate locations of the exploratory test pits are indicated on the attached Geologic Map, Plate 1. The Trench Log Sheets by

Allied Earth Technology are included in the attached Appendix B. No laboratory testing was performed on soils from the two test pits on the subject site.

SOIL AND GEOLOGIC CONDITIONS

1. Geologic Setting

   The subject site is located near the western margin of the coastal plain region of the Peninsular Ranges Geomorphic Province in San Diego, California, within an elevated level plateau, located approximately 2-miles east of San Diego Bay. The site is located within the northeast portion of the USGS Point Loma 7-1/2 minute quadrangle.

   This region of San Diego is characterized mainly by elevated plateaus cut by south trending drainage channels into Pleistocene and Pliocene, marine and non-marine sediments, discharging ultimately into San Diego Bay.

   Based on the results of the prior investigations and our recent grading observations on the property to the south, the subject site is underlain by undocumented and compacted fill, undifferentiated alluvium/colluvium and bedrock of the Linda Vista Formation. The approximate limits of these geologic units are depicted on the attached Geologic Map, Plate 1 and Geologic Cross-Sections, Figures 2 through 5.

2. Geologic Units

   a. Undocumented Fill - The site is immediately underlain by several generations of fill. Recently stockpiled fill soils exists along the northwest, west, and south sides of the site. The topography on the attached Geologic Map, Plate 1 does not reflect the stockpiled fill.

      Fill associated with the construction of "B" Street underlies the northern portion of the site to depths that likely approach 25±-feet along the north property line. Undocumented fill is not considered suitable to support new fill or proposed improvements.

   b. Compacted Fill - Fill observed and tested by Alpha Laboratories, Inc. extends onto the west side of the subject site to estimated depths of 5 to 10-feet (Reference 5).

Fill observed and tested by Hetherington Engineering, Inc. exists along the southern portion of the property (References 14 and 15). These fill soils consist of silty to clayey sand. The compacted fill is considered suitable to support new fill and proposed improvements.

c. Undifferentiated Alluvium/Colluvium - Undifferentiated alluvium/colluvium was encountered in the Robert Prater Associates borings EB-1 and EB-3 and test pits TP-1, TP-2, TP-3, TP-4 and TP-5; and in the Allied Earth Technology Trench Nos. 4 and 5. These soils consist of silty to clayey sand with gravel and cobbles. The thickness of these soils is expected to vary from 3-feet on the side slopes to 25-feet or more under the undocumented fill. Previous removals of alluvium/colluvium along the southern portion of the property extended to elevation 159.4-feet near the southeast corner to 169.3-feet near the southwest corner of the site. These soils are not considered suitable to support new fill or proposed improvements.

d. Bedrock (Linda Vista Formation) - Bedrock underlies the fill and alluvium/colluvium at depths estimated to vary from approximately 10 to 30-feet below existing site grades and consists generally of silty fine to coarse sandstone, which is moist, dense to very dense, poorly cemented, slightly friable and massive.

3. Groundwater

Groundwater was not encountered in the prior exploratory borings and test pits to the maximum depths explored. Fluctuations in the amount and level of groundwater are expected to occur due to the existing drainage channel and variations in rainfall, irrigation, and other factors that might not have been evident at the time of our field investigation.

SEISMICITY

The site is located within the seismically active southern California region. There are, however, no known active or potentially active faults presently mapped that pass through the site nor is the site located within the presently defined limits of an Alquist-Priolo Earthquake Fault Zone. Active or potentially active fault zones within the site region include the Rose Canyon, Coronado Bank and Elsinore (Julian Segment). Strong ground motion could also be expected from earthquakes occurring along the San Jacinto and San Andreas fault zones, which lie northeast of the site at greater distances, as well as a number of other offshore faults. The Texas Street Fault is mapped by the city of San Diego approximately 300-feet west of the site.

The following table lists the known active faults that would have the most significant impact on the site.

Fault	Maximum Probable Earthquake (Moment Magnitude)	Slip Rate (mm/year)
Rose Canyon (1-mile/1.6 kilometers) SW	7.0	1.5
Coronado Bank (14-miles/22.5 kilometers) SW	7.3	3.0
Elsinore (Julian Segment) (32-miles/51.5 kilometers) NE	7.3	3.0

SEISMIC EFFECTS

1. Ground Accelerations

   The most significant probable earthquake to effect the site would be a 7.0 magnitude earthquake on the Rose Canyon fault zone. Based on Section 1803.5.12 of the 2013 California Building Code, peak ground accelerations of about 0.505g are possible for the design earthquake.

2. Ground Cracks

   The risk of fault surface rupture due to active faulting is considered low due to the absence of known active faulting on site. Ground cracks due to shaking from seismic events in the region are possible, as with all of southern California.

3. Landsliding

   At the completion of site grading, slopes will consist of compacted fill slopes to a maximum height of approximately 15-feet inclined at 2:1 (horizontal to vertical) slope ratios. The risk of seismically induced landsliding is considered negligible.

4. Liquefaction

   Liquefaction is a phenomenon in which earthquake induced cyclic stresses generate excess pore water pressure in cohesionless soils, causing a temporary loss of shear strength. Due to the dense underlying Linda Vista formation, proposed compacted fill and lack of shallow groundwater, liquefaction is not considered a site hazard.

5. Tsunamis

   Due to the site elevation and distance from the coast, tsunami inundation is not considered a site hazard.

CONCLUSIONS AND RECOMMENDATIONS

1. General

   The proposed development is considered feasible from a geotechnical standpoint. Grading and foundation plans should take into account the appropriate geotechnical features of the site. The proposed construction is not anticipated to adversely impact the adjacent properties from a geotechnical standpoint, provided the recommendations presented in this report and good construction practices are implemented during design and construction.

2. Seismic Parameters for Structural Design

   Seismic considerations that may be used for structural design at the site include the following:

   a. Ground Motion - The proposed structures should be designed and constructed to resist the effects of seismic ground motions as provided in Section 1613 of the 2013 California Building Code.

      Site Address: "B" Street at 29th Street, San Diego, California

      Latitude: 32.717º

      Longitude: -117.132º

b. Spectral Response Accelerations - Using the location of the property and data obtained from the U.S.G.S. Earthquake Hazard Program, short period Spectral Response Accelerations S_s (0.2 second period) and S_1 (1.0 second period) are:

$S_s = 1.151g$
$S_1 = 0.442g$

c. Site Class - In accordance with Chapter 20 of ASCE 7-10, a Site Class D is considered appropriate for the subject property.

d. Site Coefficients F_a and F_v - In accordance with Tables 1613.3.3 and considering the values of S_s and S_1, Site Coefficients for a Class D site are:

$F_a = 1.04$
$F_v = 1.558$

e. Spectral Response Acceleration Parameters Sm_s and Sm_1 - In accordance with Section 1613.3.3 and considering the values of S_s and S_1, and F_a and F_v, Spectral Response Acceleration Parameters for Maximum Considered Earthquake are:

$Sm_s = (F_a)(S_s) = 1.196g$
$Sm_1 = (F_v)(S_1) = 0.689g$

f. Design Spectral Response Acceleration Parameters Sd_s and Sd_1 - In accordance with Section 1613.3.4 and considering the values of Sm_s and Sm_1, Design Spectral Response Acceleration Parameters for Maximum Considered Earthquake are:

$Sd_s = 2/3\ Sms = 0.798g$
$Sd_1 = 2/3\ Sm_1 = 0.459g$

g. Long Period Transition Period - A Long Period Transitional Period of TL = 8 seconds is provided for use in San Diego County.

h. Seismic Design Category – In accordance with Tables 1604.5, 1613.3.5 and ASCE 7-10, a Risk Category II and a Seismic Design Category D are considered appropriate for the subject site.

3. Slope Stability

   Cut and fill slopes should be constructed at a slope ratio of 2:1 (horizontal to vertical) or flatter.

4. Site Grading

   Prior to grading, existing improvements, vegetation and miscellaneous debris within the limits of the proposed grading and construction should be removed to an appropriate offsite disposal area. Holes resulting from the removal of buried obstructions, which extend below finished site grades, should be replaced with compacted fill. In the event that abandoned cesspools, septic tanks or storage tanks are discovered during the excavation of the site, they should be removed and backfilled in accordance with local regulations. Existing utility lines to be abandoned should be removed and capped in accordance with the local requirements.

   In the areas proposed for grading, the existing undocumented fill, undifferentiated alluvium/colluvium and other material deemed unsuitable by the Geotechnical Consultant should be removed to expose approved compacted fill or bedrock. Removals of 5 to 35-feet (or more) below existing grades are anticipated. If a bedrock/fill transition exists within the footprint of any building pad, additional removals should be performed to provide a minimum depth of compacted fill of 5-feet below proposed grades. The Geotechnical Consultant should determine final removal depths during site grading.

   Due to the required removals, "B" Street improvements will require shoring to facilitate removals. Alternatively, the existing undocumented fill and undifferentiated alluvium/colluvium can be entirely removed down to a 1:1 (horizontal to vertical) projection extended downward from the "B" Street property line to the bedrock contact, and the remaining undocumented fill and undifferentiated alluvium/colluvium densified in-place by compaction grouting. Additionally, the existing storm drain may require removals below the existing flow line. This will require excavation in sections, protecting the storm drain in place or removal and replacement of the storm drain. Actual depths of removals in the vicinity of the existing storm drain are not known.

   After the removal of unsuitable soils and any additional required over excavation have been made, all areas to receive fill should be scarified to a depth of 6 to 8-inches, brought to near optimum moisture conditions and compacted to at least 90-percent relative compaction (ASTM: D 1557).

Fill soils should be moisture conditioned to about optimum moisture content and compacted by mechanical means in uniform horizontal lifts of 6 to 8-inches in thickness. All fill should be compacted to a minimum relative compaction of 90-percent (ASTM: D 1557). The on-site materials are considered suitable for use as compacted fill. Rock fragments over 6-inches in dimension and other perishable or unsuitable materials should be excluded from the fill. All grading and compaction should be observed and tested as necessary by the Geotechnical Consultant.

Any import soil should be approved by the Geotechnical Consultant prior to import. Any imported soil to be used as structural fill should have an expansion index of 20 or less and the expansion index should be verified by the Geotechnical Consultant prior to site delivery.

5. Shoring

If the entire removal of the undocumented fill and undifferentiated alluvium/colluvium is planned to the "B" Street property line, shoring will be necessary to protect off-site property and create a safe condition for workers during construction. The design, installation, and performance of the shoring system are considered the responsibility of the contractor and designer. Geotechnical recommendations necessary for the shoring design are included under the "Foundations and Slabs" section of this report. The shoring plan should be reviewed by the Geotechnical Consultant to confirm conformance with the recommendations presented herein and to provide additional comments as necessary.

6. Foundations and Slabs

The following recommendations are considered geotechnical minimums and may be increased by structural requirements or by the soils conditions exposed at the completion of grading.

The proposed structures may be supported by conventional continuous/spread footings founded at least 18-inches into compacted fill or bedrock. Continuous footings should be at least 12-inches wide and reinforced with a minimum of four #5 bars, two top and two bottom. Foundations located adjacent to utility trenches should extend below a 1:1 plane projected upward from the bottom of the trench. Foundations located on or adjacent to slopes should provide a horizontal distance of at least H/3, where H is the slope height, from the bottom of the footing to the face of the slope. Foundations bearing as recommended may be designed for a dead plus live load bearing value of 2000-pounds-per-square-foot. This value may be increased by one-third for loads including wind and seismic forces. A lateral bearing value of 150-pounds-per-square-foot per foot of depth to a maximum value of 2000-pounds-per-square-foot and a coefficient of friction between foundation soil and concrete of 0.25 may be assumed. These values assume that footings will be placed neat against the foundation soils. Footing excavations should be observed by the Geotechnical Consultant prior to the placement of reinforcing steel in order to verify that they are founded in suitable bearing materials.

Total and differential settlement of the proposed structures due to foundation loads is considered to be less than 3/4 and 3/8-inch, respectively, for footings founded as recommended.

Drilled piers associated with the shoring should extend at least 5-feet into approved bedrock and should have a minimum diameter of 24-inches. Drilled piers founded as recommended may be designed for a dead plus live load end bearing capacity of 4000-pounds-per-square-foot. This value may be increased by one-third for wind and seismic forces. A skin friction value of 150-pounds-per-square-foot may be assumed in bedrock. Piers may resist lateral loads by a passive pressure of 400-pounds-per-square-foot per foot of depth in bedrock to a maximum value of 4000-pounds-per-square-foot. The passive resistance may be calculated over two pier diameters.

Drilled piers should be observed by the Geotechnical Consultant at the time of drilling to ensure that the appropriate bearing materials have been encountered.

Slab-on-grade floors should have a minimum thickness of 5-inches and should be reinforced with #4 bars spaced at 18-inches, center-to-center, in two directions, and supported on chairs so that the reinforcement is at mid-height in the slab. A 4-inch layer of clean sand should underlie slabs with at least a 10-mil polyvinyl chloride moisture vapor retarder placed at mid-height in the sand. The vapor retarder should be placed in accordance with ASTM: E 1643. Slab subgrade soils should be thoroughly moistened prior to vapor retarder placement.

Vapor retarders are not intended to provide a waterproofing function. Should moisture vapor sensitive floor coverings be planned, a qualified consultant/contractor should be consulted to evaluate moisture vapor transmission rates and to provide recommendations to mitigate potential adverse impacts of moisture vapor transmissions on the proposed flooring.

7. Retaining Walls

Retaining wall foundations supported in compacted fill or bedrock should be designed in accordance with the previous building foundation recommendations provided in this report. Retaining walls free to rotate (cantilevered walls) should be designed for an active earth pressure of 35-pounds-per-cubic-foot (equivalent fluid pressure) assuming level backfill consisting of the on-site soils. Walls restrained from movement at the top should be designed for an at-rest earth pressure of 60-pounds-per-cubic-foot (equivalent fluid pressure) assuming level backfill consisting of the on-site soils. Any additional surcharge pressures behind the walls should be added to these values.

Retaining walls should be provided with adequate drainage to prevent buildup of hydrostatic pressure and should be adequately waterproofed. The subdrain system behind retaining walls should consist at a minimum of 4-inch diameter Schedule 40 (or equivalent) perforated (perforations down) PVC pipe embedded in at least 1-cubic-foot of 3/4-inch crushed rock per lineal foot of pipe all wrapped in approved filter fabric. Other subdrain systems that may be contemplated for use behind retaining walls due to the ultimate wall designs and construction methodology will be addressed on a case-by-case basis. Recommendations for wall waterproofing should be provided by the Project Architect and/or Structural Engineer consistent with Section 1805.3 of the 2013 California Building Code. Unrestrained (cantilever) retaining walls should be anticipated to experience some minor rotation and improvements placed behind the walls should be designed and constructed to accommodate this movement.

The lateral pressure on retaining walls due to earthquake motions (dynamic lateral force) should be calculated as $P_A = 3/8\ \gamma\ H^2 k_h$ where

P_A	=	dynamic lateral force (lbs/ft)
γ	=	unit weight = 130 pcf
H	=	height of wall (feet)
k_h	=	seismic coefficient = 0.17g

The dynamic lateral force is in addition to the static force and should be applied using a triangular distribution with the resultant applied at 0.3H above the base of the retaining wall. Any retaining walls that are less than 6-feet high do not require design to resist the additional earth pressure caused by seismic ground shaking.

8. Concrete Flatwork

Concrete flatwork should be at least 5-inches thick (actual) and reinforced with No. 4 bars spaced at 18-inches on-center (two directions) and placed on chairs so that the reinforcement is in the center of the slab. Slab subgrade should be maintained at or slightly above optimum moisture content prior to placement of concrete. Contraction joints should be provided at 10-feet spacing (maximum). Joints should create square panels where possible. For rectangular panels (where necessary) the long dimension should be no more than 1.5 times the short dimension. Joint depth should be at least 0.25 times the flatwork thickness. Expansion joints should be thoroughly sealed to prevent the infiltration of water into the underlying soils.

9. Corrosivity Testing

Due to the need for import soils at the site, corrosivity testing should be performed at the completion of grading. Pending the results of this testing, the onsite soils should be considered severely corrosive to concrete and buried metals.

10. Temporary Slopes

Temporary slopes may be excavated vertically up to 5-feet and at a slope ratio no steeper than 1:1 (horizontal to vertical) over 5-feet in height. Field observations by the Engineering Geologist during grading of temporary slopes are recommended and considered necessary to confirm anticipated conditions and provide revised recommendations if necessary.

11. Retaining Wall and Utility Trench Backfill

All retaining wall and utility trench backfill should be compacted to at least 90-percent relative compaction (ASTM: D 1557). Backfill should be tested and observed by the Geotechnical Consultant.

12. Site Drainage

The following recommendations are intended to minimize the potential adverse effects of water on the structures and appurtenances.

a. Consideration should be given to providing the structures with roof gutters and downspouts that discharge to an area drain system and/or to suitable locations away from the structure.

b. All site drainage should be directed away from the structures and not be allowed to flow over slopes.

c. No landscaping should be allowed against the structures. Moisture accumulation or watering adjacent to foundations can result in deterioration of building materials and may effect foundation performance.

d. Irrigated areas should not be over-watered. Irrigation should be limited to that required to maintain the vegetation. Additionally, automatic systems must be seasonally adjusted to minimize over-saturation potential particularly in the winter (rainy) season.

e. All yard and roof drains should be periodically checked to verify they are not blocked and flow properly. This may be accomplished either visually or, in the case of subsurface drains, by placing a hose at the inlet and checking the outlet for flow.

13. <u>Recommended Observation and Testing During Construction</u>

The following tests and/or observations by the Geotechnical Consultant are recommended:

a. Observation and testing of grading.

b. Shoring installation.

b. Foundation excavations prior to placement of forms and reinforcement.

c. Utility trench backfill.

d. Retaining wall subdrains and backfill.

e. Concrete flatwork subgrade.

14. <u>Grading and Foundation Plan Review</u>

Grading and foundation plans should be reviewed by the Geotechnical Consultant to confirm conformance with the recommendations presented herein or to modify the recommendations as necessary.

LIMITATIONS

The analyses, conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our investigation and further assume the excavations to be representative of the subsurface conditions throughout the site. If different subsurface conditions from those encountered during our exploration are observed or appear to be present in excavations, the Geotechnical Consultant should be promptly notified for review and reconsideration of recommendations.

Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the conclusions and professional advice included in this report.

This opportunity to be of service is sincerely appreciated. If you have any questions, please call this office.

Sincerely,
HETHERINGTON ENGINEERING, INC.

Paul A. Bogseth
Professional Geologist 3772
Certified Engineering Geologist 1153
Certified Hydrogeologist 59
(expires 3/31/16)

Mark D. Hetherington
Civil Engineer 30488
Geotechnical Engineer 397
(expires 3/31/16)

Attachments:	Location Map	Figure 1
	Geologic Cross-Sections	Figures 2 through 5
	Geologic Map	Plate 1
	Robert Prater Associates Data	Appendix A
	Allied Earth Technology Data	Appendix B

Distribution: 6-Addressee
1-via e-mail (Gordon.matthew0@gmail.com)
1-via e-mail (chris@h2asandiego.com)

REFERENCES

1. Albert & Hoy Engineering, Inc., "Grading Plan for 8-Unit Condominium Project on South Side of "B" Street Between 28th and 29th Street (2861 "B" Street)," dated "AsBuilt" December 2, 1981.

2. Allied Earth Technology, "Geotechnical Investigation, Proposed 46-Unit Townhome Site, West Side of 29th Street Between B Street and C Street, San Diego, California," dated May 10, 2001.

3. Allied Earth Technology, "Update of Geotechnical Investigation Report, Proposed Golden Hills Rowhomes Site, West Side of 29th Street, Between B Street and C Street, San Diego, California," dated May 15, 2013.

4. Alpha Laboratories, Inc., "Report of Preliminary Soils Investigation for 2861 B Street, San Diego, California," dated January 28, 1980.

5. Alpha Laboratories, Inc., "Report of Compacted Fill for 2861 "B" Street, San Diego, California," dated September 23, 1981.

6. American Society of Civil Engineers, "Minimum Design Loads for Buildings and other Structures, ASCE 7-10," dated 2010.

7. California Building Standards Commission, "California Building Code," 2013 Edition.

8. California Division of Mines and Geology, "Planning Scenario for a Major Earthquake, San Diego – Tijuana Metropolitan Area," Special Publication 100, dated 1990.

9. California Emergency Agency, "Tsunami Inundation Map for Emergency Planning, National City Quadrangle," dated June 1, 2009.

10. Cao, Tianging, et al, "The Revised 2002 California Probabilistic Seismic Hazard Maps," dated June 2003.

11. Christensen Engineering and Surveying, "Tentative Map, Preliminary Grading Plan, B Street Rowhomes, San Diego, CA," undated.

12. City of San Diego Development Services, "Seismic Safety Study, Geologic Hazards and Faults, Grid Tile 17," dated April 3, 2008.

13. City of San Diego Operating Department, "Plans for the improvement of B St. between the east line of 29th St and a line parallel to and distant 200' west from the west line of 29th St…," dated March 26, 1928.

REFERENCES

14. Hetherington Engineering, Inc., "Supplemental Geotechnical Investigation, Golden Hill Rowhomes, North Side of C Street, West of 29th Street, San Diego, California," dated January 7, 2014.

15. Hetherington Engineering, Inc., "As-Graded Geotechnical Report, Golden Hill Rowhomes, North Side of C Street, West of 29th Street, San Diego, California, PTS No. 339446," dated September 23, 2014.

16. ICBO, "Maps of Known Active Faults Near-Source Zones in California and Adjacent Portions of Nevada," dated February 1998.

17. Jennings, Charles W., "Fault Activity Map of California and Adjacent Areas," California Data Map Series, Map No. 6, dated 1994.

18. Kennedy, Michael P., "Geology of the San Diego Metropolitan Area, California," California Division of Mines and Geology, Bulletin 200, dated 1975.

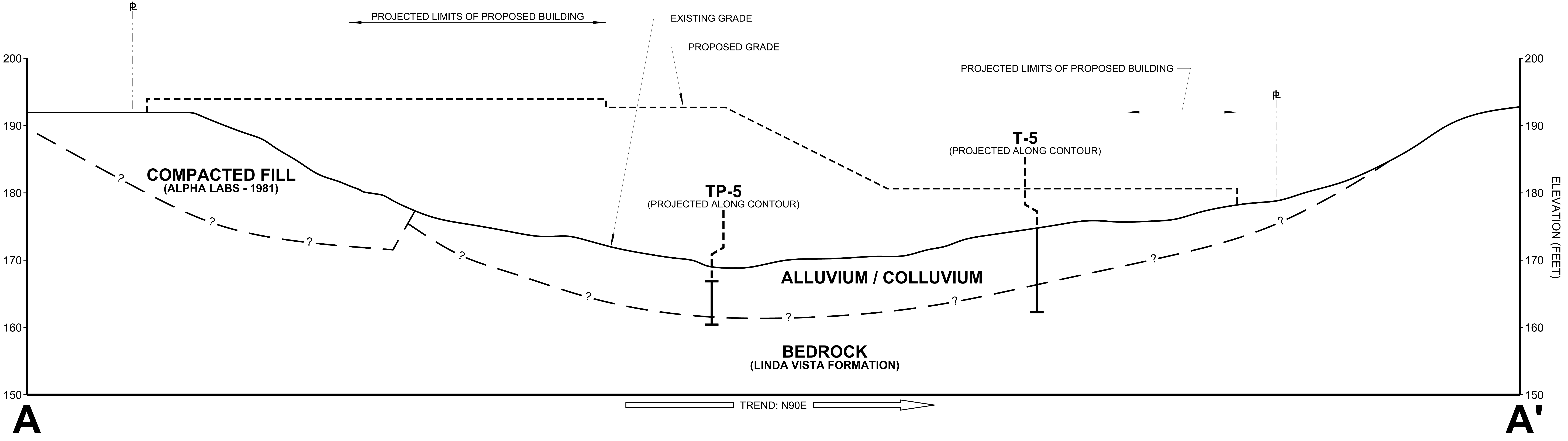
19. Kennedy, Michael P., et al., "Character and Recency of Faulting, San Diego Metropolitan Area, California," Special Report 123, dated 1975.

20. Peterson, M., Beeby, W., Bryant, W., et al., "Seismic Shaking Hazard Maps of California," California Division of Mines and Geology, Map Sheet 48, dated 1999.

21. Petersen, Mark P., "Documentation for the 2008 Update of the United States National Seismic Hazards Maps," USGS Open File Report 2008-1128, dated 2008.

22. Robert Prater Associates, "Soil Investigation, 29th & B Streets Condominiums, San Diego, California," dated December 30, 1980.

23. 2007 Working Group on California Earthquake Probability, "The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF-2)," USGS Open File Report 2007-1437 and CGS Special Report 203, dated 2008.



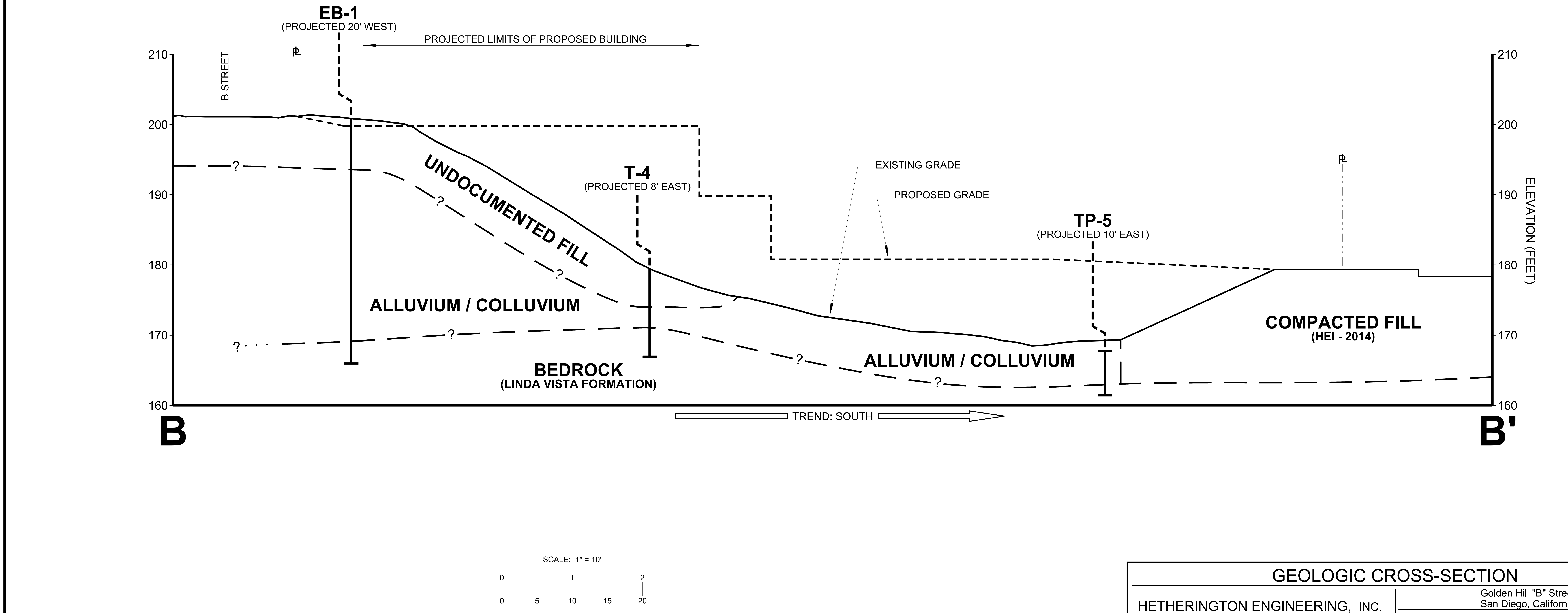
SCALE: 1" = 10'

0 1 2

0 5 10 15 20

NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

GEOLOGIC CROSS-SECTION	
HETHERINGTON ENGINEERING, INC. GEOTECHNICAL CONSULTANTS	Golden Hill "B" Street San Diego, California
	PROJECT NO. 7603.1	FIGURE NO. 2



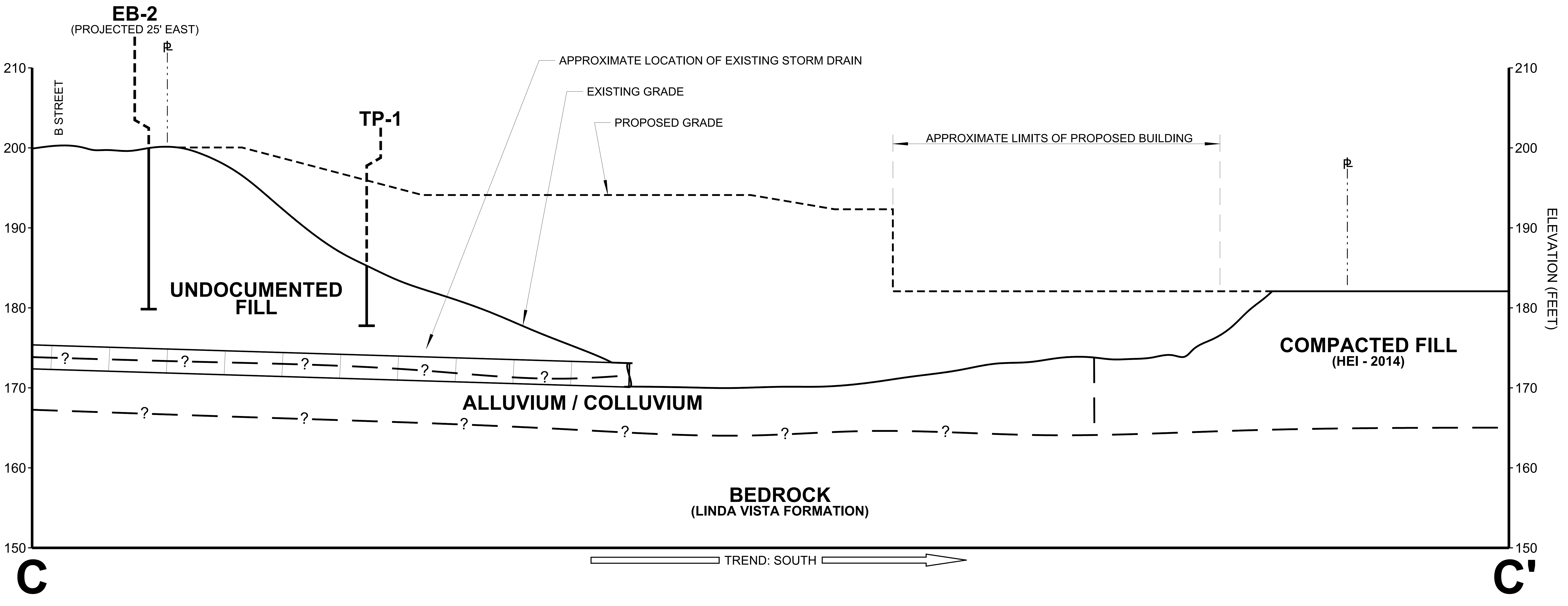
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | FIGURE NO. 3



SCALE: 1" = 10'

0 1 2

0 5 10 15 20

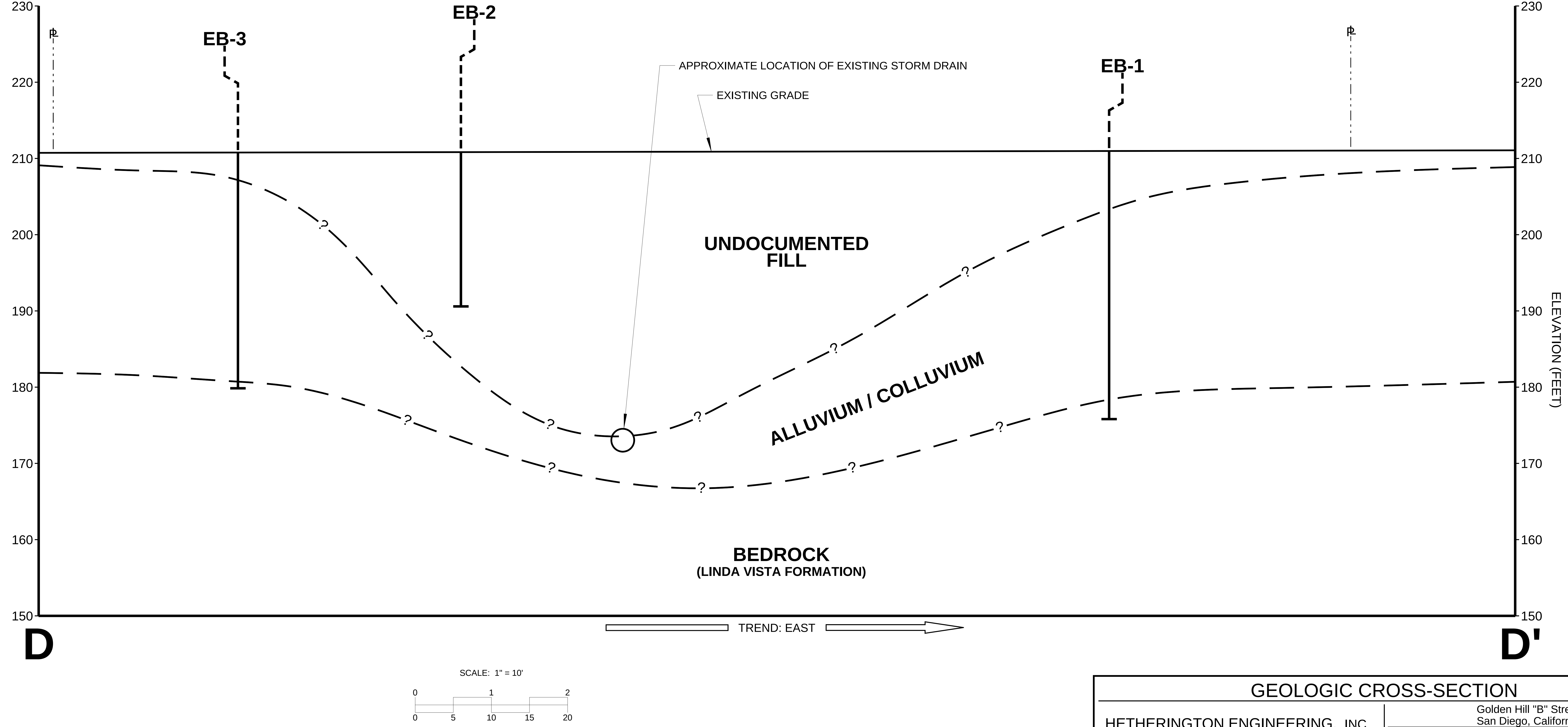
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | FIGURE NO. 4



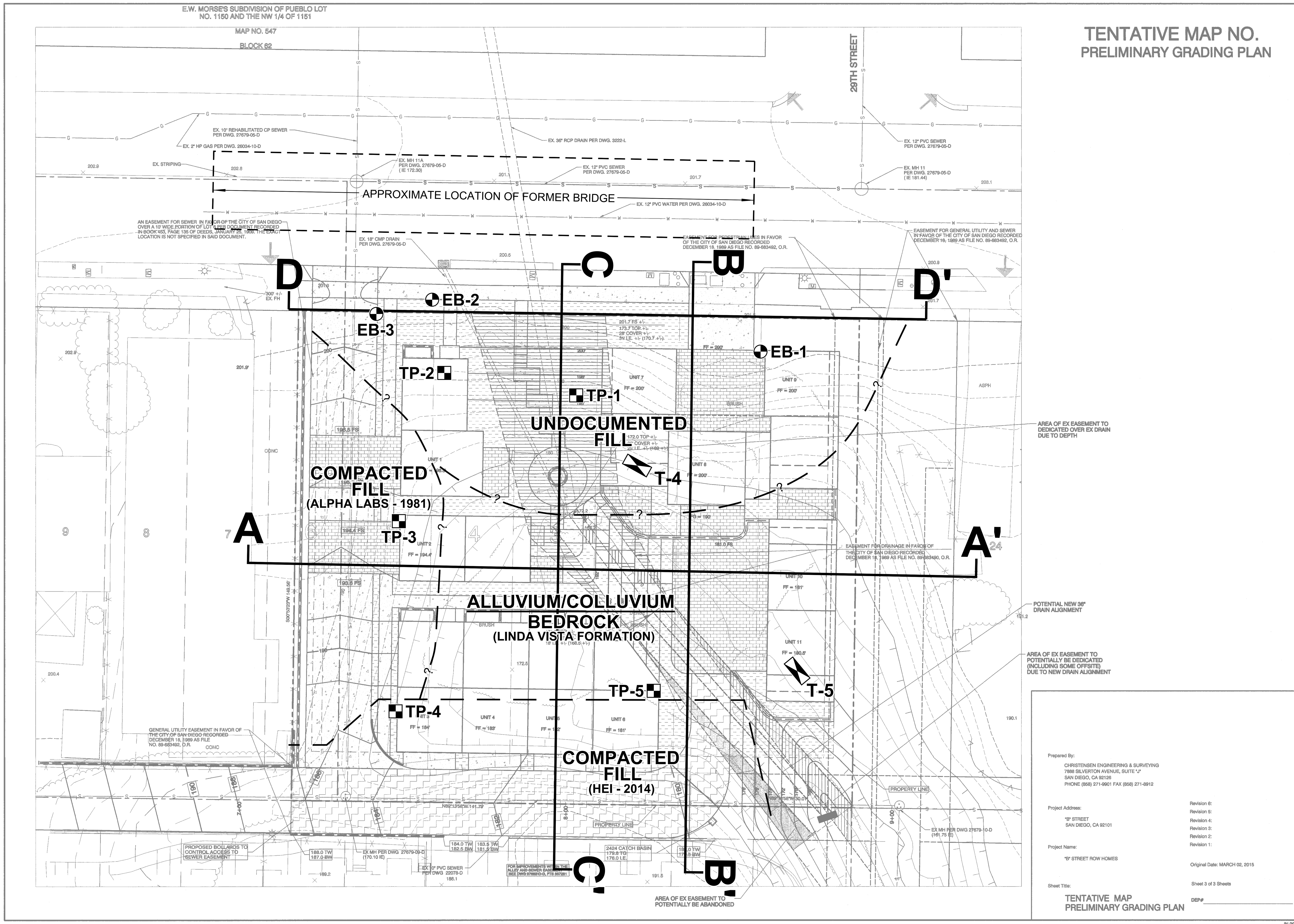
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | FIGURE NO. 5



NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

LEGEND

T-5 APPROXIMATE LOCATION OF TEST PIT BY ALLIED EARTH TECHNOLOGY (2001)

EB-3 APPROXIMATE LOCATION OF BORING BY ROBERT PRATER ASSOCIATES (1980)

TP-5 APPROXIMATE LOCATION OF TEST PIT BY ROBERT PRATER ASSOCIATES (1980)

? APPROXIMATE LOCATION OF GEOLOGIC CONTACT (QUERRIED WHERE UNCERTAIN)

B B' GEOLOGIC CROSS-SECTION

SCALE: 1" = 20'

N

0 1 2

0 10 20 30 40

GEOLOGIC MAP	
HETHERINGTON ENGINEERING, INC. GEOTECHNICAL CONSULTANTS	Golden Hill "B" Street San Diego, California
	PROJECT NO. 7603.1 | PLATE NO. 1

APPENDIX A
Robert Prater Associates Data

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION 196 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	BORING DIAMETER 6 Inches	DATE DRILLED 11/19/80

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
GRAVEL AND COBBLES, with pieces of asphalt and concrete rubble		grayish brown	loose	GP	1					
					2					
Note: "x" denotes jar sample taken from auger cuttings.					3	x				
					4–6					
FILL					7					
INTERBEDDED SILTY AND CLAYEY SAND, with lenses of gravel and cobbles		reddish & grayish brown	medium dense	SM/SC	8–9	X	21	6		
					10–14					
					15			16	7		
					16–18					
					19	X	27			
(continued)					20					

ROBERT PRATER ASSOCIATES
Consulting Soil, Foundation & Geological Engineers

EXPLORATORY BORING LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	BORING NO.
132-34	December 1980	1 (pg. 1)

02 11 2000

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION 196 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	BORING DIAMETER 6 Inches	DATE DRILLED 11/19/80

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
INTERBEDDED SILTY AND CLAYEY SAND, with lenses of gravel and cobbles		reddish & grayish brown	medium dense	SM/SC	21–28					
					29–30	X	67	13		
					31–32					
SILTY SAND, formational sandstone		grayish brown	very dense	SM	33–35		50/6"			
Bottom of Boring = 35 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil, Foundation & Geological Engineers

EXPLORATORY BORING LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	BORING NO
132-34	December 1980	1 (Pg. 2)

02 11 2000

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION 195 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	BORING DIAMETER 6 Inches	DATE DRILLED 11/19/80

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
SILTY SAND, with occasional gravel and cobbles (FILL)		yellowish brown	loose	SM	0					
Note: "x" denotes jar sample taken from auger cuttings.					3	x				
					8	x		5		
CLAYEY SAND (FILL)		grayish brown	loose-medium dense	SC	10					
					15	x		14		
Bottom of Boring = 20 Feet					20					

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil, Foundation & Geological Engineers

EXPLORATORY BORING LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	BORING NO.
132-34	December 1980	2

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION 195 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	BORING DIAMETER 6 Inches	DATE DRILLED 11/19/80

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
SILTY SAND		yellowish brown	loose	SM	0–3					
					2	x		7		
FILL										
CLAYEY SAND		reddish brown	medium dense	SC	3					
Notes: 1) "x" denotes jar sample taken from auger cuttings. 2) "s" denotes sack sample taken from auger cuttings.					8	x		6		
					10–11.5		10			
		dark reddish brown			15	s				
(continued)					20					

EXPLORATORY BORING LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	BORING NO
132-34	December 1980	3 (pg. 1)

ROBERT PRATER ASSOCIATES
Consulting Soil, Foundation & Geological Engineers

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION 195 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	BORING DIAMETER 6 Inches	DATE DRILLED 11/19/80

DESCRIPTION AND CLASSIFICATION					DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONS'ST	SOIL TYPE						
CLAYEY SAND		dark reddish brown	medium dense	SC	21		14			
					22					
					23					
					24					
					25					
					26					
					27					
					28					
SILTY SAND, formational sandstone		grayish brown	very dense	SM	29		40			
Bottom of Boring = 30 Feet					30					

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

EXPLORATORY BORING LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO	DATE	BORING NO
132-34	December 1980	3 (pg. 2)

02 11 2000

RIG Case 580-C Backhoe	SURFACE ELEVATION 185 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	Test pit excavated with a 24-inch bucket on 11/19/80	

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	Dry Density (pcf)
SILTY AND CLAYEY SAND with gravel, cobbles, asphalt, and concrete rubble		brown	loose	SM/SC	1	x				
					2					
Notes: 1) "x" denotes jar sample taken from cuttings.		yellowish brown			3	x				
2) "s" denotes sack sample taken from cuttings.					4	s		9		98.3
FILL					5			8		100.3
SILTY SAND-POORLY GRADED SAND, with gravel and cobbles		light grayish brown	medium dense	SM-SP	6					
					7	x		2		
					8					
Bottom of Test Pit = 8 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES Consulting Soil Foundation & Geological Engineers	EXPLORATORY TEST PIT LOG 29TH & B STREETS CONDOMINIUMS San Diego, California		
	PROJECT NO.	DATE	TEST PIT NO.
	132-34	December 1980	1

02 11 2000

RIG Case 580-C Backhoe	SURFACE ELEVATION 185 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	Test pit excavated with a 24-inch bucket on 11/19/80	

DESCRIPTION AND CLASSIFICATION					DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	Dry Density (pcf)
DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST	SOIL TYPE						
SILTY AND CLAYEY SAND, with asphalt and concrete rubble		brown	loose	SM/SC	1					
Notes: 1) "x" denotes jar sample taken from cuttings.					2	x		8		101.1
2) "s" denotes sack sample taken from cuttings.		yellowish brown and brown			3			9		87.0
3) "⊠" denotes hand driven tube sample.					4					
					5	x		5		
					6					
					7	s				
					8					
					9	x				
FILL					10					
CLAYEY SAND-POORLY GRADED SAND		reddish brown	medium dense	SC-SP	11	x		6		
					12					
SILTY SAND, formational sandstone		yellowish brown	dense	SM	13	⊠				
					14	x				
					15					
Bottom of Test Pit = 15 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES Consulting Soil Foundation & Geological Engineers	EXPLORATORY TEST PIT LOG 29TH & B STREETS CONDOMINIUMS San Diego, California		
	PROJECT NO.	DATE	TEST PIT NO.
	132-34	December 1980	2

RIG	Case 580-C Backhoe	SURFACE ELEVATION 177(approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER	None	Test excavated with a 24-inch bucket on 11/19/80	

DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
SILTY AND CLAYEY SAND Note: "x" denotes jar sample taken from cuttings.		grayish brown	loose	SM/SC	1	x				
SILTY SAND, with some scattered gravel and cobbles		reddish brown	medium dense	SM	2 3 4 5 6	 x				
POORLY GRADED SAND AND GRAVEL		yellowish gray	medium dense	SP/GP	7 8	 x		 2		
SILTY SAND, formational sandstone		yellowish brown	dense	SM	9 10	x		7		
Bottom of Test Pit = 10 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

EXPLORATORY TEST PIT LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	TEST PIT NO.
132-34	December 1980	3

RIG Case 580-C Backhoe	SURFACE ELEVATION 168(approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	Test pit excavated with a 24-inch bucket on 11/19/80	

DESCRIPTION AND CLASSIFICATION: DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
SILTY AND CLAYEY SAND Note: "x" denotes jar sample taken from cuttings.		grayish brown	loose	SM/SC	1	x				
					2					
SILTY SAND		reddish brown	medium dense	SM	3					
					4	x		10		
					5					
					6					
SILTY SAND, formational sandstone		yellowish brown	dense	SM	7	x				
					8					
Bottom of Test Pit = 8 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

EXPLORATORY TEST PIT LOG

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO.	DATE	TEST PIT NO.
132-34	December 1980	4

02 11 2000

RIG Case 580-C Backhoe	SURFACE ELEVATION 161 (approx.)	LOGGED BY LTJ
DEPTH TO GROUNDWATER None	Test Pit excavated with a 24-inch bucket on 11/19/80	

DESCRIPTION AND CLASSIFICATION										
DESCRIPTION AND REMARKS	SYMBOL	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	SHEAR STRENGTH BY TORVANE (KSF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
SILTY AND CLAYEY SAND, with some scattered cobbles		dark grayish brown.	loose	SM/SC	1					
					2					
Notes: 1) "s" denotes sack sample taken from cuttings.					3	s				
2) "x" denotes jar sample taken from cuttings.					4					
SILTY SAND-POORLY GRADED SAND, formational sandstone		yellowish brown	dense	SM-SP	5	x		12		
					6					
Bottom of Test Pit = 6 Feet										

Note: The stratification lines represent the approximate boundary between material types and the transition may be gradual.

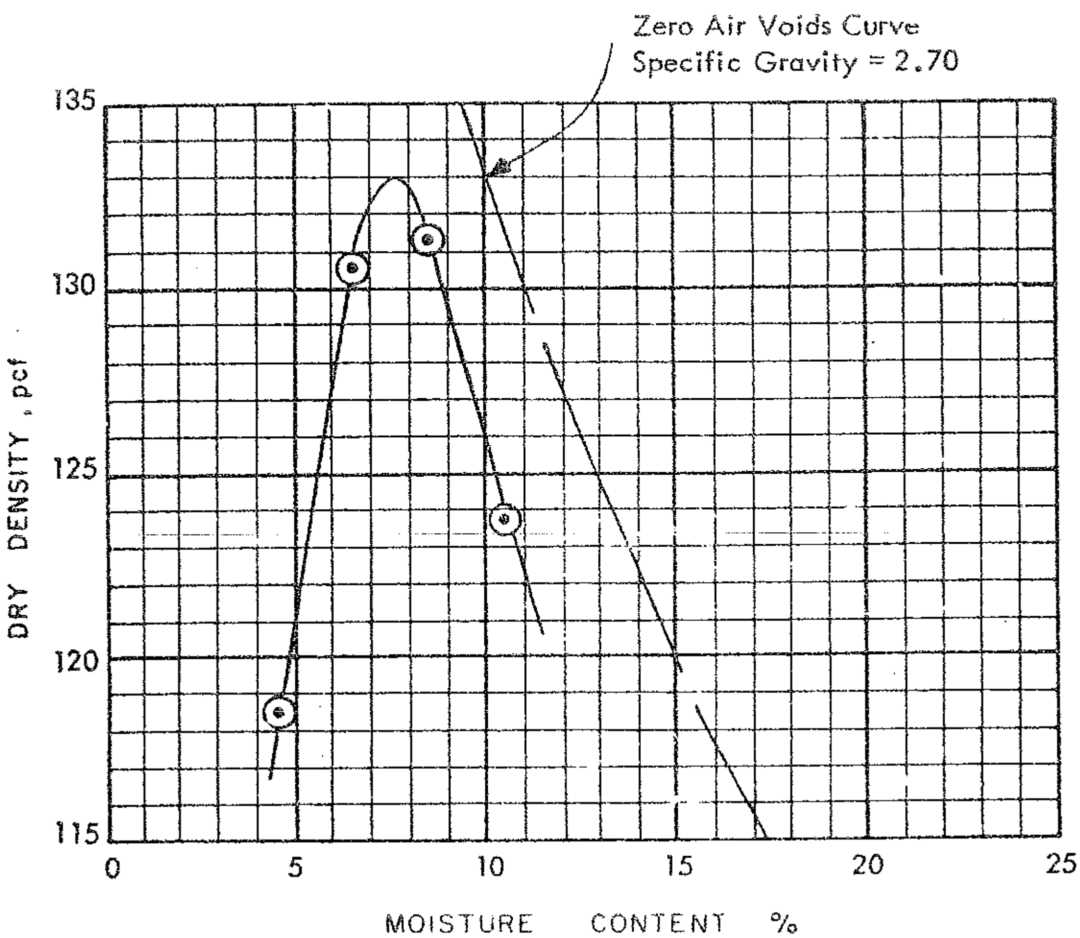
ROBERT PRATER ASSOCIATES Consulting Soil Foundation & Geological Engineers	EXPLORATORY TEST PIT LOG 29TH & B STREETS CONDOMINIUMS San Diego, California		
	PROJECT NO.	DATE	TEST PIT NO.
	132-34	December 1980	5

TABLE B-1

RESULTS OF NO. 200 SIEVE TESTS

Exploratory Boring/Test Pit No.	Sample Depth (Feet)	Sample Description	Percent Passing No. 200 Sieve
EB-1	9	SILTY SAND (SM), reddish brown	24
EB-1	29	CLAYEY SAND (SC), grayish brown	20
EB-3	15	CLAYEY SAND (SC), dark brown	32
TP-1	7	SILTY SAND-POORLY GRADED SAND (SM-SP), light grayish brown	8
TP-2	11	CLAYEY SAND-POORLY GRADED SAND (SC-SP), reddish brown	8
TP-3	8	POORLY GRADED SAND (SP), yellowish gray	4
TP-3	9	SILTY SAND (SM), yellowish brown	17
TP-5	5-1/2	SILTY SAND-POORLY GRADED SAND (SM-SP), yellowish brown	8

SAMPLE NO	DEPTH (FT.)	SAMPLE DESCRIPTION	SPECIFIC GRAVITY	LIQUID LIMIT (%)	PLASTIC INDEX
EB-3	15	CLAYEY SAND (SC), dark reddish brown	---	---	---



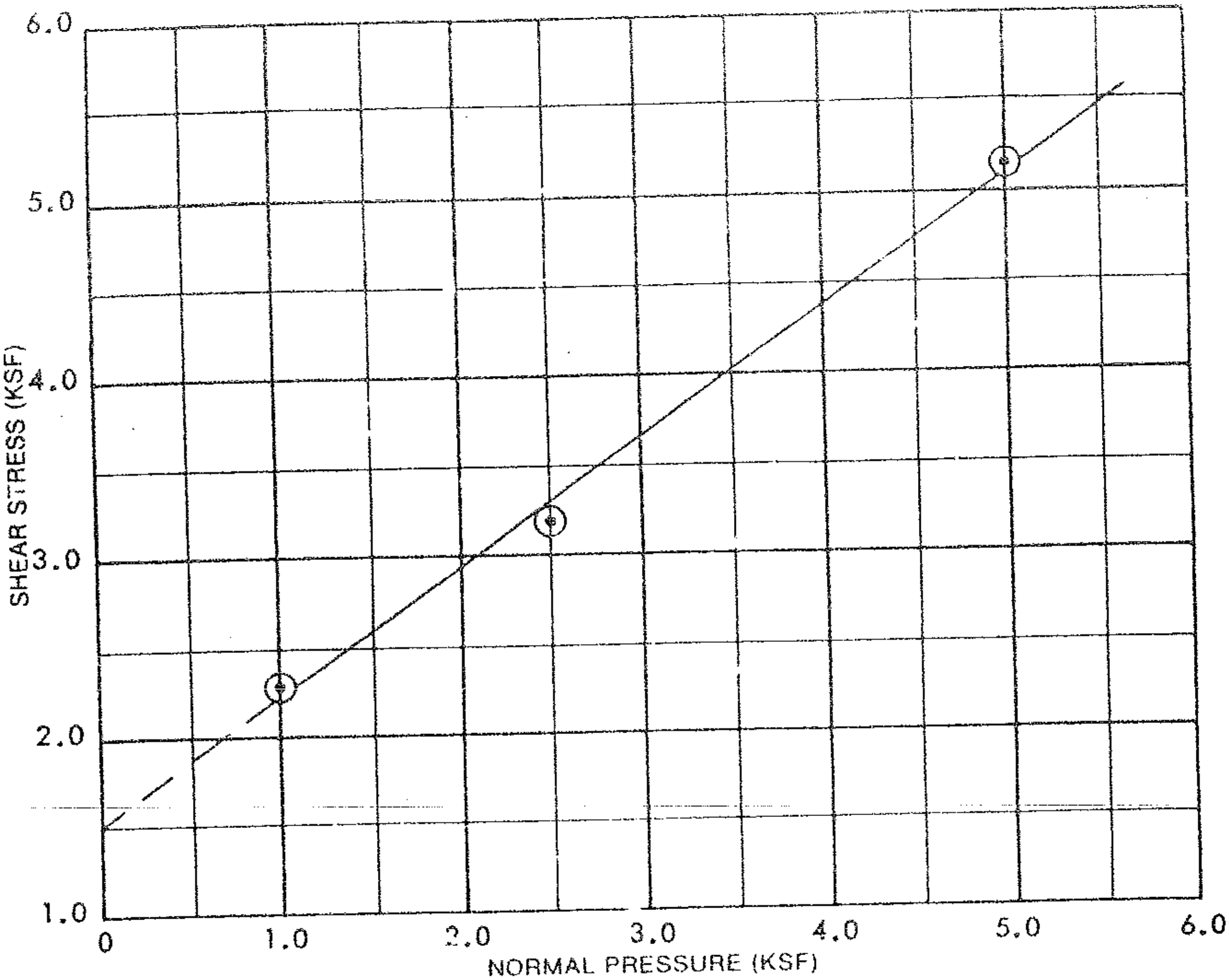
OPTIMUM WATER CONTENT %	7.7
MAXIMUM DRY DENSITY, pcf	133.0
TEST DESIGNATION	ASTM D 1557-78

ROBERT PRATER ASSOCIATES
Consulting Soil Foundation & Geological Engineers

COMPACTION TEST RESULTS

29TH & B STREETS CONDOMINIUMS
San Diego, California

PROJECT NO	DATE	FIGURE B-1
132-34	December 1980	



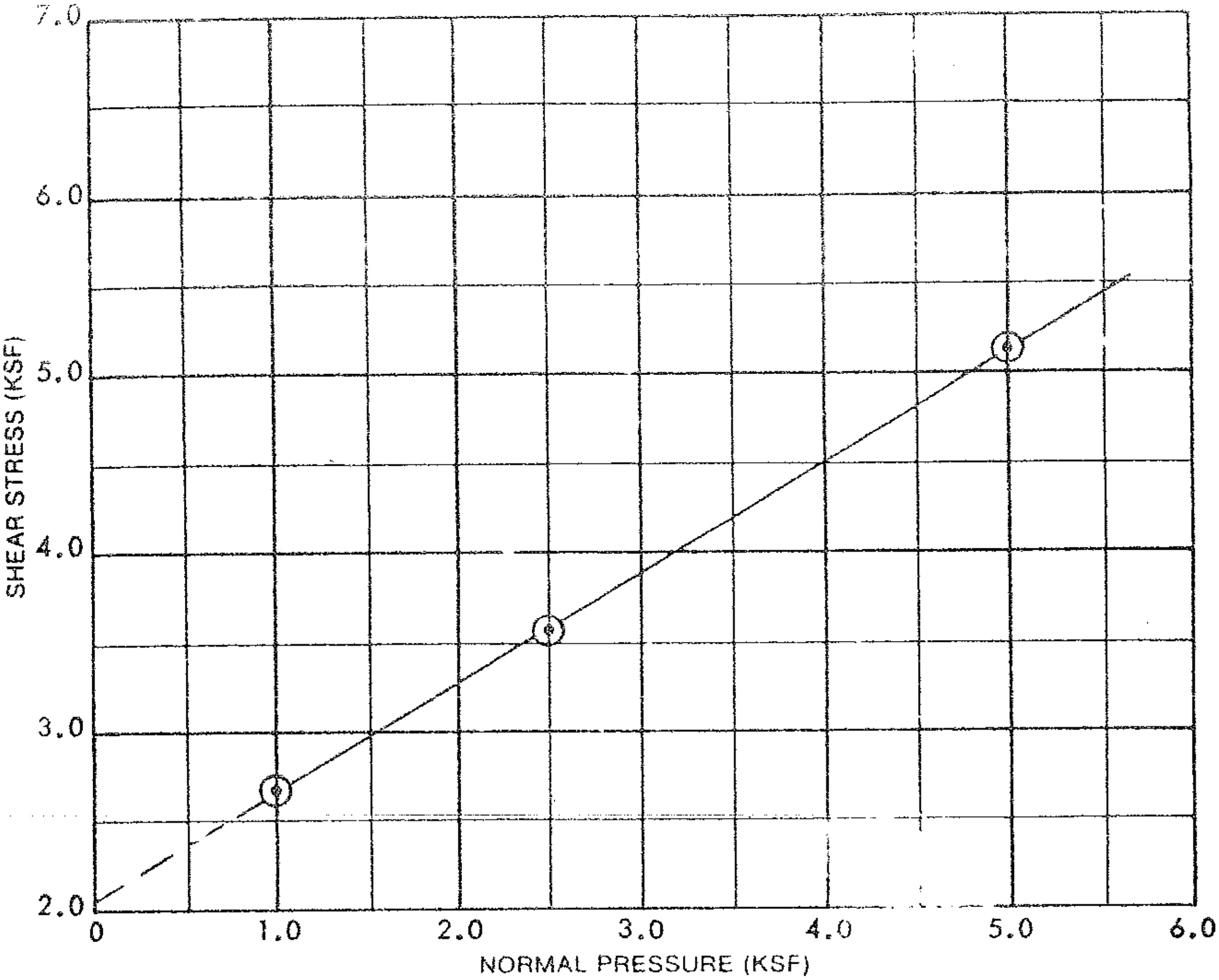
SAMPLE DATA			
DESCRIPTION	SILTY SAND (SM), reddish brown		
BORING NO	1		
DEPTH (ft)	9	ELEVATION (ft)	---

TEST RESULTS	
APPARENT COHESION (C)	1.50 ksf
APPARENT ANGLE OF INTERNAL FRICTION (Φ)	35°

TEST DATA				
TEST NUMBER	1	2	3	4
NORMAL PRESSURE (KSF)	1.00	2.50	5.00	
SHEAR STRENGTH (KSF)	2.28	3.19	5.15	
INITIAL H_2O CONTENT (%)	6	6	6	
FINAL H_2O CONTENT (%)	---	---	---	
INITIAL DRY DENSITY (PCF)	111.5	111.5	111.5	
FINAL DRY DENSITY (PCF)	---	---	---	
STRAIN RATE	0.02 inches/minute (approx.)			

Note: Test was performed on a sample recovered with a California sampler.

ROBERT PRATER ASSOCIATES Consulting Soil Foundation & Geological Engineers	DIRECT SHEAR TEST DATA		
	29TH & B STREETS CONDOMINIUMS San Diego, California		
	PROJECT NO 132-34	DATE December 1980	Figure B-2

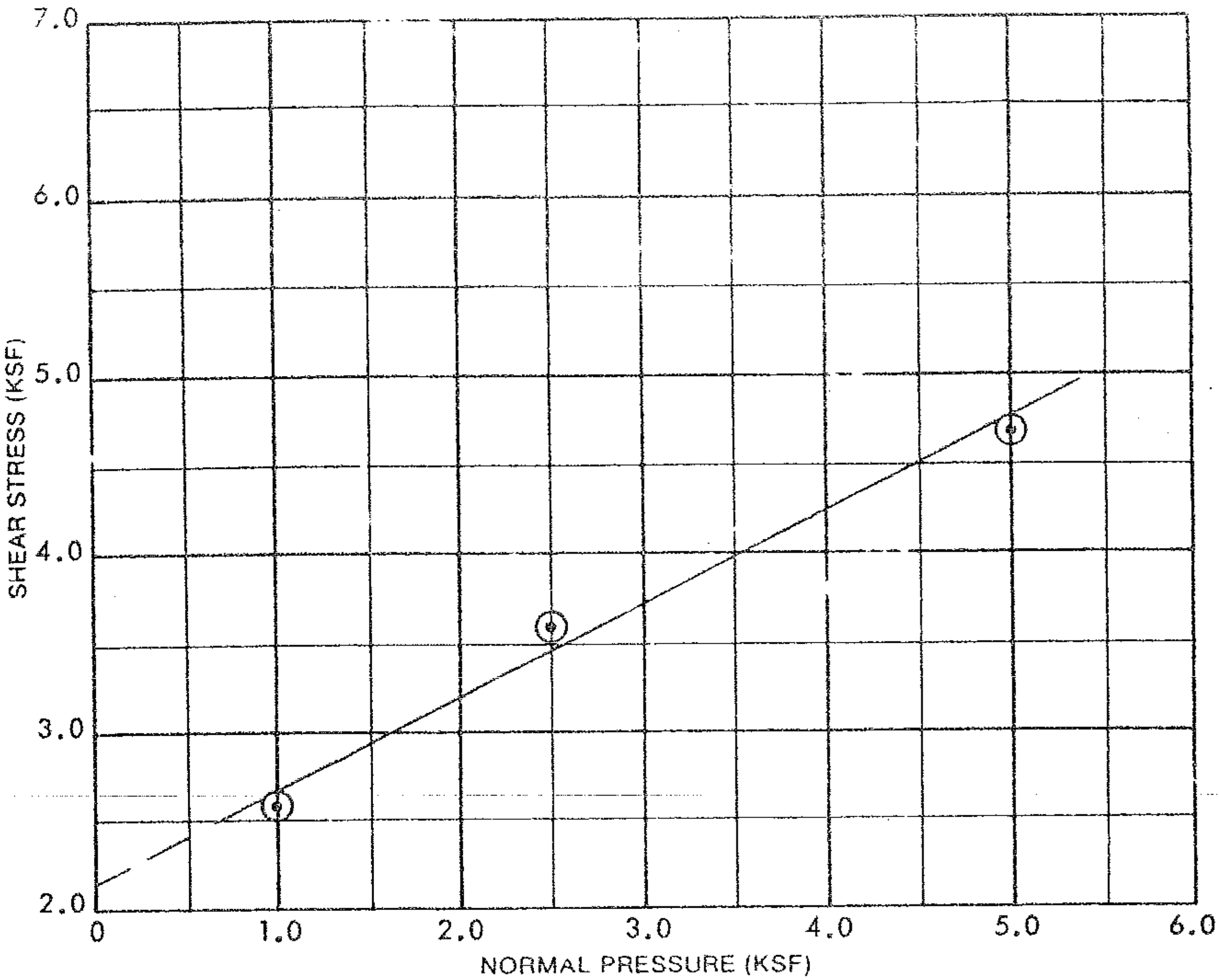


SAMPLE DATA	
DESCRIPTION	CLAYEY SAND (SC), grayish brown
BORING NO	1
DEPTH (ft.) 29	ELEVATION (ft) ---
TEST RESULTS	
APPARENT COHESION (C)	2.05 ksf
APPARENT ANGLE OF INTERNAL FRICTION (Φ)	31°

TEST DATA				
TEST NUMBER	1	2	3	4
NORMAL PRESSURE (KSF)	1.00	2.50	5.00	
SHEAR STRENGTH (KSF)	2.69	3.57	5.12	
INITIAL H_2O CONTENT (%)	13	13	13	
FINAL H_2O CONTENT (%)	---	---	---	
INITIAL DRY DENSITY (PCF)	119.3	119.3	119.3	
FINAL DRY DENSITY (PCF)	---	---	---	
STRAIN RATE	0.02 inches/minute (approx.)			

Note: Test was performed on a sampler recovered with a California sampler.

ROBERT PRATER ASSOCIATES Consulting Soil Foundation & Geological Engineers	DIRECT SHEAR TEST DATA		
	29TH & B STREETS CONDOMINIUMS San Diego, California		
	PROJECT NO 132-34	DATE December 1980	Figure B-3



SAMPLE DATA	
DESCRIPTION:	CLAYEY SAND (SC), dark reddish brown
BORING NO.	3
DEPTH (ft)	15
ELEVATION (ft)	---
TEST RESULTS	
APPARENT COHESION (C)	2.15 ksf
APPARENT ANGLE OF INTERNAL FRICTION (Φ)	27°

TEST DATA				
TEST NUMBER	1	2	3	4
NORMAL PRESSURE (KSF)	1.00	2.50	5.00	
SHEAR STRENGTH (KSF)	2.58	3.60	4.66	
INITIAL H_2O CONTENT (%)	9	9	9	
FINAL H_2O CONTENT (%)	---	---	---	
INITIAL DRY DENSITY (PCF)	119.0	119.0	119.0	
FINAL DRY DENSITY (PCF)	---	---	---	
STRAIN RATE	0.02 inches/minute (approx.)			

Note: Test was performed on a sample remolded to approximately 90 percent of the laboratory maximum density.

ROBERT PRATER ASSOCIATES Consulting Soil Foundation & Geological Engineers	DIRECT SHEAR TEST DATA	
	29TH & B STREETS CONDOMINIUMS San Diego, California	
PROJECT NO 132-34	DATE December 1980	Figure B-4

APPENDIX B
Allied Earth Technology Data

TRENCH LOG SHEET

TRENCH NO. 4

FT	DESCRIPTION	SOIL TYPE
0 1 2 3 4 5	Brown, damp, loose (undocumented fill) Broken pieces of concrete and asphalt, pebbles to 4" dia. Pockets of clayey sand	SILTY FINE SAND (SM)
6 7 8	Light grayish brown, moist. Loose to slightly dense Gravel and cobbles (alluvium/colluvium)	SILTY SAND (SM)
9 10 11 12	Yellowish brown, moist, dense Slightly cemented (San Diego Formation)	SILTY SAND (SM)

BOTTOM OF TRENCH (No Refusal)

Project No. 01-1289E3

Figure No. 6

TRENCH LOG SHEET

TRENCH NO. 5

FT	DESCRIPTION	SOIL TYPE
0 1 2 3 4 5	Dark grayish brown, damp, loose Some scattered cobbles Pockets of clayey sand (alluvium/colluvium) 1	SILTY FINE SAND (SM)
6 7 8	Yellowish brown, moist, dense Gravel and cobbles (alluvium/colluvium)	SILTY SAND (SM)
9 10 11 12	Yellowish brown, moist, dense Slightly cemented (San Diego Formation)	SILTY SAND (SM)

BOTTOM OF TRENCH (No Refusal)

Project No. 01-1289E3

Figure No. 7

ADDENDUM TO GEOTECHNICAL UPDATE
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

HETHERINGTON ENGINEERING, INC.

HETHERINGTON ENGINEERING, INC.
SOIL & FOUNDATION ENGINEERING • ENGINEERING GEOLOGY • HYDROGEOLOGY

May 21, 2015
Project 7603.1
Log No. 17697

Janco, LLC
P.O. Box 231446
Encinitas, California 92033

Attention: Mr. Matthew Gordon

Subject: ADDENDUM TO GEOTECHNICAL UPDATE
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

Reference: "Geotechnical Update, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated April 24, 2015.

Dear Mr. Gordon:

In accordance with your request, Hetherington Engineering, Inc. has prepared this addendum to the referenced "Geotechnical Update..." for the subject site. Our work was performed in April and May 2015 and included subsurface exploration, laboratory testing, and the preparation of this addendum report. The purpose of the additional work was to investigate the undocumented fill and undifferentiated alluvium/colluvium in the vicinity of "B" Street and to revise, confirm or update the geotechnical recommendations provided in the "Geotechnical Update...". The "Geotechnical Update..." includes data not duplicated in this report.

FIELD EXPLORATION

One hollow-stem auger boring was drilled on April 27, 2015, adjacent to "B" Street, to obtain bulk and relatively undisturbed soil samples, to perform Standard Penetration tests (ASTM: D 1586), and for geologic logging. The approximate location of the boring is shown on the attached Updated Geologic Map, Plate 1.

The subsurface exploration was supervised by an Engineering Geologist from this office, who visually classified the soil and bedrock materials, and obtained bulk and relatively undisturbed samples for laboratory testing. The soils were visually classified according to the Unified Soil Classification System. Classifications are shown on the attached Boring Log, Figures 1 and 2.

5365 Avenida Encinas, Suite A • Carlsbad, CA 92008-4369 • (760) 931-1917 • Fax (760) 931-0545
327 Third Street • Laguna Beach, CA 92651-2306 • (949) 715-5440 • Fax (949) 715-5442
www.hetheringtonengineering.com

LABORATORY TESTING

Laboratory testing was performed on samples obtained during the subsurface exploration. Tests performed consisted of the following:

- Dry Density/Moisture Content (ASTM: D 2216)

- One-Dimensional Swell or Collapse of Soils (ASTM: D 4546)

Results of the dry density and moisture content determinations are presented on the Boring Log, Figures 1 and 2. The remaining laboratory test results are presented on the attached Laboratory Test Results, Figure 3.

SUBSURFACE CONDITIONS

The boring confirmed the existence of undocumented fill as reported by others. The boring also confirmed the existence of undifferentiated alluvium/colluvium that, based on our laboratory testing, exhibits hydroconsolidation (collapse) potential. The bedrock encountered was consistent with San Diego Formation sandstone, consequently, the attached Updated Geologic Map, Plate 1 and Geologic Cross-Sections, Figures 4 through 7, have been modified to reflect this bedrock nomenclature and to reflect minor changes in geologic contacts.

No seepage was encountered in the boring to the total depth explored.

CONCLUSIONS AND RECOMMENDATIONS

Based on our field exploration and laboratory testing, the undifferentiated alluvium/colluvium exhibits hydroconsolidation (collapse) potential which could result in an estimated 6-inches (maximum) of settlement upon wetting.

We conclude that the recommendations for temporary slopes, removals, and compaction grouting presented in the "Geotechnical Update…" remain applicable. Geologic Cross-Sections B-B', C-C' and D-D' have been updated to reflect our recommendations adjacent to "B" Street.

LIMITATIONS

The analyses, conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our investigation and further assume the excavations to be representative of the subsurface conditions throughout the site. If different subsurface conditions from those encountered during our exploration are observed or appear to be present in excavations, the Geotechnical Consultant should be promptly notified for review and reconsideration of recommendations.

Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the conclusions and professional advice included in this report.

This opportunity to be of service is sincerely appreciated. If you have any questions, please call this office.

Sincerely,

HETHERINGTON ENGINEERING, INC.

Paul A. Bogseth
Professional Geologist 3772
Certified Engineering Geologist 1153
Certified Hydrogeologist 591
(expires 3/31/16)

CERTIFIED ENGINEERING GEOLOGIST
PAUL A. BOGSETH
E.G. 1153
Exp.
STATE OF CALIFORNIA

Mark D. Hetherington
Civil Engineer 30488
Geotechnical Engineer 397
(expires 3/31/16)

REGISTERED PROFESSIONAL ENGINEER
MARK HETHERINGTON
No. 397
Exp. Date
GEOTECHNICAL
STATE OF CALIFORNIA

Attachments:	Boring Logs	Figures 1 and 2
	Laboratory Test Results	Figure 3
	Updated Geologic Cross-Sections	Figures 4 through 7
	Updated Geologic Map	Plate 1

Distribution: 6-Addressee
1-via e-mail (Gordon.matthew0@gmail.com)
1-via e-mail (chris@h2asandiego.com)

DRILLING COMPANY: **Scott's Drilling** RIG: **Hollow Stem Auger** DATE: **04/27/15**

BORING DIAMETER: **8"** DRIVE WEIGHT: **140 lbs.** DROP: **30"** ELEVATION: **' ±**

BORING NO. B-1

DEPTH (FEET)	BULK SAMPLE	DRIVE SAMPLE	BLOWS/FOOT	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	SOIL CLASS. (U.S.C.S.)	SOIL DESCRIPTION
0.0						GP SM	**FILL:** Brown silty sand with numerous gravel/cobbles; dry to damp, loose, difficult drilling @ 0 to 4'; asphalt concrete fragments
			17	102	5.1		@ 4': Less gravel and cobbles, damp, medium dense
5.0			(SPT) 3/6" 6/6" 7/6"				
			18	112	5.1	SM ML	**ALLUVIUM/COLLUVIUM:** Red brown silty sand; damp, loose, easy drilling
10.0			(SPT) 3/6" 4/6" 3/6"				@ 10 - 12': Gravelly layer
			12				@ 12': Sample on rock - no recovery
			(SPT) 1/6" 2/6" 3/6"				@ 14': Red brown sandy silt/silty sand, moist, soft to firm/loose
15.0			9	99	6.3		
			(SPT) 2/6" 2/6" 2/6"				@ 18': Red brown sandy silt/silty sand, soft/loose
20.0			11	111	6.9		
			(SPT) 6/6" 7/6" 10/6"				@ 22': Thin gravel layer in SPT @ 23': Drilling tighter
						CL SC	Brown to tan gravelly sandy clay to clayey sand; moist, stiff/medium dense
			17	105	11.1		
25.0							

BORING LOG

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. **7603.1** FIGURE NO. **1**

DRILLING COMPANY: **Scott's Drilling** RIG: **Hollow Stem Auger** DATE: **04/27/15**

BORING DIAMETER: **8"** DRIVE WEIGHT: **140 lbs.** DROP: **30"** ELEVATION: **' ±**

BORING NO. **B-1**

DEPTH (FEET)	BULK SAMPLE	DRIVE SAMPLE	BLOWS/FOOT	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	SOIL CLASS. (U.S.C.S.)	SOIL DESCRIPTION
25.0			(SPT) 4/6" 5/6" 8/6"				
			20	101	13.5		@ 28': Brown gravelly clay; moist; firm, rock in tip of sampler
30.0			(SPT) 13/6" 10/6" 14/6"				@ 30': Not much recovery, rock in sampler
			85/9"	108	9.1		**BEDROCK (San Diego Formation):** Light brown sandstone; moist, very dense
35.0			(SPT) 17/6" 25/6" 40/6"				
							Total depth 35.5-feet No seepage
40.0							
45.0							
50.0							

BORING LOG

HETHERINGTON ENGINEERING, INC.

GEOTECHNICAL CONSULTANTS

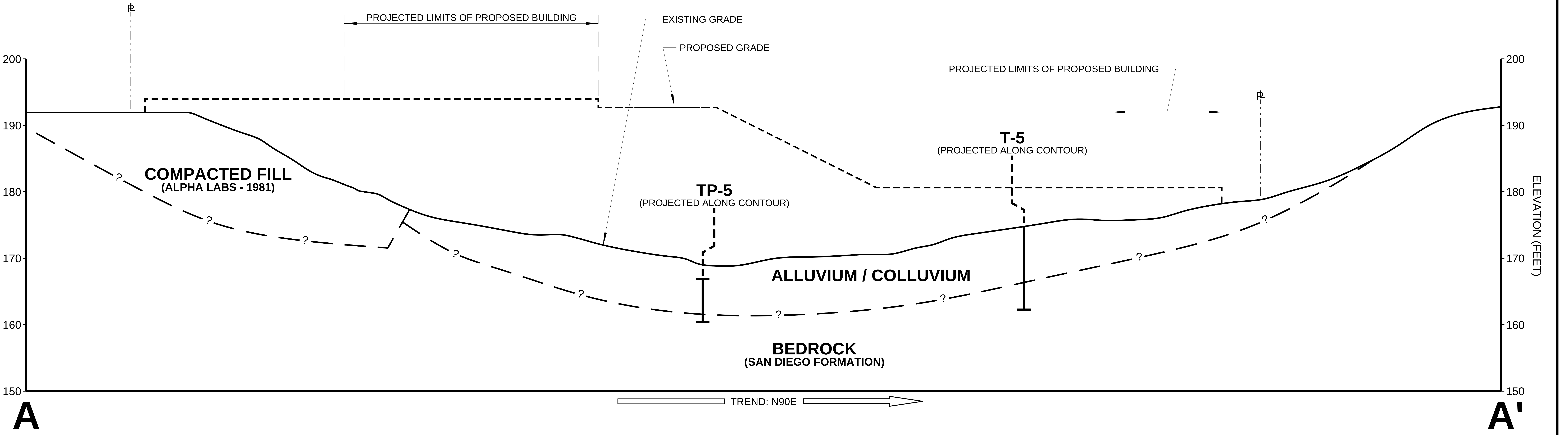
Golden Hill "B" Street
San Diego, California

PROJECT NO. **7603.1** FIGURE NO. **2**

LABORATORY TEST RESULTS

ONE-DIMENSIONAL SWELL OR COLLAPSE OF SOILS (ASTM: D 4546)		
Sample Location	**Normal Stress at Saturation (psf)**	**% Swell (+) or % Consolidation (-) When Water Added**
B-1 @ 4'	429	-1.63
B-1 @ 8'	901	-1.22
B-1 @ 16	1760	-4.16
B-1 @ 20'	2243	-2.84
B-1 @ 24'	2716	-2.09
B-1 @ 28'	3176	-1.15

FIGURE 3
Project No. 7603.1
Log No. 17697



SCALE: 1" = 10'

0 1 2

0 5 10 15 20

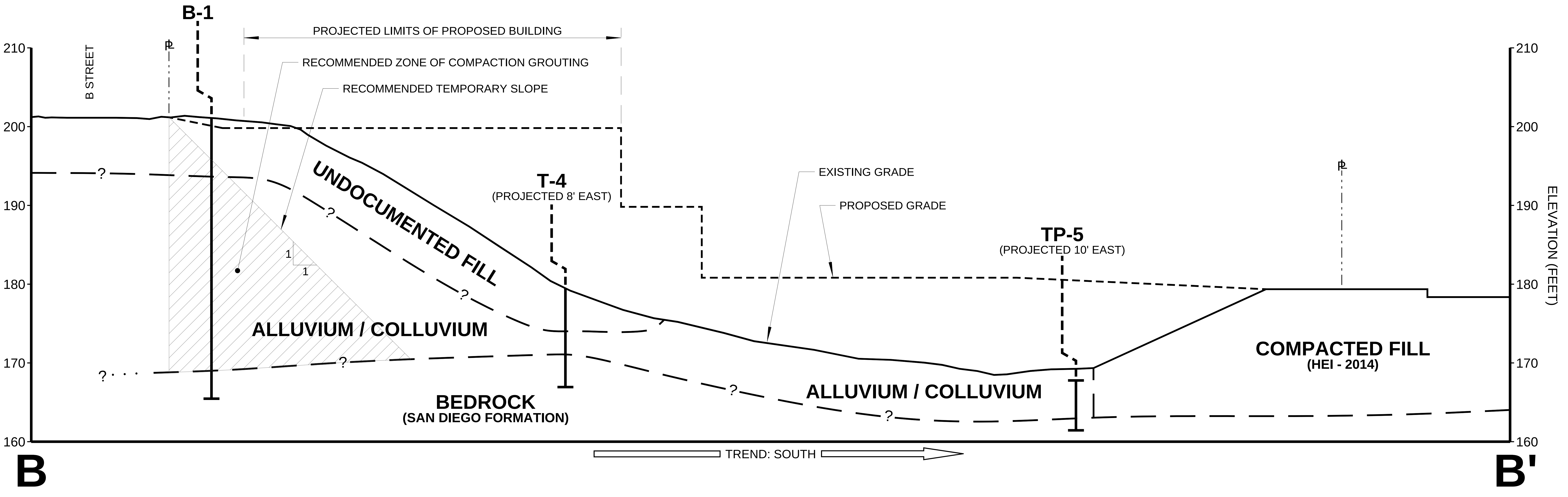
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

UPDATED GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | FIGURE NO. 4



SCALE: 1" = 10'

0 1 2

0 5 10 15 20

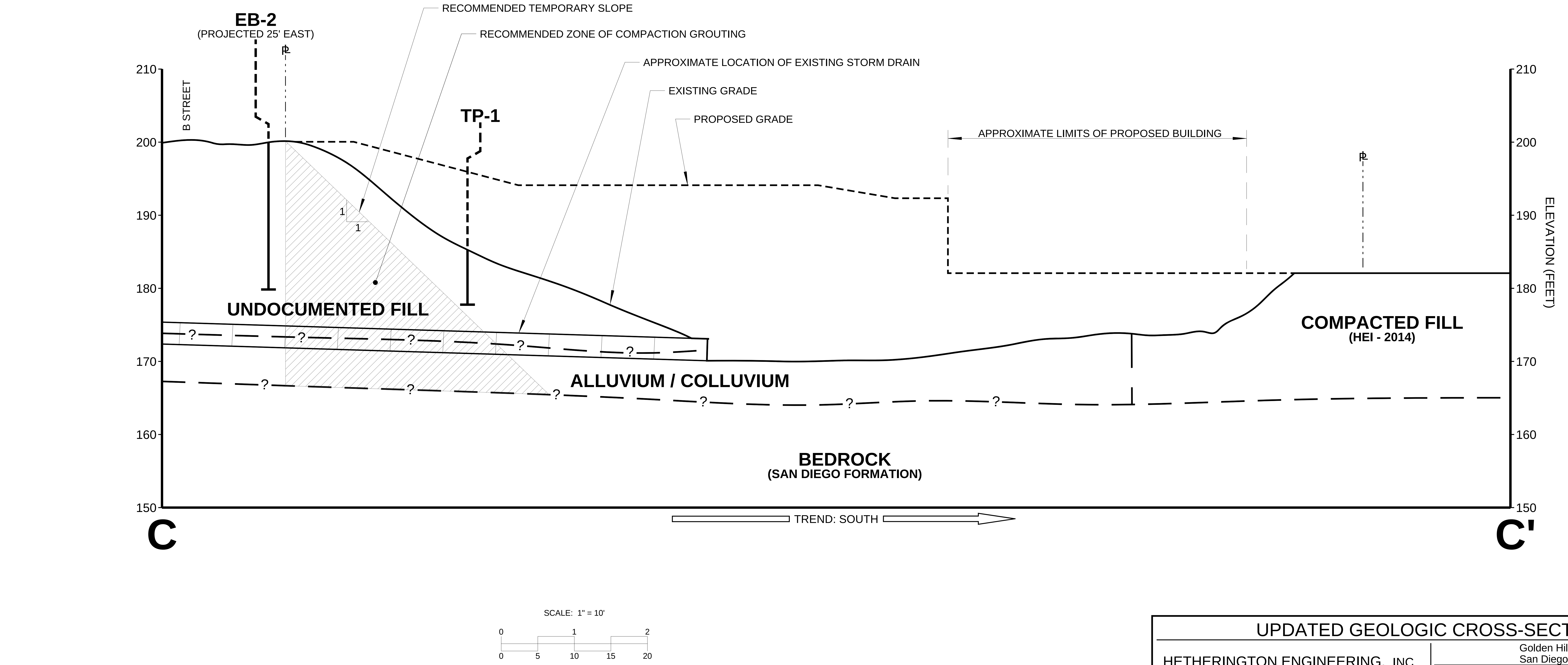
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

UPDATED GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

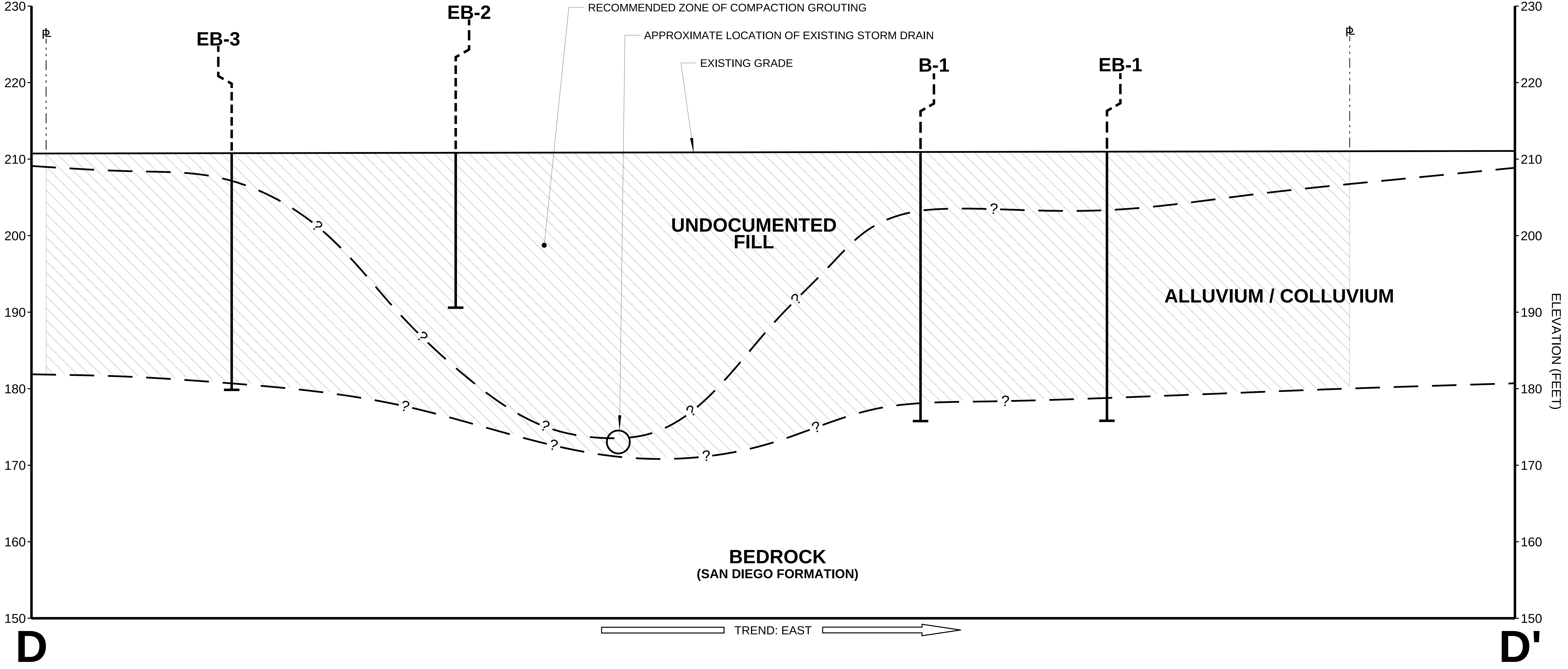
Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 FIGURE NO. 5



NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

UPDATED GEOLOGIC CROSS-SECTION	
HETHERINGTON ENGINEERING, INC. GEOTECHNICAL CONSULTANTS	Golden Hill "B" Street San Diego, California PROJECT NO. 7603.1 FIGURE NO. 6



SCALE: 1" = 10'

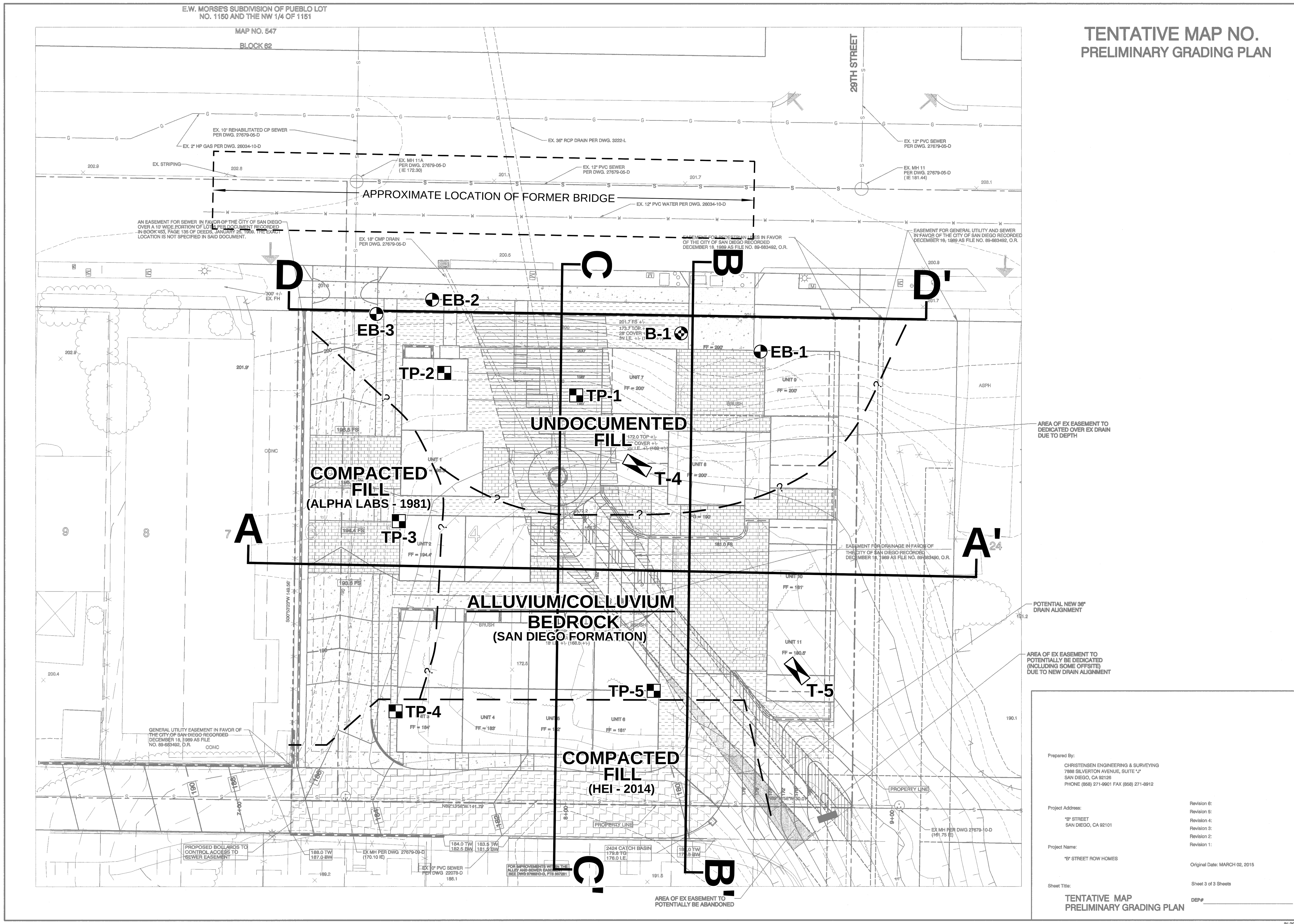
NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

UPDATED GEOLOGIC CROSS-SECTION

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 FIGURE NO. 7



NOTE: TOPOGRAPHY DOES NOT REFLECT EXISTING STOCKPILED FILL

LEGEND

T-5	APPROXIMATE LOCATION OF TEST PIT BY ALLIED EARTH TECHNOLOGY (2001)
EB-3	APPROXIMATE LOCATION OF BORING BY ROBERT PRATER ASSOCIATES (1980)
TP-5	APPROXIMATE LOCATION OF TEST PIT BY ROBERT PRATER ASSOCIATES (1980)
B-1	APPROXIMATE LOCATION OF BORING BY HETHERINGTON ENGINEERING, INC. (2015)
?	APPROXIMATE LOCATION OF GEOLOGIC CONTACT (QUERRIED WHERE UNCERTAIN)
B B'	GEOLOGIC CROSS-SECTION

SCALE: 1" = 20'

N

0 10 20 30 40

UPDATED GEOLOGIC MAP

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | PLATE NO. 1

HETHERINGTON ENGINEERING, INC.
SOIL & FOUNDATION ENGINEERING • ENGINEERING GEOLOGY • HYDROGEOLOGY

July 13, 2016
Project No. 7603.1
Log No. 18419

Janco, LLC
P.O. Box 231446
Encinitas, California 92033

Attention: Mr. Matthew Gordon

Subject: INFILTRATION TESTING
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

References:
1. "Geotechnical Update, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated April 24, 2015.

2. "Addendum to Geotechnical Update, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated May 21, 2015.

3. "East Property Line Geotechnical Exploration, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated January 8, 2016.

4. "City of San Diego, Transportation and Storm Water, Storm Water Standards, Part 1: BMP Design Manual, January 2016 Edition".

5. "Drainage Management Area Exhibit, Site Development, Preliminary Grading Plan, "B" Street Row Homes," by Christensen Engineering and Surveying, original date April 6, 2015.

Dear Mr. Gordon:

In response to your request, we have performed infiltration testing of existing compacted fill at the subject site. Based on the results of our geotechnical investigative work (References 1 through 3) and review of the preliminary grading plan (Reference 4), the site will be underlain by compacted fill and undifferentiated alluvium/colluvium improved by compaction grouting at the conclusion of site grading. No groundwater was encountered to the maximum depth explored of 35.5-feet in the borings and test pits excavated at the site (see References 1 through 3).

Infiltration tests of compacted fill were performed by this office on May 23, and 24, 2016 in accordance with the Open Pit Falling Head test method (see Reference 4, Appendix C). The approximate locations of the infiltration tests are shown on the attached Plot Plan, Figure 1 and the test results are shown on the attached Infiltration Data Sheets, Figures 2 and 3. The infiltration rates based on the infiltration testing are 0.22-inches/hour and 0.12-inches/hour (without considering safety factors).

This opportunity to be of service is sincerely appreciated. If you have any questions, please call this office.

Sincerely,

HETHERINGTON ENGINEERING, INC.

Mark D. Hetherington
Civil Engineer 30488
Geotechnical Engineer 397
(expires 3/31/18)

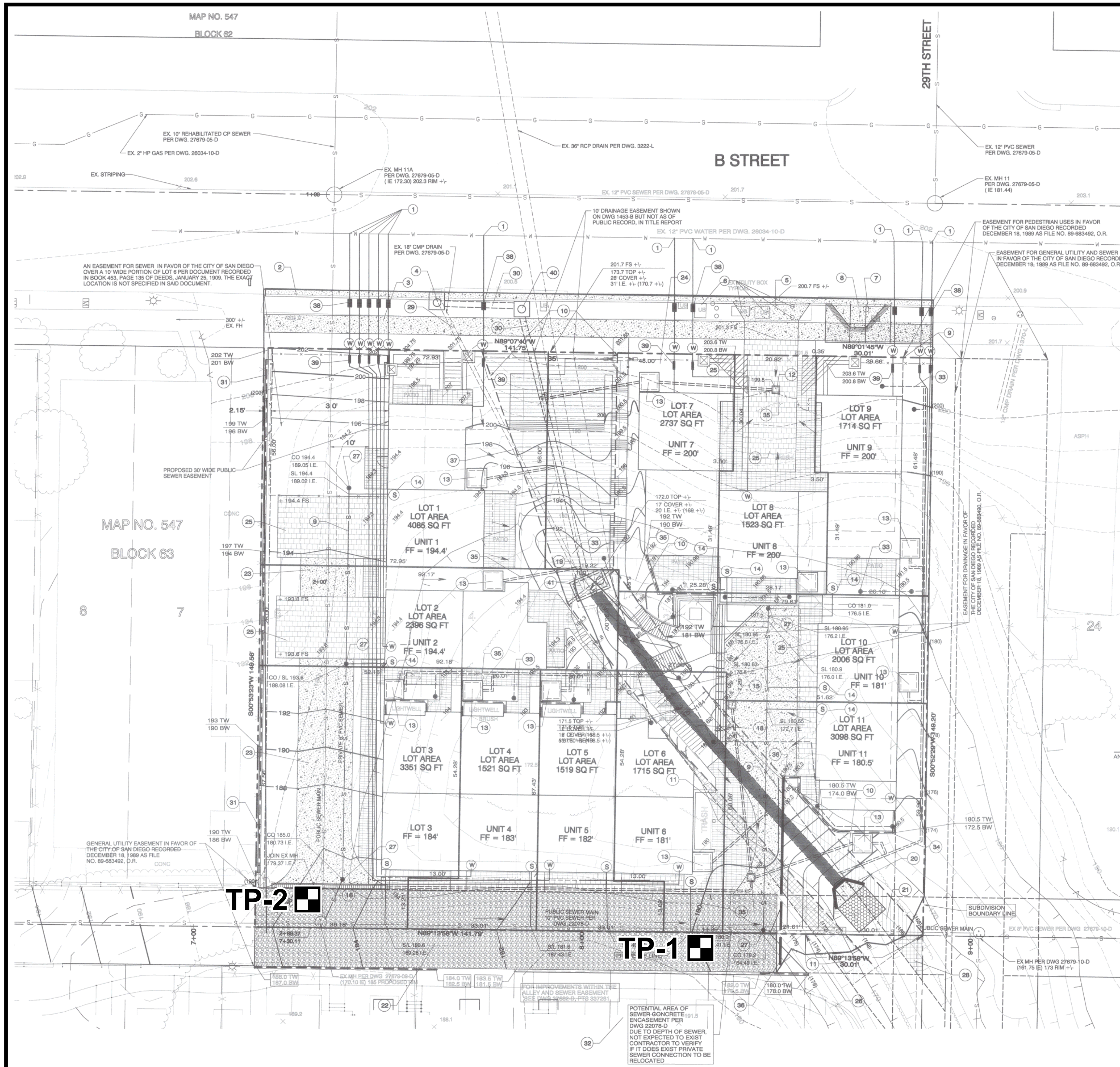
REGISTERED PROFESSIONAL ENGINEER
MARK D. HETHERINGTON
No. 397
Exp. Date
GEOTECHNICAL
STATE OF CALIFORNIA

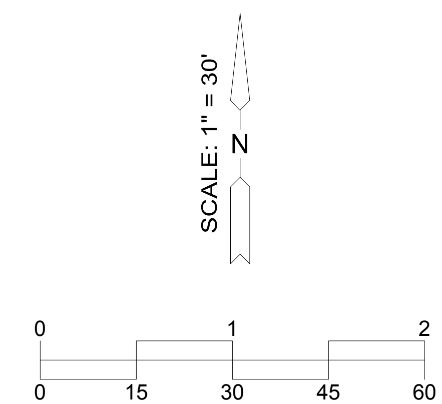
Paul A. Bogseth
Professional Geologist 3772
Certified Engineering Geologist 1153
Certified Hydrogeologist 591
(expires 3/31/18)

CERTIFIED ENGINEERING GEOLOGIST
PAUL A. BOGSETH
E.G. 1153
Exp.
STATE OF CALIFORNIA

Attachments: Plot Plan — Figure 1
Infiltration Data Sheets — Figures 2 and 3

Distribution: 1-via e-mail (Gordon.matthew0@gmail.com)
1-via e-mail (ceands@aol.com)
2-Addressee





LEGEND

TP-2 ▪ APPROXIMATE LOCATION OF INFILTRATION TEST

PLOT PLAN

HETHERINGTON ENGINEERING, INC.
GEOTECHNICAL CONSULTANTS

Golden Hill "B" Street
San Diego, California

PROJECT NO. 7603.1 | FIGURE NO. 1

INFILTRATION DATA SHEET

Project: Golden Hill	Job No.: 7603.1
Test Hole No.: 1	Soil Classification: Red brown clayey sand with cobbles, moist
Excavation by: Mansolf / CF	Date Excavated: 5/23/16
Pre-soak by: CF	Pre-soak Date: 5/23/16
Infiltration Testing by: CF	Infiltration Date: 5/24/16

Excavation and Pre-soak Data

Trench Width (ft)	Trench Length (ft)	Trench Depth (ft)	Pre-soak Time	Pre-soak Water Level (inches)
2	4	1	24 hrs.	12"

Infiltration Testing

Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	▲ in Water Level (inches)	Infiltration Rate (min/inch)	% Change from Previous
8:45 am – 9:45 am	60	12.0	11.8125	0.1875	320	-
9:45 am – 10:45 am	60	11.8125	11.6250	0.1875	320	0%
10:50 am – 11:50 am	60	12.3750	12.15625	0.2187	274	-14%
11:50 am – 12:50 pm	60	12.15625	11.9375	0.2187	274	0%

Figure 2
Project No. 7603.1
Log No. 18419

INFILTRATION DATA SHEET

Project: Golden Hill	Job No.: 7603.1
Test Hole No.: 2	Soil Classification: Red brown clayey sand to sandy clay with cobbles, moist
Excavation by: Mansolf / CF	Date Excavated: 5/23/16
Pre-soak by: CF	Pre-soak Date: 5/23/16
Infiltration Testing by: CF	Infiltration Date: 5/24/16

Excavation and Pre-soak Data

Trench Width (ft)	Trench Length (ft)	Trench Depth (ft)	Pre-soak Time	Pre-soak Water Level (inches)
2	4	1	24 hrs.	12"

Infiltration Testing

Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	▲ in Water Level (inches)	Infiltration Rate (min/inch)	% Change from Previous
8:48 am – 9:48 am	60	12.00	11.16	0.84	71.43	-
9:48 am – 10:48 am	60	11.16	10.92	0.24	250	+350
10:48 am – 11:48 am	60	10.92	10.80	0.12	500	+100
11:53 am – 12:53 pm	60	12.48	12.36	0.12	500	0

Figure 3
Project No. 7603.1
Log No. 18419

HETHERINGTON ENGINEERING, INC.
SOIL & FOUNDATION ENGINEERING • ENGINEERING GEOLOGY • HYDROGEOLOGY

September 27, 2016
Project No. 7603.1
Log No. 18538

Janco, LLC
P.O. Box 231446
Encinitas, California 92033

Attention: Mr. Matthew Gordon

Subject: RESPONSE TO CITY OF SAN DIEGO GEOLOGY REVIEW
Proposed Townhomes
Golden Hill "B" Street
San Diego, California

References: Attached

Dear Mr. Gordon:

In response to the request of Mr. David Hawkins, we are providing the following responses to the geotechnical comments included in the geology review (Reference 9). Our numbering corresponds to that utilized by the reviewer.

8. Acknowledged, we will review the construction plans (grading plans and foundation plan and details) when provided.

9. Acknowledged, we will prepare an as-graded geotechnical report when grading is completed.

16. Cut and fill slopes are recommended to be inclined at 2:1 (horizontal to vertical) to mitigate the potential for slope instability. Removal and replacement as compacted fill and/or compaction grouting of the existing undocumented fill and undifferentiated alluvium/colluvium is recommended to mitigate the potential for differential settlement. Foundation and slab recommendations including reinforcement are recommended to mitigate the potential for distress to improvements due to heave of expansive soils.

17. A revised copy of Form I-8 is attached with each yes/no box checked.

This opportunity to be of service is sincerely appreciated. If you have any questions, please call this office.

Sincerely,

HETHERINGTON ENGINEERING, INC.

Mark D. Hetherington
Civil Engineer 30488
Geotechnical Engineer 397
(expires 3/31/18)

Paul A. Bogseth
Professional Geologist 3772
Certified Engineering Geologist 1153
Certified Hydrogeologist 59
(expires 3/31/18)

REGISTERED PROFESSIONAL ENGINEER MARK D. HETHERINGTON No. 397 Exp. Date GEOTECHNICAL STATE OF CALIFORNIA

CERTIFIED ENGINEERING GEOLOGIST PAUL A. BOGSETH E.G. 1153 Exp. STATE OF CALIFORNIA

Attachment: Revised I-8 Form

Distribution: 1-via e-mail (Gordon.matthew0@gmail.com)
1-via e-mail (david@h2asandiego.com)
1-via e-mail (Luis@rec-consultants.com)
1-via e-mail (CEandS@aol.com)

REFERENCES

1. "Geotechnical Update, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated April 24, 2015.

2. "Addendum to Geotechnical Update, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated May 21, 2015.

3. "East Property Line Geotechnical Exploration, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated January 8, 2016.

4. "City of San Diego, Transportation and Storm Water, Storm Water Standards, Part 1: BMP Design Manual, January 2016 Edition".

5. "Drainage Management Area Exhibit, Site Development, Preliminary Grading Plan, "B" Street Row Homes," by Christensen Engineering and Surveying, original date April 6, 2015.

6. "Infiltration Testing, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated July 13, 2016.

7. "LDR-Geology Review," by the City of San Diego, Development Services, L644-003A, dated August 1, 2016.

8. "Response to City of San Diego Geology Review, Proposed Townhomes, Golden Hill "B" Street, San Diego, California," by Hetherington Engineering, Inc., dated August 15, 2016.

9. "LDR-Geology Review," by the City of San Diego, Development Services, Project Nbr: 422242, dated September 22, 2016.

Categorization of Infiltration Feasibility Condition		Form I-8	
Part 1 - Full Infiltration Feasibility Screening Criteria Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: Infiltration testing of the compacted fill in the previously graded alley at the rear of the site has been performed (see attached "Infiltration Testing..."). The remainder of the site has not been graded and requires import (source unknown) to achieve finished grades. We recommend that the import have infiltration rates no less than 0.17 in/hr (average of infiltration rates in alley) and that infiltration testing of the import be performed when the import source is known to confirm the infiltration rates. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: Geotechnical recommendations to mitigate potential geotechnical hazards due to storm water infiltration to acceptable levels are provided in the attached "Geotechnical Update..." and "Addendum to Geotechnical Update...". Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Form I-8 Page 2 of 4			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: No infiltration rates greater than 0.5 in/hr have been measured at the site. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: No infiltration rates greater than 0.5 in/hr have been measured at the site. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2	Possible Partial Infiltration	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by the City Engineer to substantiate findings

Form I-8 Page 3 of 4			
Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	
Provide basis: Two tests using Open Pit Falling Head test method have been performed. Results were 0.22 in/hr and 0.12 in/hr without safety factors. For design considerations, the following infiltration values will be used: 0.11 in/hr for IMP-A (as 0.22 in/hr test is closest to IMP-A and a Safety Factor of 2 is used); an average value of 0.17 in/hr divided by 2 = 0.085 in/hr will be used for IMP-B and IMP-C. As both are located in fill conditions, a requirement to use soils with an infiltration capacity no less than 0.17 in/hr will be included. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: Geotechnical recommendations to mitigate potential geotechnical hazards due to storm water infiltration to acceptable levels are provided in the attached "Geotechnical Update..." and "Addendum to Geotechnical Update...". Please refer to answer 5. A gravel layer under the french drain with a thickness calculated in accordance to the requirements of the BLP Manual and in accordance to the infiltration results displayed in answer 5 will be included. A french drain is also added above that gravel thickness for safety reasons, in case the soil does not infiltrate as expected. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			

Form I-8 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Mounding concerns should be minor as a french drain system is added in the IMPs once the water exceeds a certain minimum depth in the gravel layer. Storm water pollutant concerns are unknown at this time but the expected little infiltration has a low risk of mobilizing potential pollutants that could be present in the soil, especially considering the depth of the ground water as a boring with a depth of 35 ft failed to find the water table. Infiltrated water will travel at least 35 ft before reaching the water table, so the water will be filtered by then. In addition we are not aware of any known soil contamination present at the site. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: It is not known at this point the status of the downstream water rights. In addition, this question requires the expertise of water-rights lawyers to determine if any violation can be expected downstream by reducing the runoff slightly via infiltration of the water into the IMPs. Due to the location of the project in a highly urbanized area, it is unlikely that violation of water rights might occur; however, the Civil Team is not responsible for potential violations in water rights that could occur. Infiltration has been included on the project as part of the Water Board strategy of reducing runoff, and as a request of the City. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.	Partial Infiltration	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by the City Engineer to substantiate findings

Factor of Safety and Design Infiltration Rate Worksheet				Form I-9	
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.00
B	Design	Level of pretreatment/ expected sediment loads	0.5	1	0.50
		Redundancy/resiliency	0.25	2	0.50
		Compaction during construction	0.25	3	0.75
		Design Safety Factor, $S_B = \Sigma p$			1.75
Combined Safety Factor, $S_{total} = S_A \times S_B$				1.75 (use 2.0)	
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)				0.22 & 0.12	
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$				0.11 & 0.06	
Supporting Data					
Briefly describe infiltration test and provide reference to test forms: Two open pit falling head tests were performed (see attached "Infiltration Testing...").					

WATER QUALITY TECHNICAL REPORT
"B" STREET SMALL LOT SUBDIVISION

Portion of Block 63, Morse's Subdivision of Pueblo Lot 1150 and a Portion of Pueblo Lot 1151
Map No. 547
(APN 539-521-01 & 02)
("B" Street)

Prepared By

Christensen Engineering & Surveying
7888 Silverton Avenue, Suite "J"
San Diego, CA 92126

For

Matthew Gordon
Janco LLC
P.O. Box 231446
Encinitas, CA 92023
(619) 572-3556
Gordon.matthew0@gmail.com

PTS 422242

April 27, 2015
Revised August 03, 2015
Revised October 19, 2015

<u>**TABLE OF CONTENTS**</u>

INTRODUCTION

The Water Quality Technical Report (WQTR) preparation is required under the City of San Diego's Storm Water Management and Discharge Control Ordinance (San Diego Municipal Code Section 43.03, et seq.). The purpose of this WQTR is to address the water quality impacts from the proposed construction associated with the "B" Street Small Lot Subdivision Project located on a portion of Block 63, Morse's Subdivision of Pueblo Lot 1150 and a Portion of Pueblo Lot 1151, Map No. 547, in the City of San Diego. Best Management Practices (BMPs) will be utilized to provide compliance with the Construction Storm Water BMP Performance Standards. The WQTR is subject to revisions as needed.

1.0 PROJECT DESCRIPTION

The Golden Hill Row Homes Project is located on a portion of Block 63, Map No. 547, a 0.589 acre parcel, in the City of San Diego, westerly of a vacated portion of 29^{th} Street, between a vacated alley and "B" Street. This project will involve the extension of an existing 36" storm drain and construction of an 11 Lot Small Lot Subdivision including the construction a driveway, sewer and water facilities, site walls and offsite construction of curb, gutter and sidewalk to replace that which exists.

Topography and Land Use

The project area is characterized by multi-residential properties. Prior to development there is no onsite impervious surface (0% of site) and following development there will be 0.352Ac of impervious surface (59.8% of site). The site is drained by the storm drain system located in the drainage basin southeasterly of the site which contains a City of San Diego public storm drain inlet.

1.2 Hydrologic Unit Contribution

The "B" Street Small Lot Subdivision project is located in the Pueblo Watershed and in the San Diego Mesa Hydrologic Area (908.2), Cholla Hydrologic Sub-Area 908.22 and represents less then 0.003% of the watershed area. The site drains southeasterly into City of San Diego inlet located just northerly of "C" Street, easterly of vacated 29^{th} Street and continues southerly within the public storm drain system to the bay. The proposed improvements will not materially change the volume of flow into the public storm drain system.

1 WATER QUALITY ENVIRONMENT

2.1 Beneficial Uses

The beneficial uses for the hydrologic unit are included in Tables 1.1 and 1.2. These tables have been extracted from the Water Quality Control Plan for the San Diego Basin.

MUN – Municipal and Domestic Supply: Includes uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
AGR - Agricultural Supply: Includes uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

IND – Industrial Services Supply: Includes uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
REC1 – Contact Recreation: Includes uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and SCUBA diving, surfing, white water activities, fishing, or use of natural hot springs.
REC2 – Non-Contact Recreation: Includes the uses of water for recreational involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
WARM – Warm Freshwater Habitat: Includes uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
WILD – Wildlife Habitat: Includes uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife, (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

2.1.1 Inland Surface Waters

Inland Surface waters have the following beneficial uses as shown on table 1.1

Table 1.1 Beneficial Uses for Inland Surface Waters

Hydrologic Unit Number	Mun	Ind	Rec 1	Rec 2	Warm	Wild
908.2	-	-	x	x	x	x

2.1.2 Groundwater

Groundwater beneficial uses includes agricultural and potentially municipal and industrial.

Tab le 1.2 Beneficial Uses for Groundwater

Hydrologic Unit Number	Mun	Agr	Ind
908.2	x	-	-

- *** Excepted from Municipal**

x Existing Beneficial Use
0 Potential Beneficial Use
- None Reported

2.2 303(d) Status

According to the California 2010 303d list published by the San Diego Regional Water Quality Control Board the nearest impaired water body is the San Diego Bay impaired by coliform bacteria, benthic community effects, copper and sediment toxicity. The San Diego Bay is approximately 1 mile southwesterly of the project and the project does not directly discharge into the San Diego Bay. Runoff is comingled with that from the public storm drain.

3.0 CHARACTERIZATION OF PROJECT RUNOFF

3.1 **Existing and Post-Construction Drainage**

Runoff from the area of the project and a large area northerly and westerly of the site is conveyed to a basin that is located adjacent to the project. The basin is located easterly and southerly of the site. Following construction this drainage pattern will persist. The runoff conveyed to the basin is picked up by a City of San Diego storm drain and conveyed southerly where it eventually enters San Diego Bay. Runoff offsite (westerly) will be conveyed to the basin after flowing over a concrete alley westerly of the site and then over a permeable paving improved sewer easement at the southern boundary of the project, which also acts as access for units 3-6 and 10-11. Each lot will have s separate Filterra Bioretention Unit to treat runoff from its impervious area. Lot 7's unit will also treat runoff from the driveway for Lots, 8 and 9 and Lot's 11 unit will treat runoff from the driveway fronting Lots 1, 2, 3, 10 and 11 and portions of the driveway fronting lots 4, 5 & 6. Runoff from the remaining permeable surfaces of the site will be conveyed to the southeasterly basin, as well.

This neighborhood is primarily improved with multi-family residences but the project site itself is unimproved so the runoff coefficient selected for the pre-construction site evaluation is C=0.45. Post-construction the entire area is evaluated using a runoff coefficient of C = 0.70. The area of the pre and post-construction analysis is the same and the runoff coefficient changes resulting in a change in runoff from 0.90 cfs pre-construction to 1.40 cfs post-construction.

Since the project does use proper Energy Dissipation and does directly discharge to a hardened (engineered) conveyance system to an Exempt System (Nodes1,2.3.4.5.6.7.8) it is exempt from hydromodification requirements (Nodes are from Figure 4-1 of Storm Water Standards Manual). See attached drainage study for the current project. In Appendix "C" and "D" for the current project the basin adjacent to the property and the channel at Highway 94, 29th Street and an alley provides analysis and evidence to support the exemption by demonstrating these areas are hardened conveyance locations. The analysis also notes that both the basin and channel have conveyed large volumes of public runoff for many years (part of it since the 1920's) and is not subject to erosion from the volumes and velocities shown to exist in each location.

The most restrictive portion of this conveyance system is capable of conveying the anticipated 10 year return frequency storm.

The Rational Method was used to calculate the anticipated flow for the 100-year storm return frequency event using the method outlined in the City of San Diego Drainage Design Manual.

A detailed description of the drainage patterns and flows are discussed and demonstrated in the Drainage Study and were developed using the City of San Diego Drainage Design Manual rational method. See attachment “D”.

3.2 Post-Construction Expected Discharges

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	X
Commercial Development	P(1)	P(1)	X	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

(1.1.1) *A potential pollutant if landscaping exists on-site.*
(1.1.2) *A potential pollutant if the project includes uncovered parking areas.*
(1.1.3) *A potential pollutant if land use involves food or animal waste products.*
(1.1.4) *Including petroleum hydrocarbons.*
(1.1.5) *Including solvents.*

3.3 Soil Characteristics

The project will not have any new slopes with a gradient greater then 2:1. The site will include landscaping following construction.

4.0 MITIGATION MEASURES TO PROTECT WATER QUALITY

To address water quality for the project, BMPs will be implemented during construction and post-construction. The answers to questions on the Storm Water Applicability Checklist have resulted in the determination that this project is subject to Priority LID BMP requirements.

LOW-IMPACT DEVELOPMENT DESIGN PRACTICES

1. Optimize the Site Layout

This project uses the existing topography to reduce the need for extensive grading. Primarily, that portion of the site that was previously graded is proposed to be developed. The basin portion of this site is not proposed to be disturbed by this project. The area of proposed development does not fall under the Environmentally Sensitive Lands regulations.

Natural vegetation is not proposed to be disturbed by this project and will be protected. There are no wetlands, creeks or riparian habitat onsite or near the site. The basin area is not to be disturbed.

No hillsides are being disturbed by this development.

There are no high infiltration capacity soils onsite in which to locate storm water treatment facilities.

Runoff from the site is not directed to highly erosive potential soils. Runoff is conveyed to a rip rap energy dissipater. The offsite alley portion of the development will convey runoff to an energy dissipater before it is conveyed to the basin area. That portion of the site that is to be developed and previously conveyed runoff to the basin will continue to be conveyed to the basin.

Some areas of vegetation are being conserved and not being developed.

2. Minimize Impervious Footprint

This project proposes the use of the site topography that will limit the change in imperviousness and quantity of grading. Portions of the proposed development utilize pervious paving to help limit the increase in impervious surfaces

Impermeable surfaces will be drained to a appropriately sized Filterra “Roof Drain” Units (biofiltration) that will convey filtered runoff to the proposed rip rap energy dissipater. There are no streets, sidewalks or parking lot aisles to be constructed with minimum widths proposed for this project.

The project is for 11 single-family residences and does propose a shared driveway.

There are no parking lots proposed for this project.

Parking will be within enclosed garages.

The landscape design utilizes extensive vegetated and permeable surfaces.

Permeable pavement is proposed as a part of the design of this project

Vegetated roofs are not proposed for this site.

The project is designed to include landscaping and pervious paving. These elements serve to reduce the site's potential imperviousness and decrease runoff.

3. Disperse Runoff to Adjacent Landscaping

Rooftops and impervious paving are designed to convey their runoff to the Filterra Unit. Vegetated areas, being self-treating, convey their runoff directly to the basin.

Areas of newly developed roof and hardscape are proposed to have their runoff directed to Filterra Unit.

There are no roadway sections to be directed to pervious areas.

There are proposed landscaped areas but the structure of the soil will not allow infiltration. Drainage from the driveways and impervious portions of the project will be conveyed to the Filterra Units, to be treated.

There are some specific depressed landscaping areas in the center of the project that will allow runoff to flow over landscaping.

Rooftops are proposed to drain to Filterra Units. The site is not suitable for infiltration nor percolation. Areas of landscaping allow for treatment of runoff before it leaves the site. Impervious site improvements are "broken up" and separated by landscape areas which allow for runoff from the pervious areas to flow though these areas before leaving the site. Walkways are pervious and designed to allow for runoff to flow to landscaped areas. The proposed site improvements do not contain all directly connected impervious areas. Some areas of landscaping and planter construction are interspersed with impervious areas.

4. Construction Considerations

Landscaped areas will be minimally compacted.

Soil amendments will be considered by the project landscape architect, as appropriate.

Landscaped area shall be scarified at least 6 inches into the subsoil to avoid stratified layers below the topsoil layer.

The San Diego Landscape regulations will be adhered to and topsoil improvements will be implemented, where necessary, to improve the soil's capacity to retain moisture and reduce runoff from the water quality design storm.

5. Additional Considerations

The use of drought tolerant vegetation is a part of the proposed landscape plan. There are no permanent channel crossings as a part of this project.

Energy dissipaters are proposed for this site and will promote sheet flow dispersal of runoff.

Buffer Measures

While there is a drainage basin adjacent to the project site it is not a natural water body and so a buffer is not required to be provided. The basin area is generally nearly dry and only conveys significant runoff during storms. There are no aquatic resources within the basin. The project is protected from overflow from the basin (flood elevation of 171.41' (see previous drainage study)) by the finish floors being higher than the flood elevation. Even if the outlet from the basin should become plugged the basin will overtop at an elevation of 180, still below the finish floor elevations of the units.

SOURCE CONTROL BMPs

Source control BMPs will be selected that are feasible for the site. Post project runoff volumes and peak flows from a water quality design storm cannot be infiltrated onsite due to proximity to the building of areas that could be meet design requirements and is not recommended by the project geotechnical consultant The actual treatment of water quality volume of water is through filtering in a Filterra Unit.

1. Maintenance Bays

There are no maintenance bays proposed for this project.

2. Vehicle and Equipment Wash Areas

There are no vehicle and equipment wash areas proposed for this project.

3. Outdoor Processing Areas

There are no outdoor processing areas proposed for this project.

4. Retail and Non-Retail Fueling Areas

There are no fueling areas proposed for this project.

5. Steep Hillside Landscaping

There are no steep hillsides that exist onsite, to be disturbed. Consideration for any inadvertently disturbed areas will include vegetation using deep-rooted, drought tolerant and/or native plant species, in accordance with the Landscape Technical Manual.

6. Efficient Irrigation Systems and Landscape Design

Rain shutoff devices will be used in all landscaped areas that use irrigation located onsite. They will prevent irrigation during and after precipitation events.

Irrigation contribution to dry-weather runoff will by not allowing irrigation spray patterns to fall on paved surfaces or drain inlets.

The landscaped areas will include separate irrigation systems, as appropriate, to address specific water requirements.

Flow reducers and shutoff valves will be used, as appropriate to control water loss in the event of a break in the irrigation system.

Rain shutoff devices will be used in all landscaped areas that use irrigation located onsite.

Inlets within lawn areas will be minimized and/or will include a non-turf buffer around the inlet to minimize or eliminate the transport of lawn care products.

7. Design Trash Storage Areas

There is a planned separate covered and paved trash storage area. The some trash containers will be contained within the proposed garages and will prevent rainfall intrusion.

A roof or awning is not required as the project is not a high usage trash area or high-density residential development with exposed trash areas.

8. Design Outdoor Material Storage Areas

There are no outdoor storage areas proposed for this project.

9. Loading Docks

There are no loading docks proposed for this project.

10. Integrated Pest Management

It is not anticipated that there will be a need for pesticides on site but if needed they will be used sparingly and will utilize biological controls and habitat manipulation as well as consideration of pest resistant vegetation use.

The owners are directed to http://www.ipm.ucdavis.edu/WATER/U/index.html to obtain educational information materials concerning pests. These materials will address (1) Keeping pests out of buildings and landscaping using barriers, screens and caulking; (2) Physical pest elimination techniques, such as, weeding, squashing, trapping, washing or pruning out pest; (3) Relying on natural enemies to eat pests; (4) Proper use of pesticides as a last line of defense.

11. Public Storm Water Conveyance System Stamping and Signage

There will not be any storm water conveyance systems that will be publicly available that could be stamped with prohibitive language concerning dumping.

12. Fire Sprinkler System Discharges

There are proposed Fire Sprinkler systems that could require discharge to sanitary sewer due to operational maintenance and testing in this multi-family project.

13. Air Conditioning Condensate

Air Conditioning Condensate will be conveyed to the sanitary sewer.

14. Non-Toxic Roofing Materials

Non-Toxic Roofing Materials are proposed for use onsite.

15. Other Source Control Requirements

Landscape and Grading Plans shall require implementation of post-construction soil stabilization practices and construction shall be performed in conformance with those plans.

Pet Waste collection dispensers are not applicable to this project.

There are no high pedestrian traffic areas requiring trash receptacles for this project.

BMPs Applicable to Individual Priority Projects

This project is not a candidate for infiltration of runoff because the geotechnical consultant has determined the site is not appropriate for infiltration. This eliminates use of the infiltration BMPs listed below including; Infiltration Basin, Bioretention Basin, Constructed Wetlands, Extended Detention Basins, Dry Well. The area and slope requirements for Cistern Plus Bioretention, Vegetated Swales and Strips and Flow Through Planters prohibit their use. The other BMPs are not supported for LID management.

Priority Development Projects are subject to Low-Impact Development design standards in an attempt to mimic predevelopment hydrologic conditions. This project proposes the use of a Filterra "Roof Drain" Unit system to address LID.

Trees and plants will also be incorporated in the site design.

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	Y	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 Separator 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*

4.1 Construction BMPs

BMPs that will be utilized during the Grading/Construction include the following:

- Silt Fence
- Street Sweeping and Vacuuming
- Gravel Bag Berm
- Storm Drain Inlet Protection

- Material Delivery and Storage
- Spill Prevention and Control
- Concrete Waste Management
- Water Conservation Practices
- Stockpile Management
- Solid Waste Management
- Stabilized Construction Entrance
- Vehicle and Equipment Maintenance

Construction BMPs for this project will be selected, constructed, and maintained so as to comply with all applicable ordinances and guidance documents.

4.2 Post-construction BMPs

Pollutants of concern as noted in section 3 will be addressed through three types of BMPs. These types of BMPs are site design, source control and treatment control. Design and Source Control BMPs have been discussed above.

4.2.1 **Treatment Control BMPs**

The following treatment control BMPs will be implemented to address water quality:

- **Filterra Bioretention System**

The Filterra[TM] treatment system is a manufactured bioretention stormwater best management practice (BMP) that filters stormwater runoff from impervious surfaces (roadways, parking lots and roof tops). The FilterraTM treatment system consists of a concrete container filled with an engineered soil filter media, a mulch layer, an under-drain system and a tree, shrub or other plant selection. This filtration system can be integrated into the site design of both new development and redeveloped projects. Runoff drains directly from the impervious surface, through the filter media, and then out of the container through the under drain system to be discharged to a receiving system or infiltrated into the surrounding soil.

The Filterra Bioretention Sytem has a evaluation grade of “B” in the City of San Diego Evaluation and Selection of Proprietary Treatment Control BMPs (Draft Report) and is listed as having “Medium” removal efficiency for Sediment, Trash, Metals (aluminum, copper, lead and nickel), Bacteria, Oils & Grease, Organics and Nutrients (nitrogen & NH_3).

► DETAILS

Filterra[TM] can serve as a water quality BMP in areas where discharge of stormwater runoff into the sub-soils is not desired (e.g., gas stations and karst soils). An under drain system is used to convey filtered runoff to an adjacent drainage system. Where soils are permeable and ground water recharge is desirable Filterra^{TM} can be designed to infiltrate highly treated water into the subsurface. It can be used as a filter only or as a combination filter and infiltration device. Filterra^{TM} is generally not used for attenuation of large volumes of runoff for stream channel erosion control and flood control purposes. However, some degree of volume / flow reduction can be achieved by combining this filter system with an adjacent under ground storage / detention system (gravel trench or pipes). Such a combined system may be useful for urban retrofit projects to address problems associated with combined sewer overflows or for stream protection.

Filterra^{TM} takes up little space (surface area or depth) and can be used in any type of urban or suburban commercial, industrial or residential development. Filterra^{TM} is a suitable device for urban retrofit due to its flexible design, sizing criteria and concrete container and easy drop in place construction, it can be installed within the green space or streetscapes of redevelopment projects. Filterra^{TM} can be modified to fit any curb line as a drop inlet along roadways, parking lots, or pedestrian plaza areas. An adjacent drainage conveyance system is necessary in order to connect the under-drain system, and accept large storm bypass flows.

It is designed to be used where runoff is likely to contain high concentrations of urban pollutants such as heavy metals, oil, and organics (such as gas stations, maintenance facilities and roadways). The system can be used alone or in combination with other BMP's. When used alone, pretreatment is not necessary as the system is designed to operate effectively without clogging from typical urban runoff concentrations of sediment and other particulate matter. The nature of the surface mulch and engineered filter media is such that particles become entrained into the mulch / filter media itself without clogging at the surface. The plant root system also keeps the soil open and free from clogging. As long as the manufacturer's operating and maintenance procedures are followed the filter device is projected to work for 20 years or more without replacement of the filter media or plant material.

► APPLICATIONS

Site Conditions

The enclosed non-permeable concrete container makes Filterra^{TM} suitable for situations where infiltration is undesirable or not possible. These situations would include: karst topography, high groundwater conditions, close proximity to buildings, steep slopes, contaminated soils, brownfields sites, highly contaminated runoff or where chemical or oil spills are likely (maintenance facilities, industrial and gas stations). For "hot spots" where chemical spills are likely, the system can be fitted with a valve to quickly close the discharge drain pipe isolating the spill in the concrete container and filter media for easy cleanup, removal and replacement. Where Filterra™ is being used to provide a combination of filtration and infiltration into the adjacent soils, planning considerations should include unique site conditions such as soil permeability, seasonal high groundwater table, depth to bedrock, karst topography, etc. Soil permeability will determine the degree to which it can be used as an infiltration device.

Developed Conditions

Filterra™ is highly adaptable and can be used for most developments. Since the filter is contained in a concrete box it can be built in and around roadways sidewalks buildings and parking lots. It can be installed on many slope conditions typical of parking lots and roadways. In highly urban areas it is possible to use it in the design of an entire streetscape converting the typical non-functional streetscape into one large vegetated filter treatment device.

Location Guidelines

Filterra™ is best incorporated into the overall site, or streetscape or parking lot landscaping plan. The individual box locations represent a combination of drainage considerations (based on final grades and water quality requirements), desired aesthetics, and minimum landscaping requirements, and must be coordinated with the design of the drainage infrastructure.

Aesthetic Considerations

Aesthetic considerations must be evaluated early in the site planning process. While topography and hydraulic considerations may dictate the general placement of each structure, overall aesthetics of the site should be integrated into the site plan and stormwater concept plan from their inception. Both the stormwater engineer and the Landscape Architect must participate during the layout of facilities and infrastructure to be placed on the site.

Sediment Control

Similar to bioretention basins and sand filters, Filterra™ if installed prior to full site stabilization and without proper inlet protection will become choked with sediment from upland construction operations, rendering it inoperable from the outset. Simply providing inlet protection or some other filtering mechanism during construction will not adequately control the sediment. One large storm may completely clog the soil media, requiring immediate maintenance.

Filterra™ should be installed AFTER the site work is complete and stabilization measures have been implemented. (External and adjacent drainage and conveyance systems are typically built along with the site utilities and other infrastructure, and later connected to the boxes when installed. If this is not possible, strict implementation of E&S protective measures must be installed and maintained in order to protect the filter media from premature clogging and failure.

In general, bioretention has proven successful in part because of the relatively small surface area, low construction costs and ease of maintenance. Filterra^{TM} provides these same benefits.

Bioretention Practices establishes a target ratio of bioretention surface area to contributing impervious area of 2.5%. The manufacturer of Filterra^{TM} in cooperation with the University of Virginia has conducted research to optimize the flow / pollutant removal characteristics of the filter media to significantly reduce this ratio. The patented filter media has both high flow rates and high pollutant removal capabilities. To establish the sizing criteria the manufacturer has examined the rainfall distribution and frequency data from the mid-Atlantic region to size the filter surface area to treat 90% of the total annual rainfall volume. Pollutant removal data was also related to the filter surface area and drainage area relationships. The optimum filter surface area to drainage area ratio is 0.33%. For example, the required minimum size filter for ¼ acre of impervious surface would be 36 square feet of filter surface area or one 6 ft. by 6 ft. filter box.

The pollutant removal rates for Filterra^{TM} also vary as a function of the filter surface area to drainage area. At the minimum 0.33% ratio filtering 90% of the annual runoff the expected pollutant removal rates are shown below. It is not recommended that a ratio of less than 0.33% be used.

Expected Pollutant Removal (@ 0.33% filter surface area / drainage area)

Total Suspended Solids Removal = 85%
Total Phosphorous Removal = 74%
Total Nitrogen Removal = 68%
Total Metal Removal = 82%

Higher pollutant removal rates are possible by increasing the ratio of filter surface area to drainage area. See the manufactures detailed calculations for sizing and pollutant removal on their web site at: http://www.americastusa.com/filterra.html. Local jurisdictions may want to consider achieving the highest pollutant removals possible to protect water supplies (surface and ground water) or sensitive water bodies and streams. This may be achieved with Filterra^{TM} by increasing the filter surface area to drainage area ratio.

However it is well documented that the pollutant removal efficiency of a filter device varies with the concentration of pollutants in the inflow (the higher the pollutant levels are in the inflow the higher the pollutant removal rates will be). In order to account for this variability in efficiency, the maximum allowable pollutant removal rates for FilterraTM are as follows:

Maximum Pollutant Removal Rates

Total Suspended Solids Removal = 90%
Total Phosphorous Removal = 80%

Total Nitrogen Removal = 65%
Total Metals Removal = 85%

The Filterra® media has been TAPE and TARP tested and approved.

TAPE

The Washington State Department of Ecology (DOE) has now approved the Filterra® Bioretention System for General Use Level Designation (GULD) for TSS, oil and grease, and enhanced dissolved metals. This state approval recognizes Filterra as a proven, effective solution to mitigate unwanted pollutants from stormwater runoff. In additional, Filterra® has also achieved Conditional Use Level Designation (CULD) for Total Phosphorus removal.

Widely regarded as the industry's most stringent testing standard, Filterra® successfully completed the Technology Assessment Protocol for Ecology (TAPE) Process in Washington State. The program was accomplished by Filterra through third party support, verification and endorsement; a decision backed by extensive lab testing as well as years of tested site-based performance.

TARP

In addition to TAPE approval, the Filterra® Bioretention System has been approved for stand alone applications in Maryland and Virginia through University of Virginia laboratory and field third party monitoring under the Technology Acceptance and Reciprocity Partnership (TARP) protocol. This study was subsequently published in the Journal of Environmental Engineering and Management in 2007

Configuration

General

The design of Filterra™ shall be in accordance with manufacturers specifications. The designer is not only responsible for selecting the appropriate components for the particular design but also for ensuring long-term operation.

Sizing Methodology

The designer must verify that Filterra™ has been sized and installed in accordance with the manufacturer's specifications. The distribution and sizing of the system of filters should be in accordance with the manufacturer's recommendations to achieve the most cost-effective treatment practicable while satisfying the performance-based or technology-based water quality criteria. Typical development / redevelopment streetscape or parking lot design will use a minimum of one 6'x6' filter box in an off-line configuration for every ¼ of drainage area, or a combination of boxes so as to maintain a 0.33% ratio of filter surface area to drainage area.

When designing the system, consideration must be given for overflows during major storm events. Once the filter flow capacity is exceeded a backflow condition develops forcing runoff to by-pass the filter. Overflows should be diverted to a safe conveyance device (inlet, swale or green space).

Pretreatment

Pretreatment is generally not necessary as the filter's media, mulch and plant root system is designed to operate without clogging under normal conditions. Routine annual inspection and maintenance will ensure that the filter will operate for at least 20 years. Normal conditions mean a stabilized drainage area with typical concentrations of sediment and other urban pollutants. Follow the manufacturer's recommendations for unusual site conditions where high pollutant loads are expected. If it is installed when there is active construction within the drainage area the opening to the filter should be blocked off. Follow the manufacturer's recommendations on protection of the filter box and media during construction activities.

Observation Well and Clean-out

Filterra™ is typically delivered to the site completely assembled or assembled by the manufacturer at the site. The system comes with an observation well installed that can also be used as a clean out to remove any blockages in the under drain piping.

Plant Materials

The plant materials used for Filterra™ should follow the manufacturer's recommendations. Generally, the manufacturer will provide and install the filter material and plants. The system can use typical readily available landscape plant materials. It is designed to use upland plants not wetland plants. Filterra™ provides a hydrologic regime where wetland plants will not survive and should not be used. The plants used for bioretention will also work for Filterra™

One of the advantages of this system is that it uses commonly available nursery stock plant materials so the end user can select from a wide range of plants to also achieve aesthetic and habitat values. The types of plants used will also determine the depth and design of the concrete container. The standard 6' x 6' box is designed to accommodate a typical shrub, herbaceous material or a very small tree. If a standard street tree is used, the filter box must be larger to accommodate the larger root system, prevent wind throw and to ensure adequate filter surface area as the tree matures. A 9' x 12' box would be the minimum size needed for most street trees. In some cases the manufacturer may recommend a customized box size and configuration to accommodate special plant requirements, unique site conditions, water quality protection goals and ensure adequate performance.

Construction

Accepted construction standards and specifications should be followed where applicable. Specifications and the work should conform to methods and procedures applicable to the installation of a prefabricated concrete box such as an inlet or other type container structure. The construction specification of the concrete container or use of an alternative material for the container should comply with the recommendations of the manufacturer and all applicable standards by the local or state approval authority.

Sequence of Construction

Filterra™ can be constructed and installed at any convenient time during the construction of the site or after the installation of the site's infrastructure as a “drop in place” devise. However, it should not be placed in service until the contributing drainage area has been stabilized. If the device is installed during the construction of the site’s infrastructure, the inlet opening must be protected from sediment. Follow the manufacturer’s recommendations on sediment / erosion protection.
The specification for the construction of the system should state the following: 1) the earliest point at which the runoff can be safely directed to the device and 2) the means by which this “delay in usage” is to be accomplished. When the device is made operational will depend on a variety of unique site conditions and should be evaluated and determined on those conditions.

Excavation

When Filterra™ is to be used in conjunction with or as an infiltration device the preparation of the infiltration trench placement and type of stone used or filter fabric should conform to the Construction Specifications of on Infiltration Trenches. Placement of the filter box should be on an acceptable base (gravel, sand or compacted soil) to prevent the device from settling. The filter container should be backfilled and compacted in the same manner as any precast concrete structure. The under drain leaving the box and connecting to the receiving conveyance system should be appropriately supported to prevent deflection during backfilling operations and sealed at the connection points to prevent leakage.

Total Project Area: (0.589 Ac)

I. Self-treating areas:

DMA Name	Area (Acres)
DMA – D (Landscape)	0.269 Ac

II. Self-retaining areas:

DMA Name	Area (square feet)
None	

III. Areas draining to self-retaining areas: None

IV. Runoff Flow Draining to IMPs:

DMA	Area (Ac)	Intensity (0.2 In/hr)	Runoff Volume C = IxA	Filterra Treatment Volume	Adequate
B (Lot 1)	0.028	0.2	0.006 cfs	0.038 cfs	Yes
C (Lot 2)	0.019	0.2	0.004 cfs	0.038 cfs	Yes
D (Lot 11/DW)	0.117	0.2	0.023 cfs	0.038 cfs	Yes
E (Lot 3)	0.020	0.2	0.004 cfs	0.038 cfs	Yes
F (Lot 4)	0.020	0.2	0.004 cfs	0.038 cfs	Yes
G (Lot 5)	0.019	0.2	0.004 cfs	0.038 cfs	Yes
H (Lot 6)	0.016	0.2	0.003 cfs	0.038 cfs	Yes
I (Lot 7/DW)	0.038	0.2	0.008 cfs	0.038 cfs	Yes
J (Lot 8)	0.014	0.2	0.003 cfs	0.038 cfs	Yes
K (Lot 9)	0.019	0.2	0.004 cfs	0.038 cfs	Yes
L (Lot 10)	0.010	0.2	0.002 cfs	0.038 cfs	Yes
Total Area	0.320				

5.0 OPERATION AND MAINTENANCE PROGRAM

Filterra Bioretention System

Maintenance

The manufacturer provides for the inspection, care and maintenance of the Filterra™ device for the first two years. After this initial two year period, the owner / operator of the system should follow all of the manufacturer's maintenance and inspection guidelines. In general, annual routine inspection and maintenance activities required are of a similar nature to any landscaped area and would include removal of trash, debris and sediment, replenishment of the mulch, and care or replacement of plants. The plant material requires no special care or attention once it has acclimated. Annual maintenance and care of the plants in a 6'x6' FT may require using one bag of mulch, a hand full of all purpose fertilizer (optional) and 20 minutes of time. Fertilization of the plants is optional since the system receives adequate nitrogen, organics and phosphorus from the runoff. During extreme droughts the plants may need to be watered in the same manner as any other landscape material. In the event of a chemical spill all of the soil and plants should be removed and properly disposed and replaced with new uncontaminated filter media and plants.

Maintenance Responsibility

The homeowners are ultimately responsible for the maintenance of the storm water facilities along with the required record-keeping**.**

6.0 ....SUMMARY/CONCLUSIONS

This WQTR has been prepared in accordance with the City of San Diego Storm Water Standards (January 20, 2012 Edition) section of the Land Development Manual. This WQTR has evaluated and addressed the potential pollutants associated with this project and it effect on water quality. A summary of the facts and findings associated with this project and the measures addressed by this WQTR is as follows:

- The beneficial uses for the receiving waters have been identified. None of these beneficial uses will be impaired or diminish due to the construction of this project.
- The "B" Street Small Lot Subdivision project will not materially alter drainage patterns on the site. The ultimate discharge points will not change. The collection of runoff by the public storm drain system will increase nominally.
- There will not be any open areas with exposed soil. A Filterra "Roof Drain" Unit will be used to filter impervious surface runoff intercepted onsite, including roof and surface drainage.
- The filtration elements will treat runoff and will not convey the commonly expected pollutant discharges into the public storm drain system.
- Runoff from the newly constructed impervious areas will be conveyed to the public storm drain system under "C" Street and will then be conveyed after commingling with other public storm drain runoff, to the area southerly of the site and then to the San Diego Bay.
- The attached site plan demonstrates the location of the Filterra Units.
- The proposed construction BMPs address mitigation measures and will promote water quality and protection of water quality objectives and beneficial uses to the maximum extent practicable.
- The proposed post-construction BMPs address mitigation measures to protect water quality and protection of water quality objectives and beneficial uses to the maximum extent practicable.

Since the project does use proper Energy Dissipation (Node 2) and does directly discharge to a hardened (engineered) conveyance system to an Exempt System (Node 5) it is exempt from hydromodification requirements (Nodes are from Figure 4-1 of Storm Water Standards Manual). See attached Drainage Study.

This Water Quality Technical Report has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based. The selection, sizing and design of storm water treatment and other control measures in this report meet the requirements of Regional Water Quality Control Board Oder R9-2007-0001 and subsequent amendments.

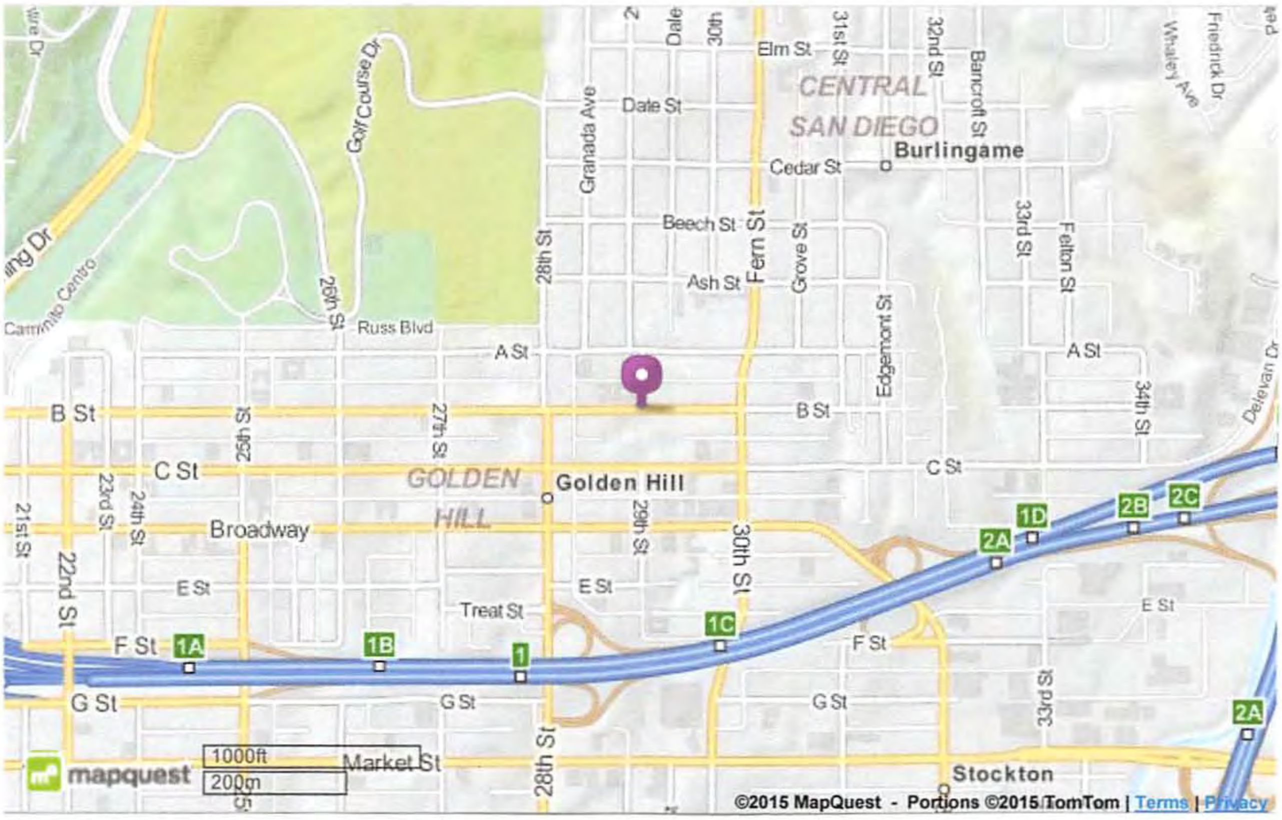
ANTONY K. CHRISTENSEN, RCE 54021, EXP. 12-31-15

DATE

ATTACHMENT A

LOCATION MAP

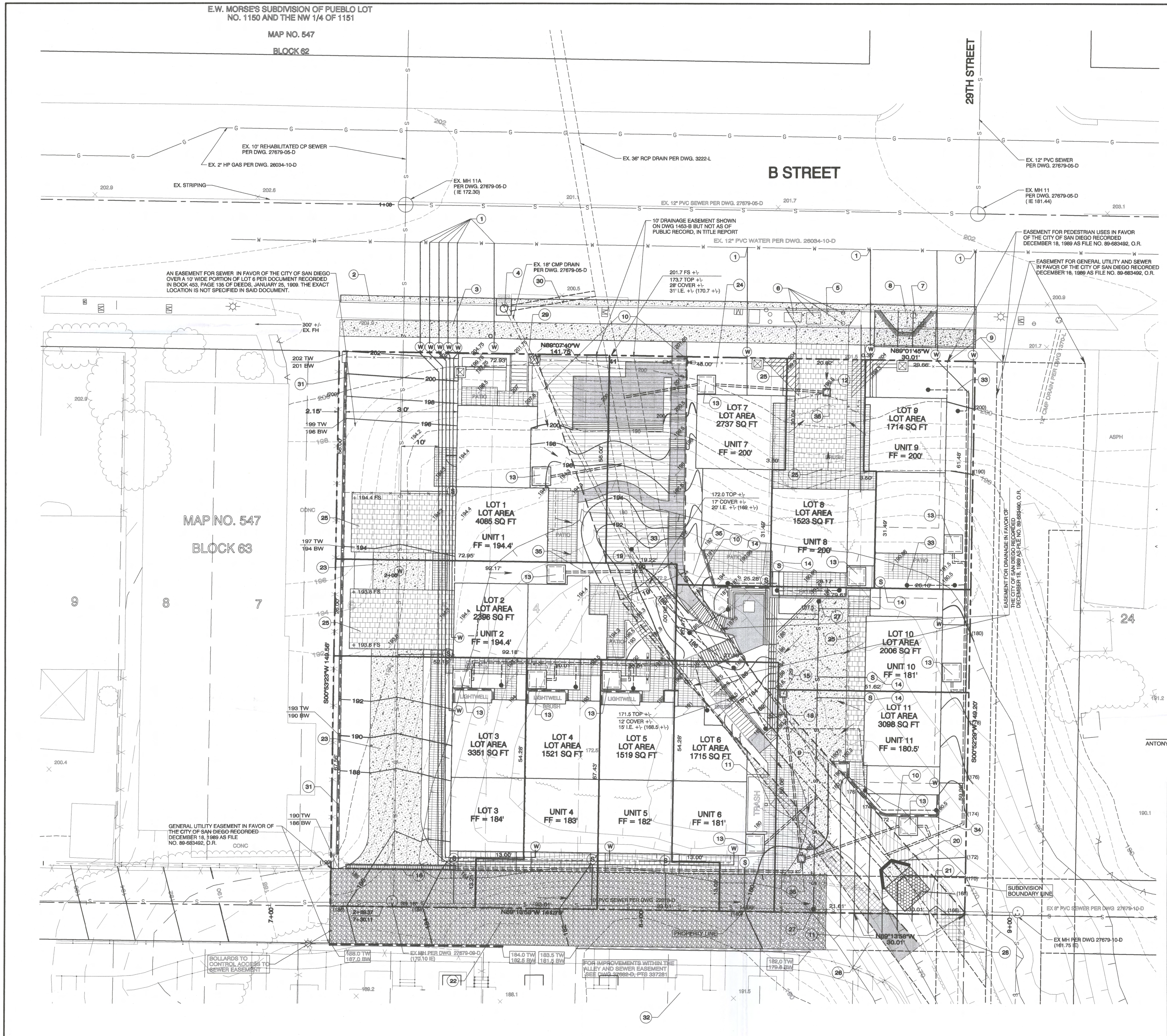
B STREET AND 29TH STREET



ATTACHMENT B

PROJECT MAP

TENTATIVE MAP NO. 1487346
PRELIMINARY GRADING PLAN



CONSTRUCTION NOTES

1. NEW WATER SERVICE (TYPICAL)
2. REMOVE & REPLACE CURB & GUTTER PER SDG-151
3. REMOVE AND REPLACE SIDEWALK PER SDG-155
4. REMOVE EX CATCH BASIN REPLACE WITH CURB INLET PER SDD-116
5. C/L 20' D/W PER SDG-160
6. RELOCATE EX UTILITY IMPROVEMENTS
7. RELOCATE EX UTILITY POLE
8. REMOVE AND REPLACE EX PED RAMP PER SDG-132B
9. PROPOSED 6" PRIVATE SEWER MAIN
10. PROPOSED NEW/ADDITIONAL DRAIN EASEMENT
11. PORTION OF EX DRAINAGE EASEMENT TO BE VACATED
12. PROPOSED CATCH BASIN FOR D/W AND ROOF RUNOFF UNITS 7-9
13. PROPOSED 4' X 4' ROOFDRAIN TYPE FILTERRA BIORETENTION UNIT
14. PROPOSED PRIVATE SEWER LATERAL TO PRIVATE 6" MAIN
15. PROPOSED CATCH BASIN FOR D/W UNITS 10-11
16. CATCH BASIN TO COLLECT RUNOFF FROM WESTERLY D/W
18. PROPOSED 36" RCP DRAIN
19. REMOVE EX HEADWALL AND JOIN NEW 36" RCP DRAIN
20. PROPOSED WING HEADWALL PER D-34
21. PROPOSED RIP RAP PER SDD-104
22. PERMEABLE PAVING PER DWG 37682-D
23. PROPOSED 5.5' PCC DRIVEWAY
24. PROPOSED LANDSCAPE AREA (TYPICAL)
25. PROPOSED STAMPED PAVERS (TYPICAL)
26. LETTER OF PERMISSION REQUIRED FOR GRADING IN THIS AREA
27. SEWER CLEANOUT FOR PRIVATE 6" SEWER MAIN
28. AREA OF DRAINAGE EASEMENT TO BE DEDICATED (OFFSITE) SAME OWNER OF THIS SITE AND SOUTHERLY SITE
29. EX 18" RCP DRAIN TO BE ABANDONED
30. PROPOSED 18" RCP DRAIN
31. PROPOSED SITE WALL
32. SOUTHERLY PROPERTY OWNER BY SAME DEVELOPER OF THIS PROJECT
33. PERMEABLE SURFACE DRAIN (TYPICAL)
34. DRAIN THROUGH WALL (PERMEABLE SURFACE) (TYPICAL)
35. IMPERMEABLE SURFACE DRAIN

GRADING DATA

AREA OF SITE - 25,664 S.F.
AREA OF SITE TO BE GRADED 25,364 SF (DOES NOT INCLUDE OFFSITE GRADING)
PERCENT OF SITE TO BE GRADED 98.8%
AREA OF SITE WITH SLOPES GREATER THEN 25% - 15,535 SF
PERCENT OF SITE WITH SLOPES GREATER THEN 25% - 60.5%
AMOUNT OF SITE WITH 25% SLOPES OR GREATER: AREA - 0 SF, PERCENT OF TOTAL SITE - 0%.
AMOUNT OF CUT - 100 C.Y.
AMOUNT OF FILL - 6,700 C.Y.
AMOUNT OF IMPORT - 6,600 C.Y.
MAXIMUM HEIGHT OF FILL SLOPE - 14 FEET
MAXIMUM DEPTH OF CUT - 10 FEET
RETAINING WALL: 11 FEET MAX, HT. 240 FEET TOTAL LENGTH
(OTHERS, PART OF RESIDENCES)

SCALE: 1" = 10'
CONTOUR INTERVAL: 2'
0 10 20 30 40

AUGUST 03, 2015

ANTONY K. CHRISTENSEN, RCE 54021 Date
LS 7508

REGISTERED PROFESSIONAL ENGINEER Antony K. Christensen No. 54021 Exp. 12-31-15 CIVIL STATE OF CALIFORNIA

LICENSED LAND SURVEYOR Antony K. Christensen Exp. 12-31-15 No. LS 7508 STATE OF CALIFORNIA

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858) 271-9901 FAX (858) 271-8912

Project Address:

"B" STREET AT 29TH STREET
SAN DIEGO, CA 92101

Project Name:

"B" STREET ROW HOMES

Revision 6:
Revision 5:
Revision 4:
Revision 3:
Revision 2:
Revision 1: 08-03-15 REVISE PROJECT DESIGN

Original Date: APRIL 06, 2015

Sheet 3 of 3 Sheets

Sheet Title:

TENTATIVE MAP
PRELIMINARY GRADING PLAN

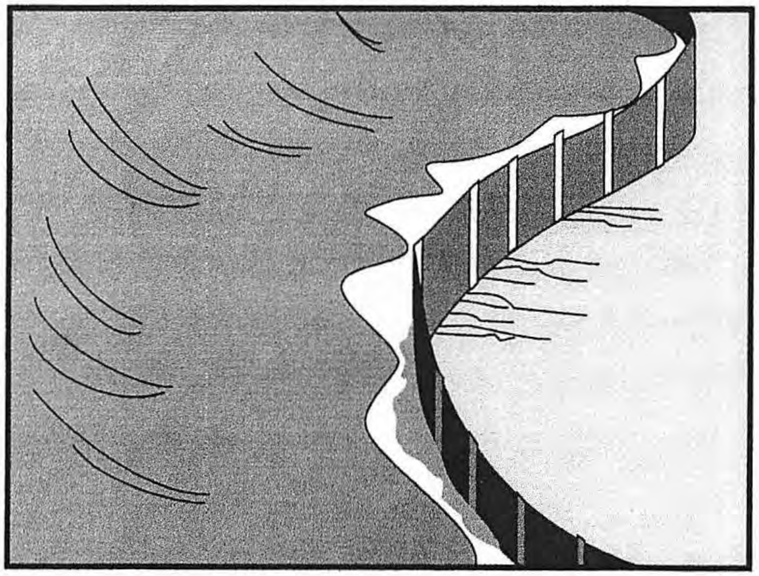
DEP# ____________

JN 2015-07

ATTACHMENT C

BMP DATA SHEETS

Silt Fence SE-1



Categories		
EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents	
Sediment (coarse sediment)	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm SE-12 Manufactured Linear Sediment Controls

SE-13 Compost Socks and Berms

SE-14 Biofilter Bags

Description and Purpose

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains water, promoting sedimentation of coarse sediment behind the fence. Silt fence does not retain soil fine particles like clays or silts.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They could also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas (SE-10). Silt fences should not be used in locations where the flow is concentrated. Silt fences should always be used in combination with erosion controls. Suitable applications include:

- At perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Around inlets.
- Below other small cleared areas.

Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause a flooding hazard.
- Do not use silt fence to divert water flows or place across any contour line.
- Improperly installed fences are subject to failure from undercutting, overtopping, or collapsing.
- Must be trenched and keyed in.
- Not intended for use as a substitute for Fiber Rolls (SE-5), when fiber rolls are being used as a slope interruption device.
- Do not use on slopes subject to creeping, slumping, or landslides.

Implementation

General

A silt fence is a temporary sediment barrier consisting of woven geotextile stretched across and attached to supporting posts, trenched-in, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap coarse sediment by intercepting and detaining sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

The following layout and installation guidance can improve performance and should be followed:

- Silt fence should be used in combination with erosion controls up-slope in order to provide the most effective sediment control.
- Silt fence alone is not effective at reducing turbidity. (Barrett and Malina, 2004)
- Designers should consider diverting sediment laden water to a temporary sediment basin or trap. (EPA, 2012)
- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.
- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft^2 of ponding area should be provided for every acre draining to the fence.
- Efficiency of silt fences is primarily dependent on the detention time of the runoff behind the control. (Barrett and Malina, 2004)
- The drainage area above any fence should not exceed a quarter of an acre. (Rule of Thumb-100-feet of silt fence per 10,000 square feet of disturbed area.) (EPA 2012)

- The maximum length of slope draining to any point along the silt fence should be 100 ft per foot of silt fence.

- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.

- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.

- Silt fences should remain in place until the disturbed area draining to the silt fence is permanently stabilized, after which, the silt fence fabric and posts should be removed and properly disposed.

- J-Hooks, which have ends turning up the slope to break up long runs of fence and provide multiple storage areas that work like mini-retention areas, may be used to increase the effectiveness of silt fence.

- Be aware of local regulations regarding the type and installation requirements of silt fence, which may differ from those presented in this fact sheet.

Design and Layout

In areas where high winds are anticipated the fence should be supported by a plastic or wire mesh. The geotextile fabric of the silt fence should contain ultraviolet inhibitors and stabilizers to provide longevity equivalent to the project life or replacement schedule.

- Layout in accordance with the attached figures.

- For slopes that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to protect silt fence from rocks (e.g., rockfall netting) ensure the integrity of the silt fence installation.

Standard vs. Heavy Duty Silt Fence

Standard Silt Fence

- Generally applicable in cases where the area draining to fence produces moderate sediment loads.

Heavy Duty Silt Fence

- Heavy duty silt fence usually has 1 or more of the following characteristics, not possessed by standard silt fence.
  - Fabric is reinforced with wire backing or additional support.
  - Posts are spaced closer than pre-manufactured, standard silt fence products.
- Use is generally limited to areas affected by high winds.
- Area draining to fence produces moderate sediment loads.

Materials

Standard Silt Fence

- Silt fence material should be woven geotextile with a minimum width of 36 in. The fabric should conform to the requirements in ASTM designation D6461.

- Wooden stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.

- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

Heavy-Duty Silt Fence

- Some silt fence has a wire backing to provide additional support, and there are products that may use prefabricated plastic holders for the silt fence and use metal posts instead of wood stakes.

Installation Guidelines – Traditional Method

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line of the proposed silt fence (trenches should not be excavated wider or deeper than necessary for proper silt fence installation).

- Bottom of the silt fence should be keyed-in a minimum of 12 in.

- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.

- When standard strength geotextile is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy–duty wire staples at least 1 in. long. The mesh should extend into the trench.

- When extra-strength geotextile and closer post spacing are used, the mesh support fence may be eliminated.

- Woven geotextile should be purchased in a long roll, then cut to the length of the barrier. When joints are necessary, geotextile should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.

- The trench should be backfilled with native material and compacted.

- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.

- Cross barriers should be a minimum of 1/3 and a maximum of ½ the height of the linear barrier.

- See typical installation details at the end of this fact sheet.

Installation Guidelines - Static Slicing Method

- Static Slicing is defined as insertion of a narrow blade pulled behind a tractor, similar to a plow blade, at least 10 inches into the soil while at the same time pulling silt geotextile fabric into the ground through the opening created by the blade to the depth of the blade. Once the geotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
  - Ease of installation (most often done with a 2 person crew).
  - Minimal soil disturbance.
  - Better level of compaction along fence, less susceptible to undercutting
  - Uniform installation.
- Limitations:
  - Does not work in shallow or rocky soils.
  - Complete removal of geotextile material after use is difficult.
  - Be cautious when digging near potential underground utilities.

Costs

- It should be noted that costs vary greatly across regions due to available supplies and labor costs.
- Average annual cost for installation using the traditional silt fence installation method (assumes 6 month useful life) is $7 per linear foot based on vendor research. Range of cost is $3.50 - $9.10 per linear foot.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches 1/3 of the barrier height.
- Silt fences should be left in place until the upgradient area is permanently stabilized. Until then, the silt fence should be inspected and maintained regularly.

- Remove silt fence when upgradient areas are stabilized. Fill and compact post holes and anchor trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground, and stabilize disturbed area.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Monitoring Data on Effectiveness of Sediment Control Techniques, Proceedings of World Water and Environmental Resources Congress, Barrett M. and Malina J. 2004.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.

Sedimentation and Erosion Control Practices, and Inventory of Current Practices (Draft), USEPA, 1990.

Southeastern Wisconsin Regional Planning Commission (SWRPC). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI. 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

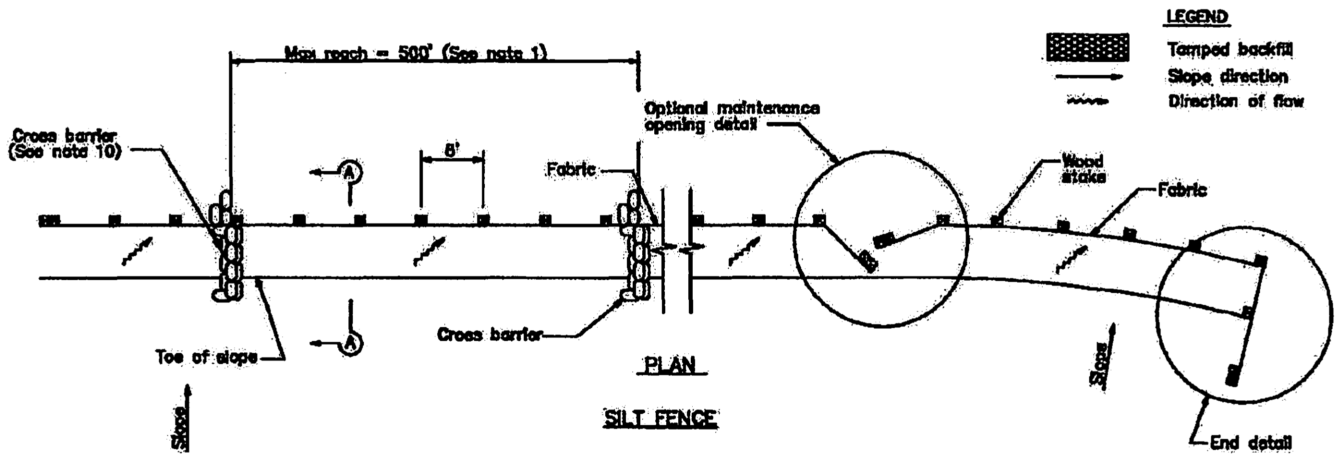
U.S. Environmental Protection Agency (USEPA). Stormwater Best Management Practices: Silt Fences. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 2012.

U.S. Environmental Protection Agency (USEPA). Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

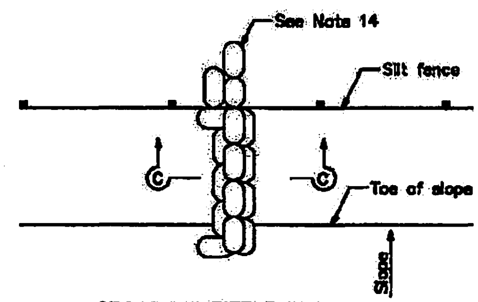
Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

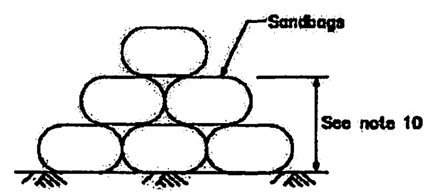


PLAN

SILT FENCE



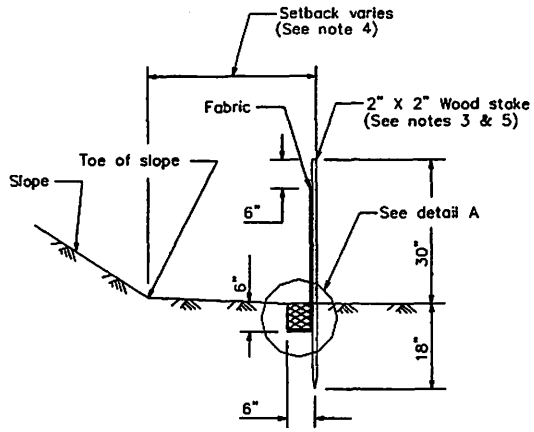
CROSS BARRIER DETAIL



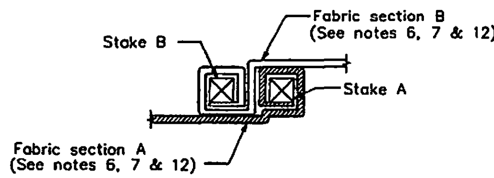
SECTION C–C

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. The last 8'–0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'–0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow–through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.
14. Add 3–4 bags to cross barrier on downgradient side of silt fence as needed to prevent bypass or undermining and as allowable based on site limits of disturbance.



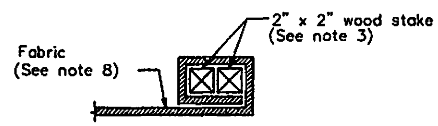
SECTION A–A



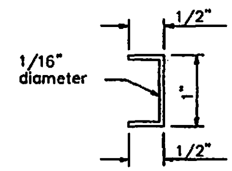
JOINING SECTION DETAIL (TOP VIEW)

LEGEND

- Tamped backfill
- Slope direction
- Direction of flow

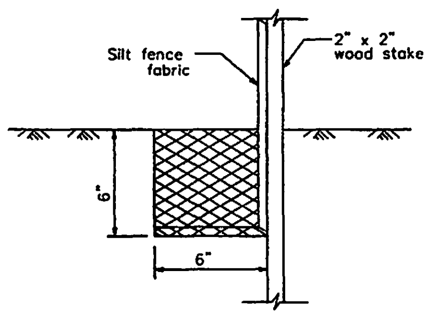


END STAKE DETAIL (TOP VIEW)

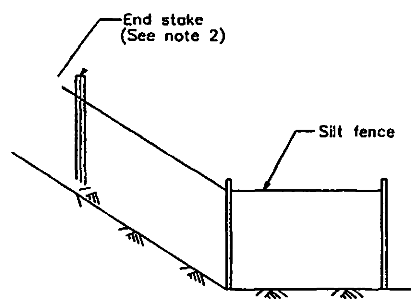


STAPLE DETAIL

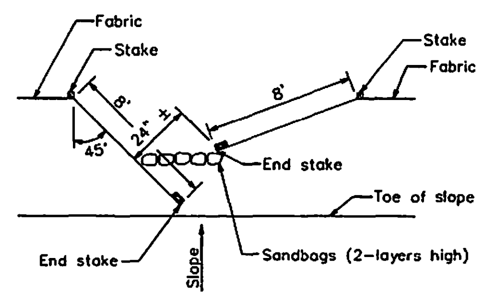
(SEE NOTE 9)



DETAIL A

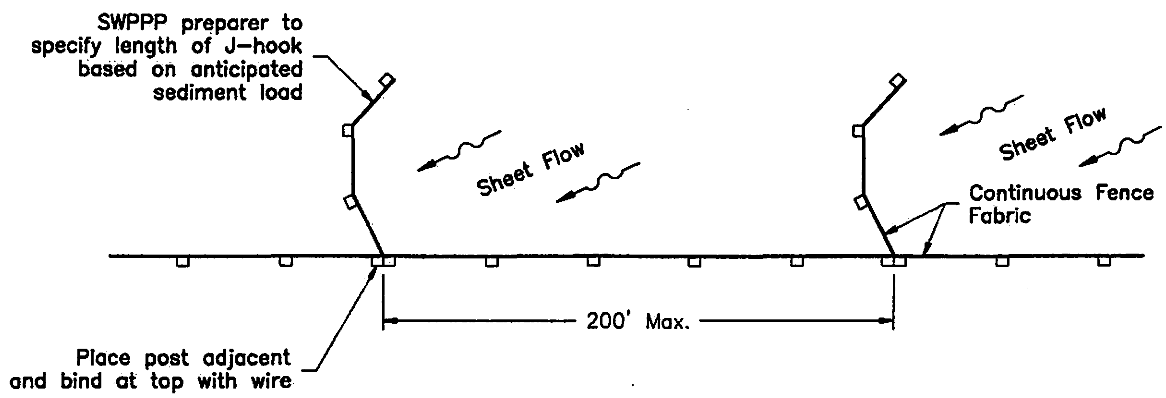


END DETAIL



OPTIONAL MAINTENANCE OPENING DETAIL

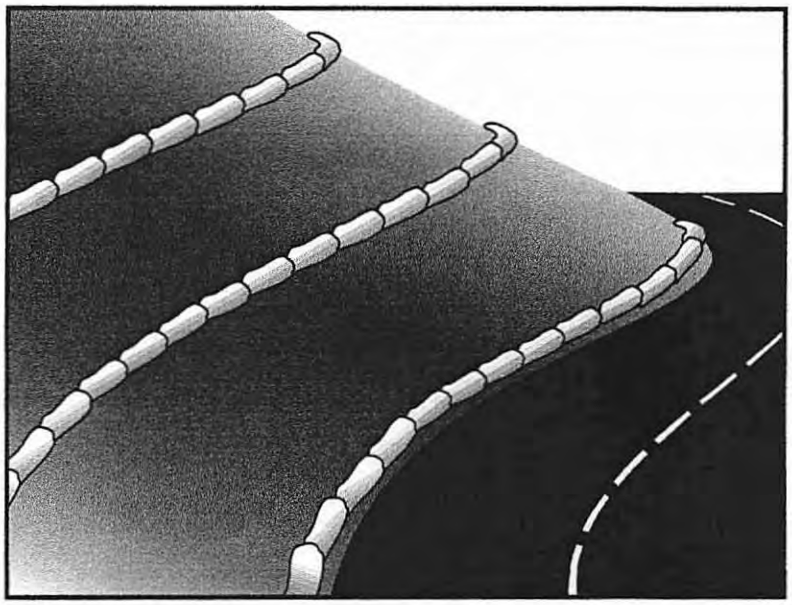
(SEE NOTE 11)


SWPPP preparer to specify length of J-hook based on anticipated sediment load
Sheet Flow
Sheet Flow
Continuous Fence Fabric
200' Max.
Place post adjacent and bind at top with wire

Plan

J-HOOK

Gravel Bag Berm SE-6



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-8 Sandbag Barrier

SE-12 Temporary Silt Dike

SE-14 Biofilter Bags

Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels
- As a linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

- At the top of slopes to divert runoff away from disturbed slopes.

- As chevrons (small check dams) across mildly sloped construction roads. For use check dam use in channels, see SE-4, Check Dams.

Limitations

- Gravel berms may be difficult to remove.

- Removal problems limit their usefulness in landscaped areas.

- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.

- Runoff will pond upstream of the berm, possibly causing flooding if sufficient space does not exist.

- Degraded gravel bags may rupture when removed, spilling contents.

- Installation can be labor intensive.

- Durability of gravel bags is somewhat limited and bags may need to be replaced when installation is required for longer than 6 months.

- Easily damaged by construction equipment.

- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel-filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers, but are more porous. Generally, gravel bag berms should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate gravel bag berms on level contours.

- When used for slope interruption, the following slope/sheet flow length combinations apply:

  - Slope inclination of 4:1 (H:V) or flatter: Gravel bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.

  - Slope inclination between 4:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

Slope inclination 2:1 (H:V) or greater: Gravel bags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, gravel bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the gravel bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more layer construction
  - Top width = 12 in. minimum for one or two layer construction
  - Side slopes = 2:1 (H:V) or flatter
- In Construction Traffic Areas:
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more layer construction.
  - Top width = 12 in. minimum for one or two layer construction.
  - Side slopes = 2:1 (H:V) or flatter.
- Butt ends of bags tightly.
- On multiple row, or multiple layer construction, overlap butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

Materials

- ***Bag Material:*** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

- ***Bag Size:*** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.

- ***Fill Material:*** Fill material should be 0.5 to 1 in. crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Material costs for gravel bags are average and are dependent upon material availability. $2.50-3.00 per filled gravel bag is standard based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.

- Reshape or replace gravel bags as needed.

- Repair washouts or other damage as needed.

- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.

- Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area.

References

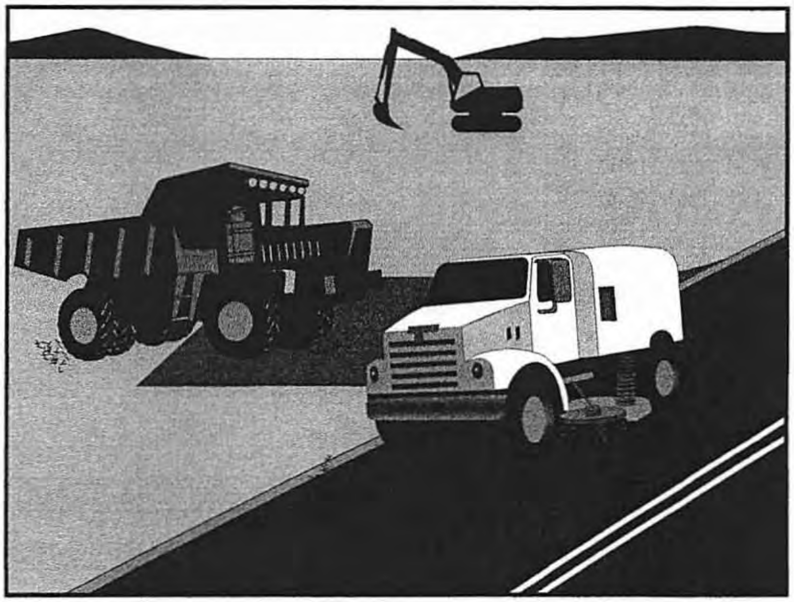
Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Street Sweeping and Vacuuming SE-7



Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.

- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from \$58/hour (3 yd^3 hopper) to \$88/hour (9 yd^3 hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- When actively in use, points of ingress and egress must be inspected daily.

- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.

- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.

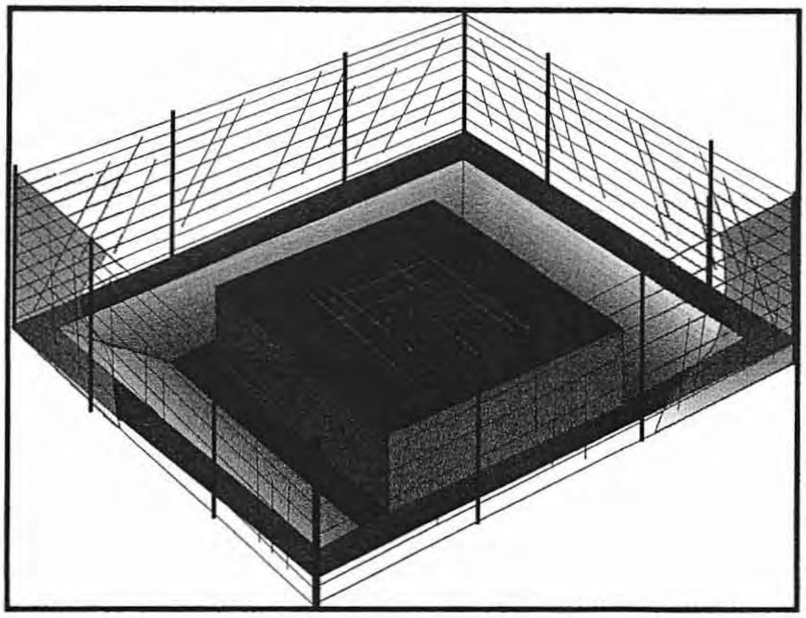
- Adjust brooms frequently; maximize efficiency of sweeping operations.

- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.



Categories

EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☒
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-14 Biofilter Bags

SE-13 Compost Socks and Berms

Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area in, around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

Suitable Applications

- Every storm drain inlet receiving runoff from unstabilized or otherwise active work areas should be protected. Inlet protection should be used in conjunction with other erosion and sediment controls to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Limitations

- Drainage area should not exceed 1 acre.
- In general straw bales should not be used as inlet protection.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Sediment removal may be inadequate to prevent sediment discharges in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use

other onsite sediment trapping techniques in conjunction with inlet protection.

- Frequent maintenance is required.

- Limit drainage area to 1 acre maximum. For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.

- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap and/or used in conjunction with other drainage control, erosion control, and sediment control BMPs to protect the site. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Alternative methods are available in addition to the methods described/shown herein such as prefabricated inlet insert devices, or gutter protection devices.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- The key to successful and safe use of storm drain inlet protection devices is to know where runoff that is directed toward the inlet to be protected will pond or be diverted as a result of installing the protection device.

  - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.

  - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.

- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.

- Seven types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.

- Silt Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.
- Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).
- Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.
- Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.
- Temporary Geotextile Storm drain Inserts: Different products provide different features. Refer to manufacturer details for targeted pollutants and additional features.
- Biofilter Bag Barrier: Used to create a small retention area upstream of inlets and can be located on pavement or soil. Biofilter bags slowly filter runoff allowing sediment to settle out. Appropriate for flows under 0.5 cfs.
- Compost Socks: Allow filtered run-off to pass through the compost while retaining sediment and potentially other pollutants (SE-13). Appropriate for flows under 1.0 cfs.

- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.
- Provide area around the inlet for water to pond without flooding structures and property.
- Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.
- Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- ***DI Protection Type 1 - Silt Fence*** - Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced and water flow through the grate will be blocked resulting in flooding. See typical Type 1 installation details at the end of this fact sheet.

  1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.
  2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes should be at least 48 in.
  3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.
  4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.

5. Backfill the trench with gravel or compacted earth all the way around.

- ***DI Protection Type 2 - Excavated Drop Inlet Sediment Trap*** - Install filter fabric fence in accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd^3/acre of drainage area. See typical Type 2 installation details at the end of this fact sheet.

- ***DI Protection Type 3 - Gravel bag*** - Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability. See typical Type 3 installation details at the end of this fact sheet.

  1. Construct on gently sloping street.
  2. Leave room upstream of barrier for water to pond and sediment to settle.
  3. Place several layers of gravel bags – overlapping the bags and packing them tightly together.
  4. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10 year storm) should not overtop the curb.

- ***DI Protection Type 4 – Block and Gravel Filter*** - Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction. See typical Type 4 installation details at the end of this fact sheet.

  1. Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place woven geotextile over the wire mesh.
  2. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.
  3. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.
  4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.

- ***DI Protection Type 5 – Temporary Geotextile Insert (proprietary)*** – Many types of temporary inserts are available. Most inserts fit underneath the grate of a drop inlet or inside of a curb inlet and are fastened to the outside of the grate or curb. These inserts are removable and many can be cleaned and reused. Installation of these inserts differs between manufacturers. Please refer to manufacturer instruction for installation of proprietary devices.

- ***DI Protection Type 6 - Biofilter bags*** – Biofilter bags may be used as a substitute for gravel bags in low-flow situations. Biofilter bags should conform to specifications detailed in SE-14, Biofilter bags.

    1. Construct in a gently sloping area.

    2. Biofilter bags should be placed around inlets to intercept runoff flows.

    3. All bag joints should overlap by 6 in.

    4. Leave room upstream for water to pond and for sediment to settle out.

    5. Stake bags to the ground as described in the following detail. Stakes may be omitted if bags are placed on a paved surface.

- ***DI Protection Type 7 – Compost Socks*** – A compost sock can be assembled on site by filling a mesh sock (e.g., with a pneumatic blower). Compost socks do not require special trenching compared to other sediment control methods (e.g., silt fence). Compost socks should conform to specification detailed in SE-13, Compost Socks and Berms.

Costs

- Average annual cost for installation and maintenance of DI Type 1-4 and 6 (one year useful life) is $200 per inlet.

- Temporary geotextile inserts are proprietary and cost varies by region. These inserts can often be reused and may have greater than 1 year of use if maintained and kept undamaged. Average cost per insert ranges from $50-75 plus installation, but costs can exceed $100. This cost does not include maintenance.

- See SE-13 for Compost Sock cost information.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Silt Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes. At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.

- Gravel Filters. If the gravel becomes clogged with sediment, it should be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.

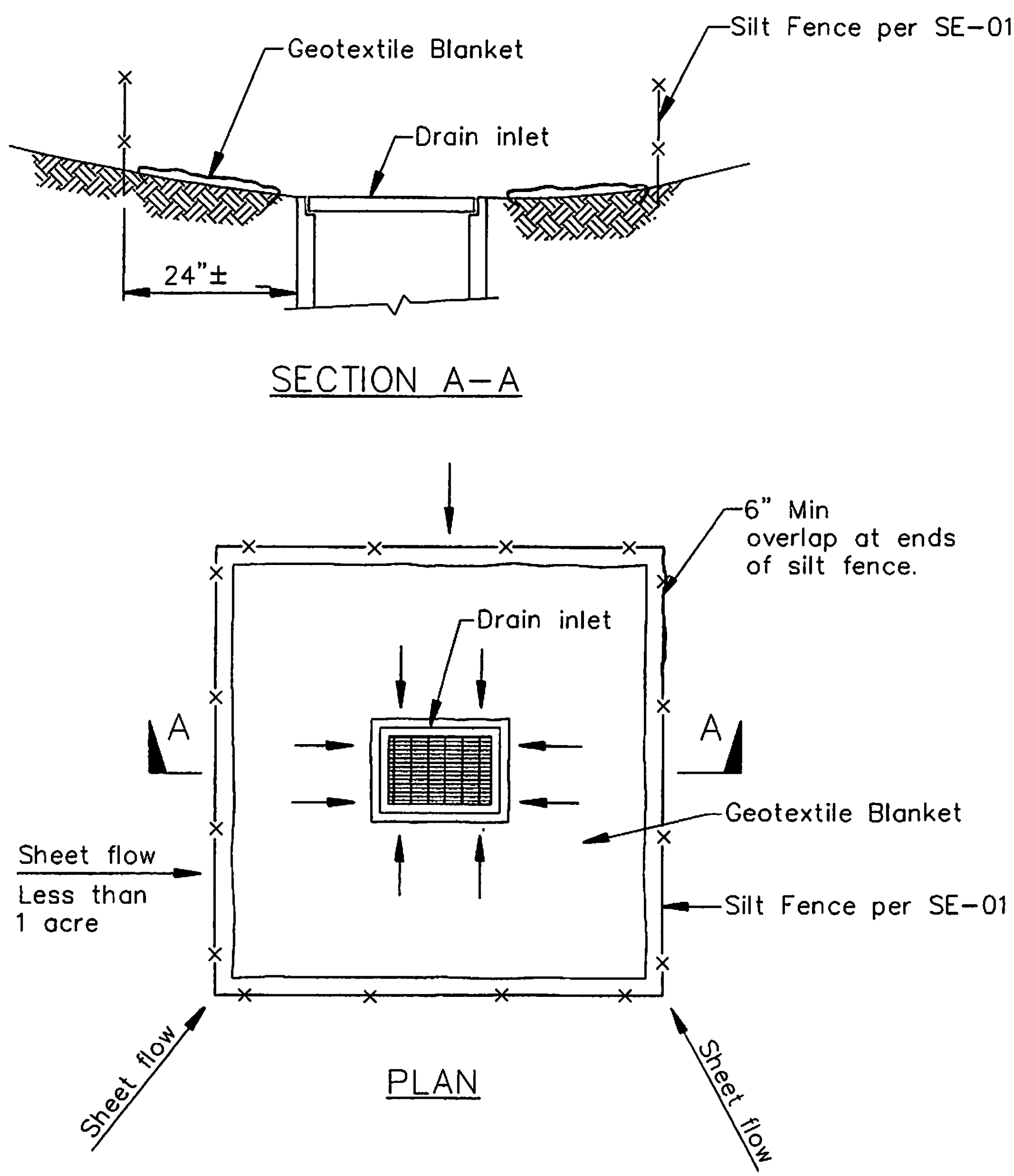
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Inspect and maintain temporary geotextile insert devices according to manufacturer's specifications.
- Remove storm drain inlet protection once the drainage area is stabilized.
  - Clean and regrade area around the inlet and clean the inside of the storm drain inlet, as it should be free of sediment and debris at the time of final inspection.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

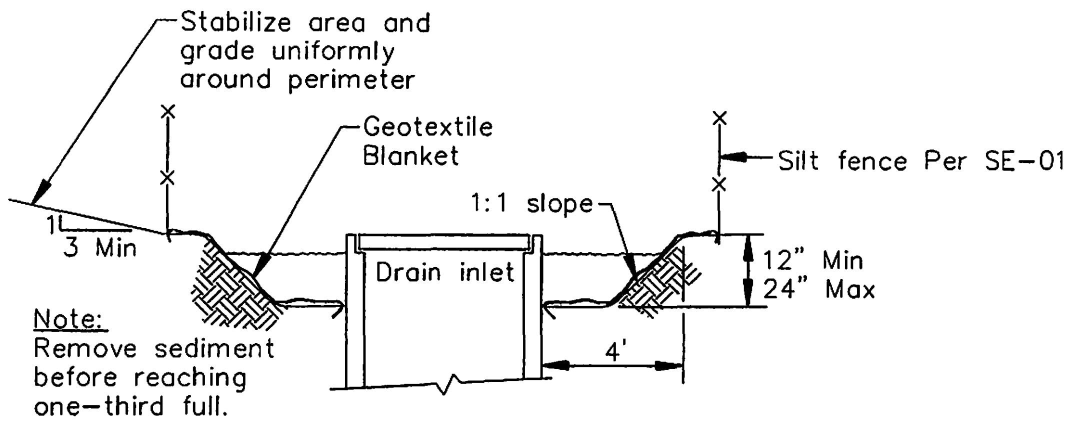
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



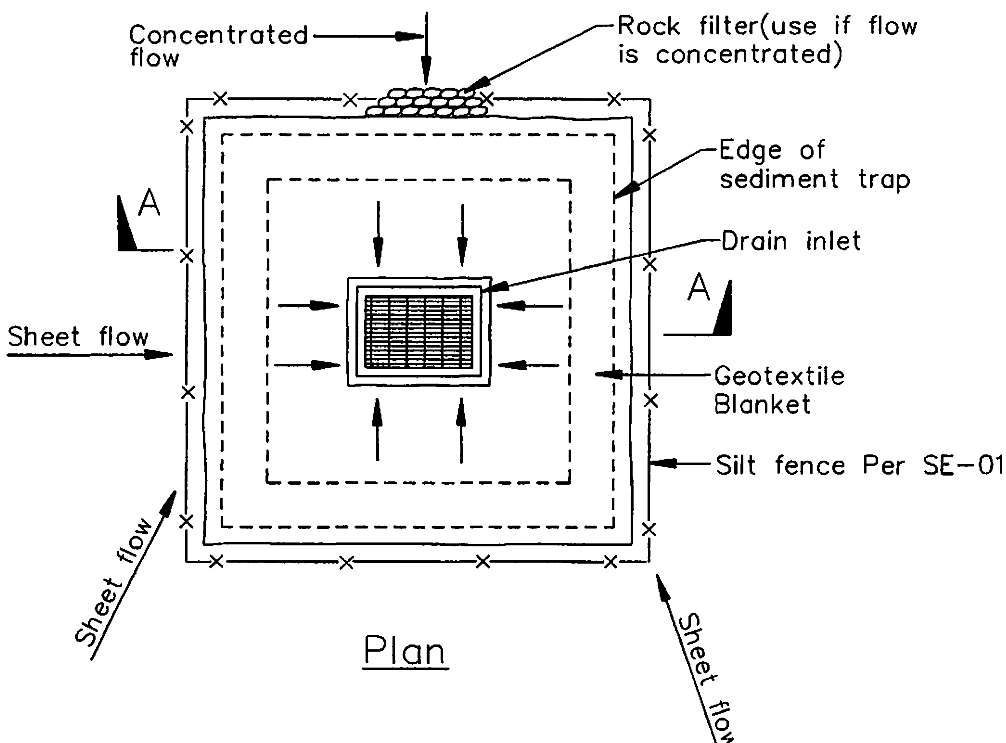
DI PROTECTION TYPE 1
NOT TO SCALE

NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.



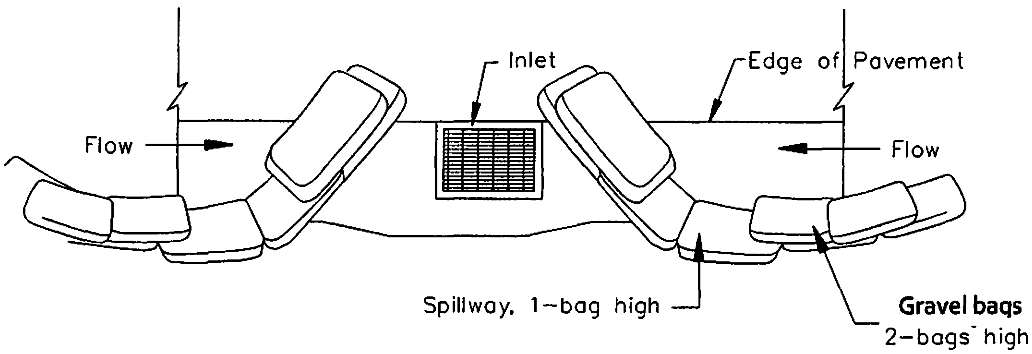
Section A-A



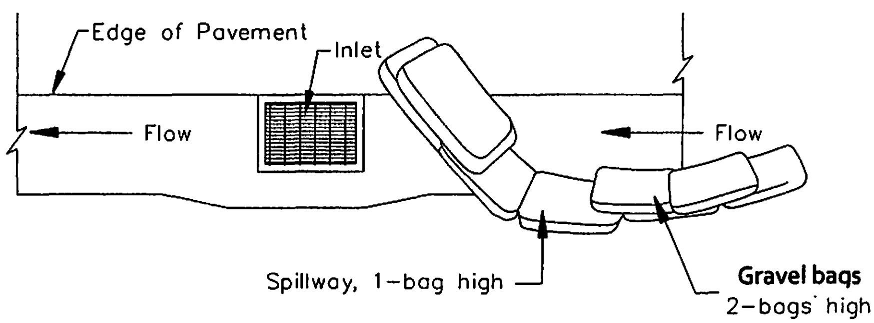
Plan

DI PROTECTION TYPE 2
NOT TO SCALE

Notes
1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.



TYPICAL PROTECTION FOR INLET ON SUMP

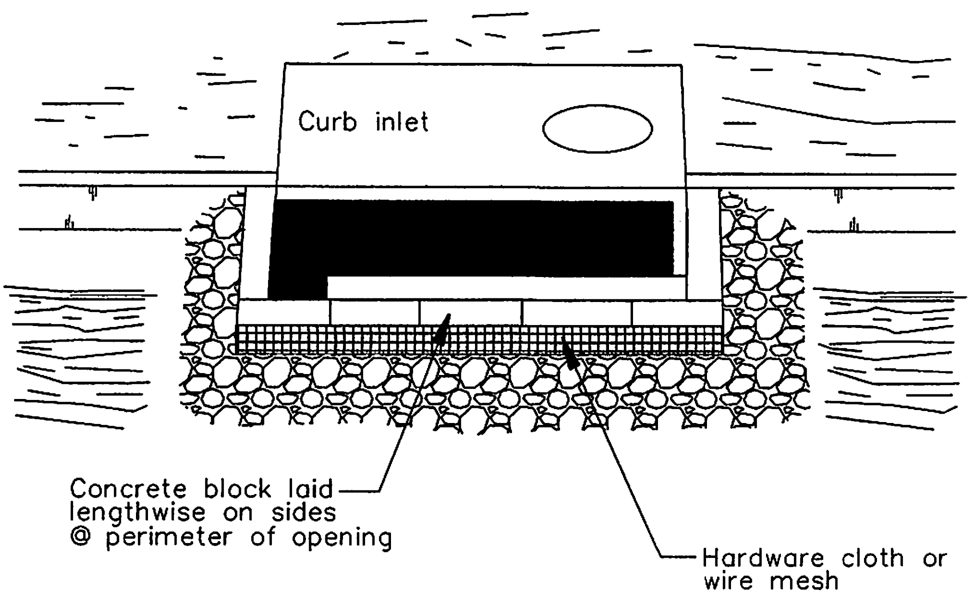


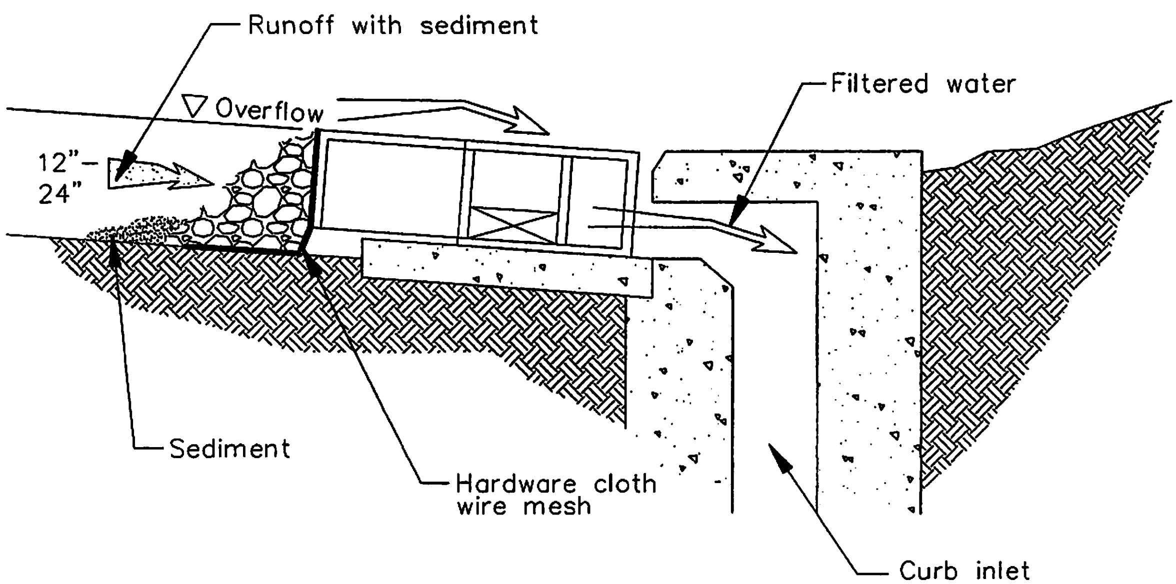
TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.
6. **Protection can be effective even if it is not immediately adjacent to the inlet provided that the inlet is protected from potential sources of pollution.**

DI PROTECTION TYPE 3
NOT TO SCALE

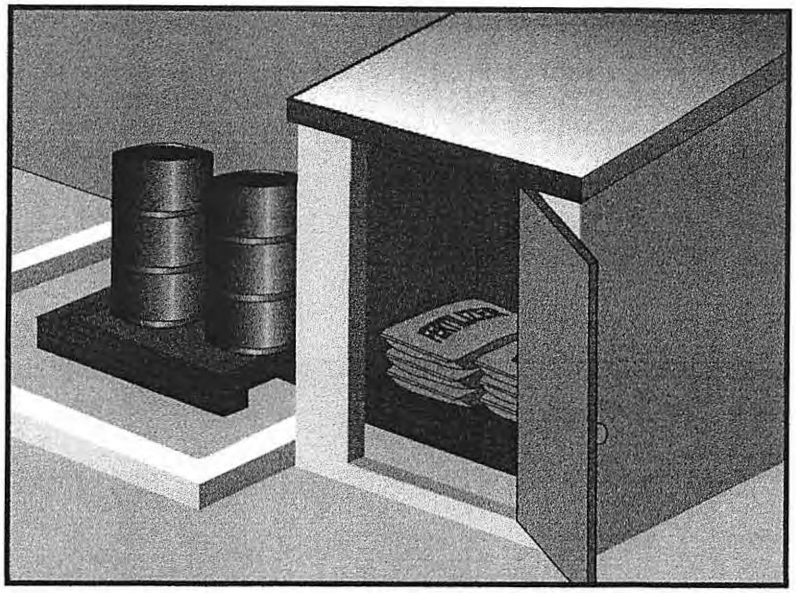




DI PROTECTION – TYPE 4

NOT TO SCALE

Material Delivery and Storage WM-1



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
  - Avoid transport near drainage paths or waterways.
  - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
  - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.

- Stockpiles should be protected in accordance with WM-3, Stockpile Management.

- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.

- Proper storage instructions should be posted at all times in an open and conspicuous location.

- An ample supply of appropriate spill clean up material should be kept near storage areas.

- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.

- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.

- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.

- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.

- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Keep storage areas clean and well organized, including a current list of all materials onsite.

- Inspect labels on containers for legibility and accuracy.

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

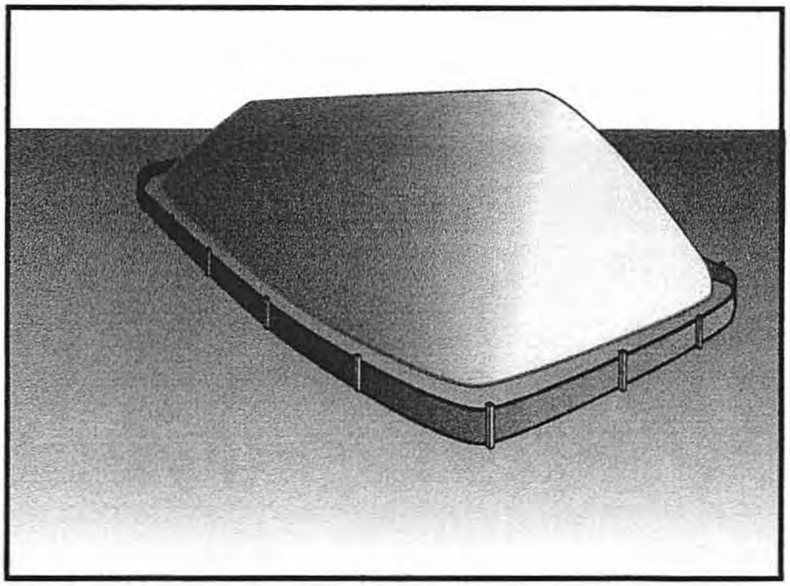
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☒
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- After 14 days of inactivity, a stockpile is non-active and requires further protection described below. All stockpiles are required to be protected as non-active stockpiles immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater runon using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

A stockpile is considered non-active if it either is not used for 14 days or if it is scheduled not to be used for 14 days or more. Stockpiles need to be protected immediately if they are not scheduled to be used within 14 days. Non-active stockpiles of the identified materials should be protected as follows:

Soil stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of "cold mix"

- Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Stockpiles of fly ash, stucco, hydrated lime

- Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

Stockpiles/Storage of wood (Pressure treated with chromated copper arsenate or ammoniacal copper zinc arsenate

- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

A stockpile is active when it is being used or is scheduled to be used within 14 days of the previous use. Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.

- Stockpiles of "cold mix" and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.

- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).

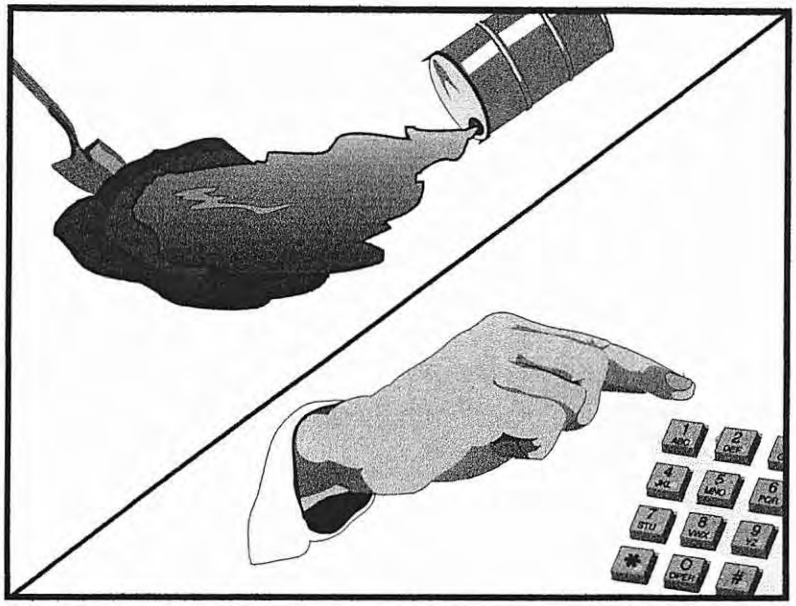
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.

- Sediment shall be removed when it reaches one-third of the barrier height.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Spill Prevention and Control WM-4



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.

- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.

- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.

- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.

- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.

- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.

- Use absorbent materials on small spills rather than hosing down or burying the spill.

- Absorbent materials should be promptly removed and disposed of properly.

- Follow the practice below for a minor spill:

  - Contain the spread of the spill.

  - Recover spilled materials.

  - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
  - Contain spread of the spill.
  - Notify the project foreman immediately.
  - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
  - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
  - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
  - Notification should first be made by telephone and followed up with a written report.
  - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
  - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

References

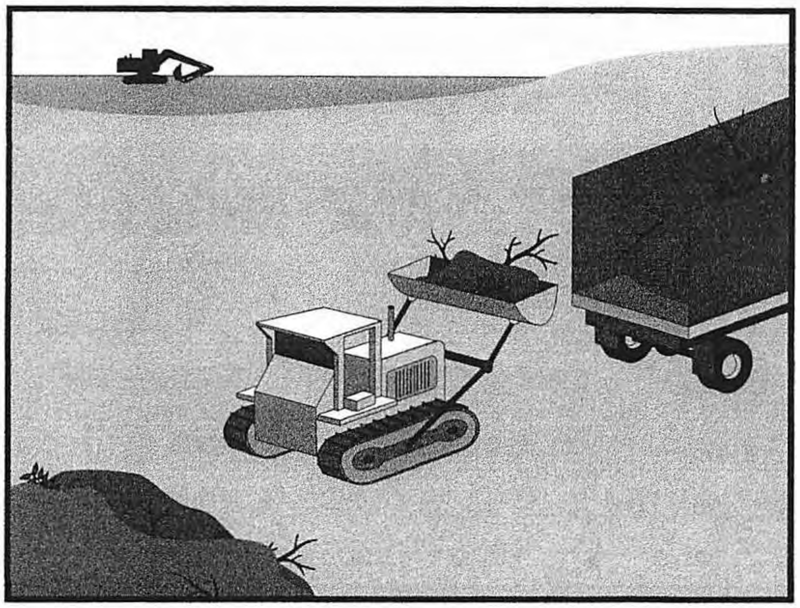
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management

WM-5



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.

- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur

- Inspect construction waste area regularly.

- Arrange for regular waste collection.

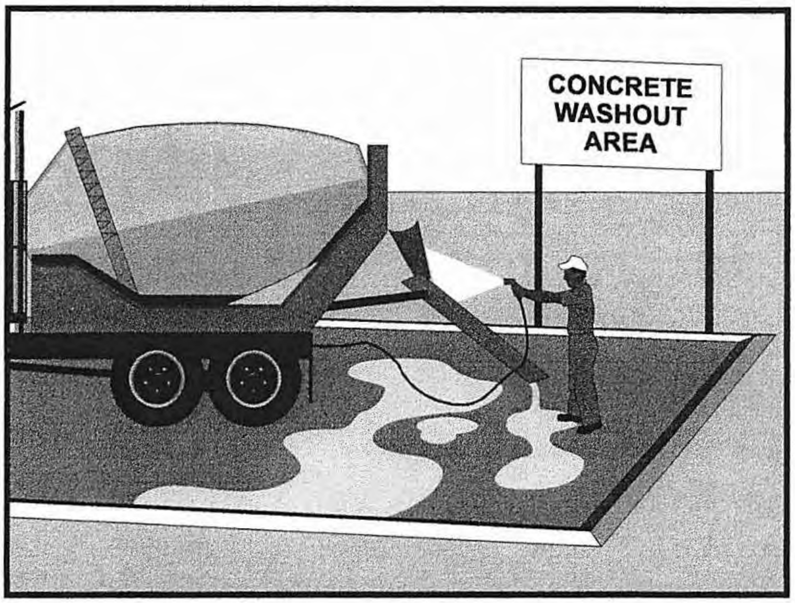
References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Concrete Waste Management WM-8



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☒
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Concrete trucks and other concrete-coated equipment are washed onsite.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

- Mortar-mixing stations exist.
- Stucco mixing and spraying.
- See also NS-8, Vehicle and Equipment Cleaning.

Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
  - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
  - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
  - Washouts shall be implemented in a manner that prevents leaching to underlying soils. Washout containers must be water tight and washouts on or in the ground must be lined with a suitable impervious liner, typically a plastic type material.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.

- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

Concrete Demolition Wastes

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.

- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.

- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).

- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.

- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.

- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.

- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.

- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.

- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.

- Washout of concrete trucks should be performed in designated areas only.

- Only concrete from mixer truck chutes should be washed into concrete wash out.

- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.

- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.

- Temporary Concrete Washout Facility (Type Above Grade)

  - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.

  - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).

  - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

  - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a "roll-off"; this concrete washout facility should be properly sealed to prevent leakage, and should be removed from the site and replaced when the container reaches 75% capacity.

- Temporary Concrete Washout Facility (Type Below Grade)

  - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.

  - Lath and flagging should be commercial type.

  - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations..

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures. Roll-off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.

- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

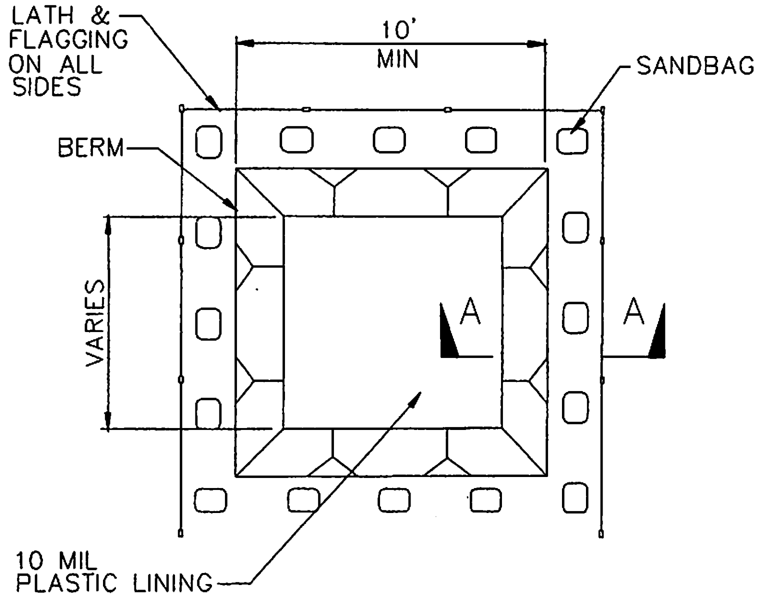
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

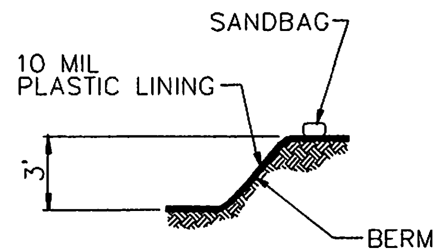
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000, Updated March 2003.

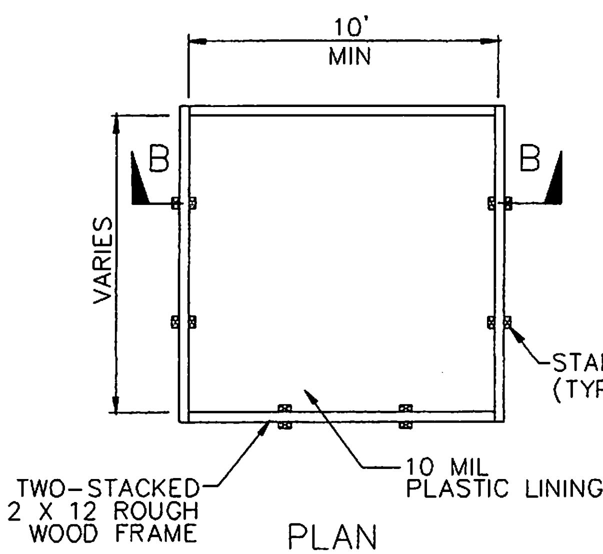
Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



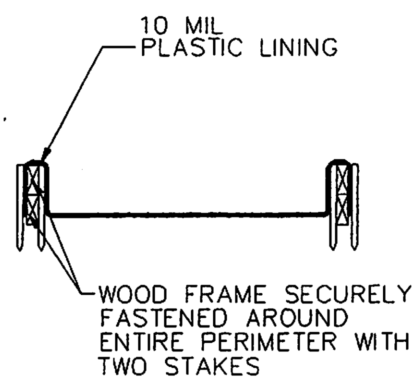
PLAN
NOT TO SCALE
TYPE "BELOW GRADE"



SECTION A–A
NOT TO SCALE



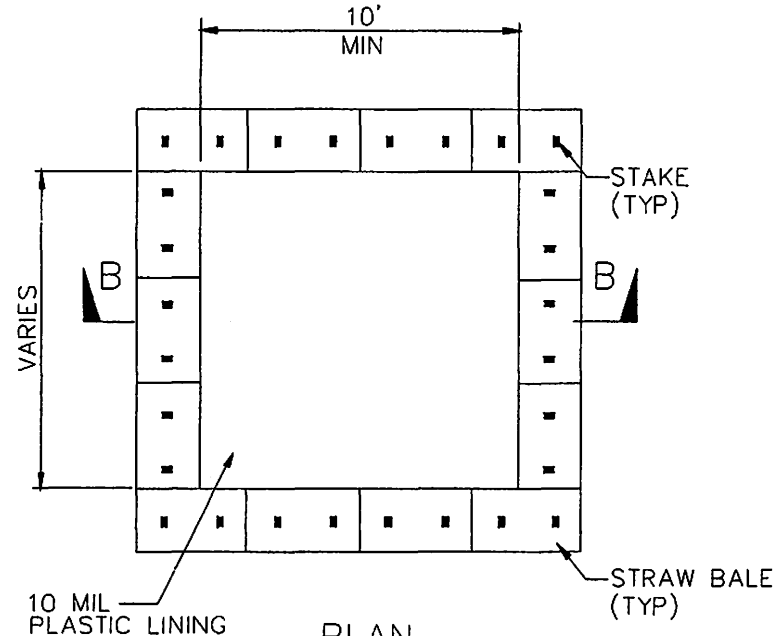
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"



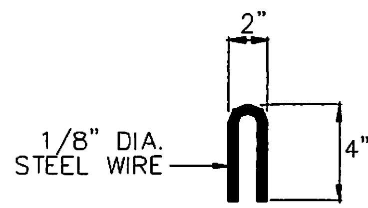
SECTION B–B
NOT TO SCALE

NOTES

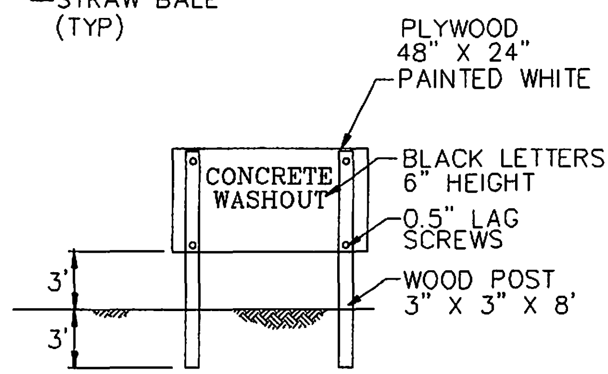
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



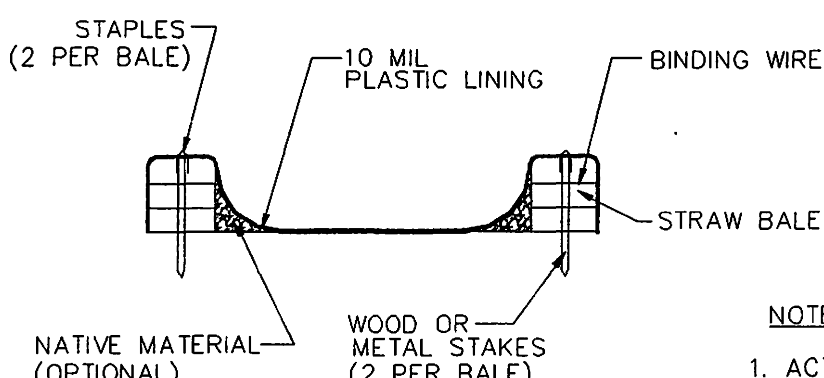
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES



STAPLE DETAIL



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)

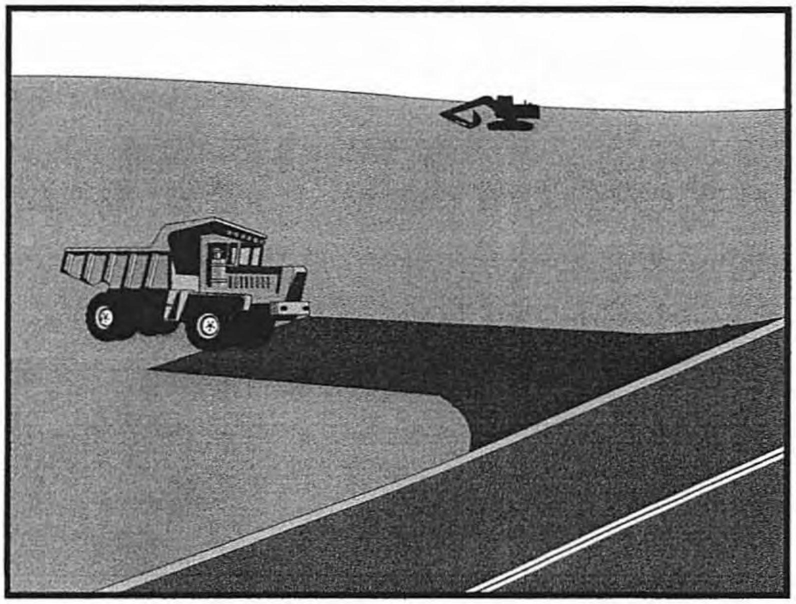


SECTION B-B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Stabilized Construction Entrance/Exit TC-1



Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft or maximum site will allow, and 10 ft minimum width or to accommodate traffic.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from $1,200 to $4,800 each, averaging $2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from $1,200 - $6,000 each, averaging $3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

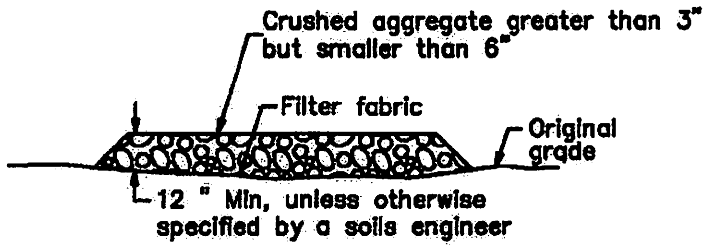
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

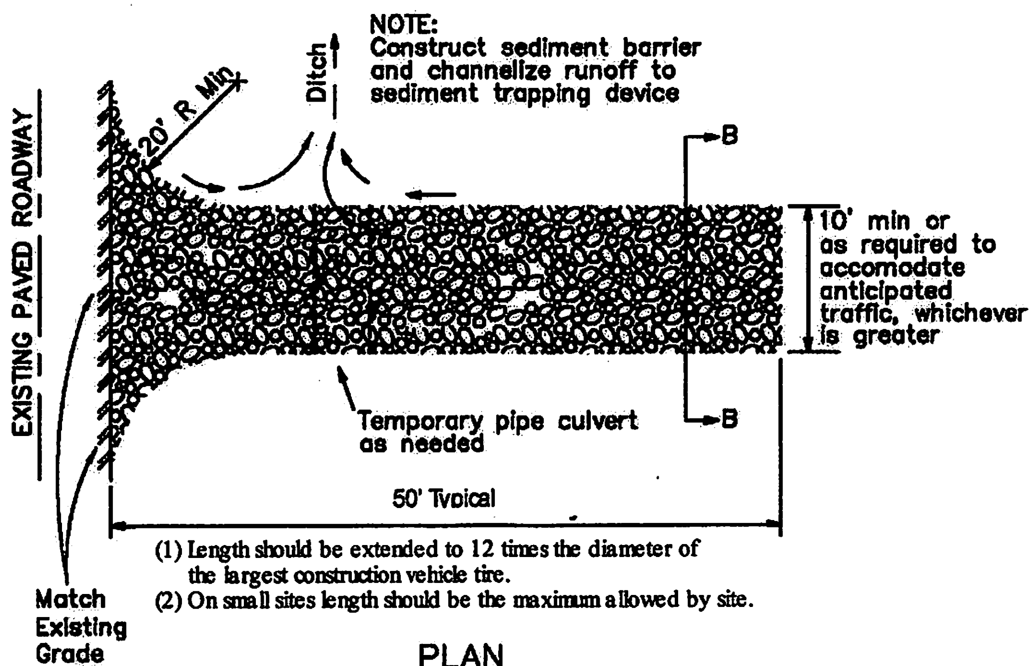
Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

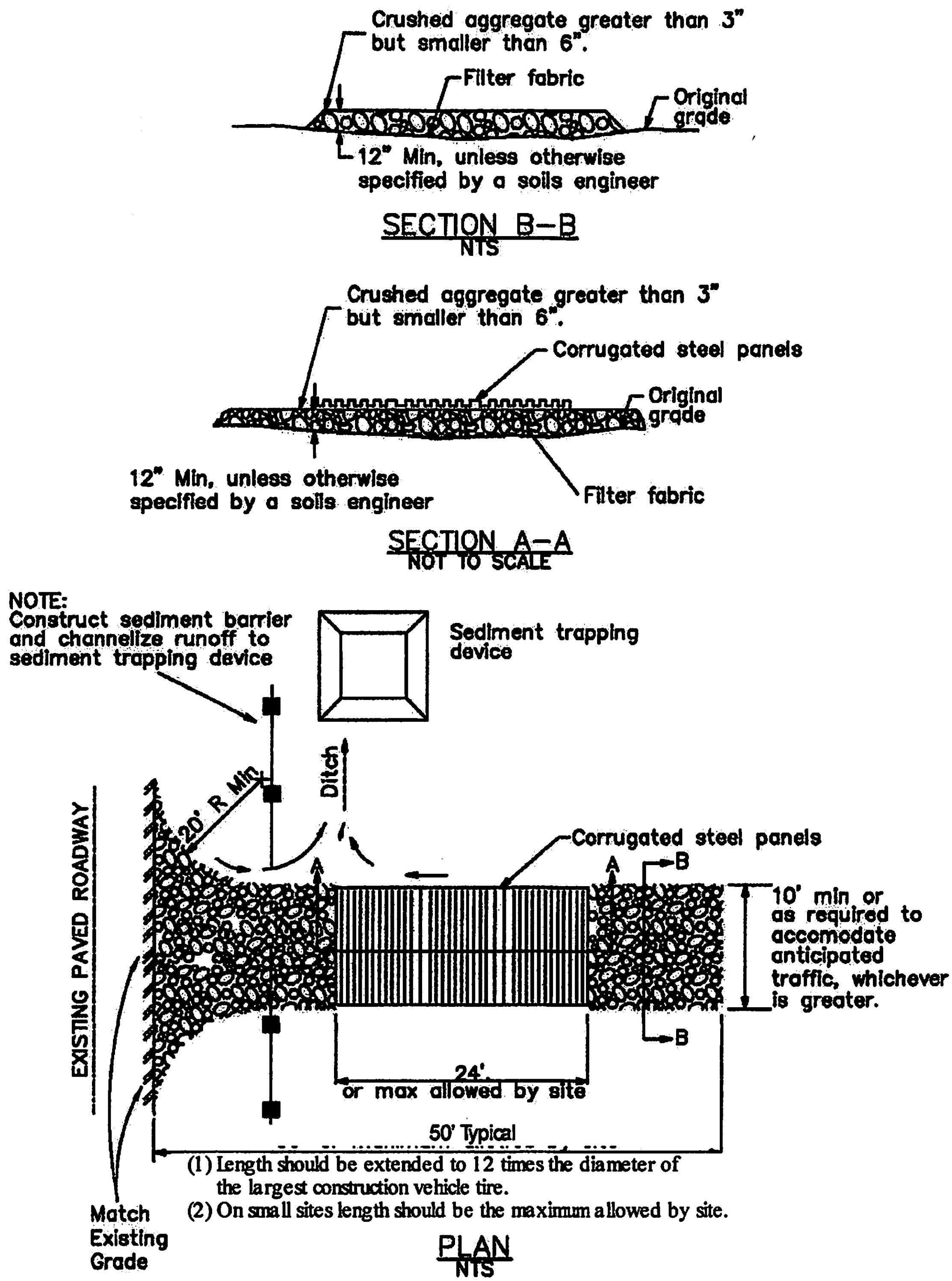


SECTION B–B
NTS



(1) Length should be extended to 12 times the diameter of the largest construction vehicle tire.
(2) On small sites length should be the maximum allowed by site.

PLAN
NTS


Crushed aggregate greater than 3" but smaller than 6".
Filter fabric
Original grade
12" Min, unless otherwise specified by a soils engineer
SECTION B-B
NTS
Crushed aggregate greater than 3" but smaller than 6".
Corrugated steel panels
Original grade
12" Min, unless otherwise specified by a soils engineer
Filter fabric
SECTION A-A
NOT TO SCALE
NOTE:
Construct sediment barrier and channelize runoff to sediment trapping device
Sediment trapping device
Ditch
20' R Min
EXISTING PAVED ROADWAY
Corrugated steel panels
A
A
B
B
10' min or as required to accomodate anticipated traffic, whichever is greater.
24' or max allowed by site
50' Typical
(1) Length should be extended to 12 times the diameter of the largest construction vehicle tire.
(2) On small sites length should be the maximum allowed by site.
Match Existing Grade
PLAN
NTS

Water Conservation Practices NS-1

Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

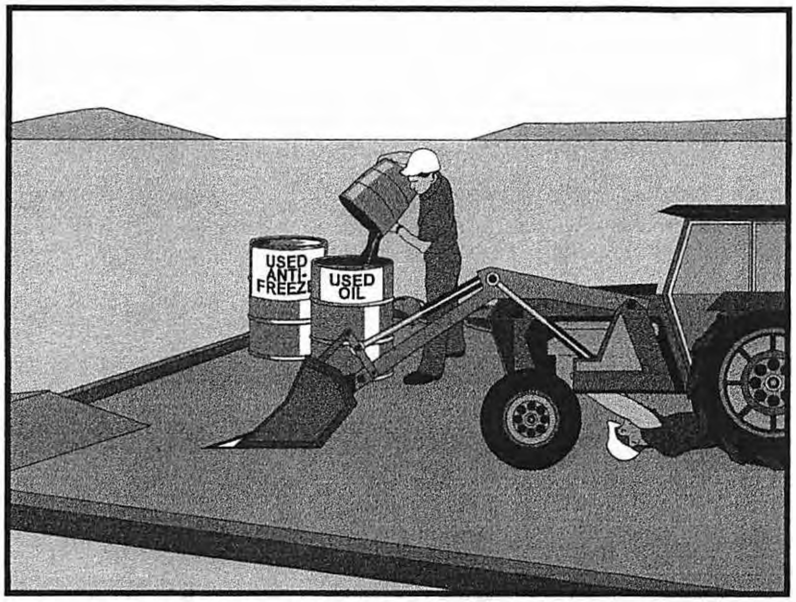
- Direct construction water runoff to areas where it can soak into the ground or be collected and reused.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs
The cost is small to none compared to the benefits of conserving water.

Inspection and Maintenance
- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.
- Repair water equipment as needed to prevent unintended discharges.
  - Water trucks
  - Water reservoirs (water buffalos)
  - Irrigation systems
  - Hydrant connections

References
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Vehicle & Equipment Maintenance NS-10



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8, Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.

- Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.

- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.

- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like,-trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Keep ample supplies of spill cleanup materials onsite.

- Maintain waste fluid containers in leak proof condition.

- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.

- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

ATTACHMENT D

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: B Street & 29th Street	Project Number *(for City Use Only)*: 422242

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.

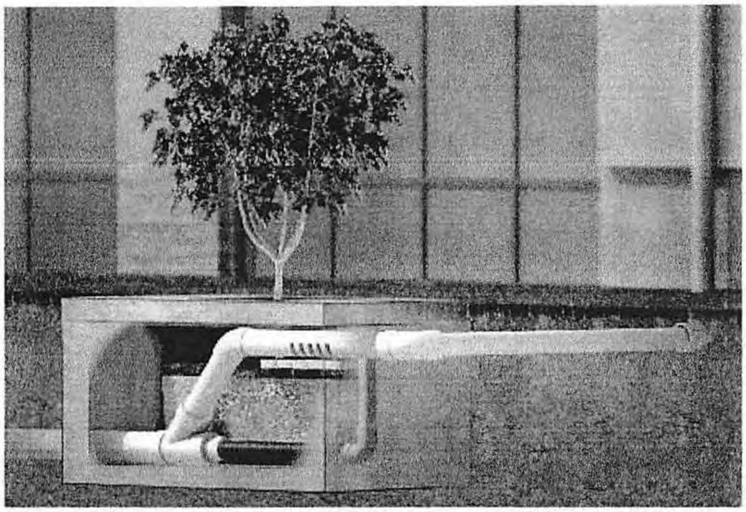
☐ **2 Medium Priority**. Projects 1 acre or more but not subject to a high priority designation.

☐ **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):* Joy Christensen	Title: Assistant Engineer
Signature: Joy Christensen	Date: 04/27/2015

ATTACHMENT E

TREATMENT BMP EXHIBIT



Filterra® Roofdrain Stormwater Treatment System

A Greenroof at Ground Level™

Filterra® Roofdrain System

The Filterra Roofdrain System treats piped in stormwater runoff from rooftops. Using bioretention filtration the system captures and immobilizes pollutants of concern such as: TSS, nutrients and metals.

Stormwater continues to flow through the media and into the underdrain system, where treated water is discharged. Higher flows bypass the bioretention treatment via an overflow/bypass pipe design.

Features and Benefits

Best Value for Rooftop Treatment.

- **compact size**
- **needs no external bypass**
- **easy installation**
- **simple maintenance**

Versatile.
Filterra Roofdrain can be used for:

- **new construction**
- **retrofits**
- **commercial or residential applications.**

Filterra Roofdrain can be placed:

- **At grade**
- **Above grade with effluent below grade to meet elevation challenges of high water tables**
- **Install next to or away from your building**

Maintenance. Maintenance is simple and safe (at ground level), and the first year is provided FREE with the purchase of every unit. The procedure is so easy you can perform it yourself.

Protection. The Filterra Roofdrain's hydraulic configuration was tested by the Colorado State University Hydraulics Laboratory.

Below grade treatment using Filterra Roofdrain avoids the slipping hazard liabilities of daylighted roofdrains during freezing weather.

Protect from erosion with Filterra's monolithic water tight design.

Expected Pollutant Removal

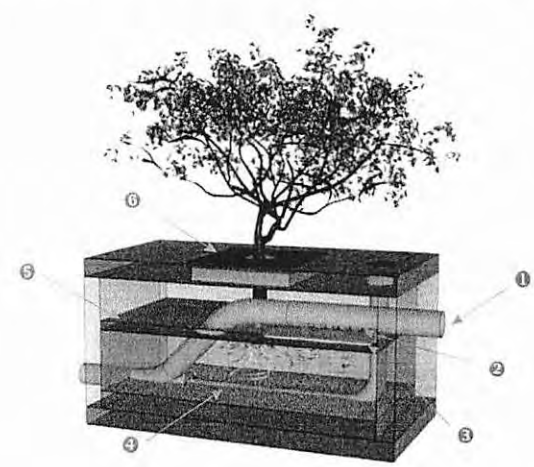
(Ranges Varying with Particle Size, Pollutant Loading and Site Conditions)

TSS Removal	85%
Phosphorus Removal	60% - 70%
Zinc Removal	> 66%
Copper Removal	>58%
Nitrogen Removal	43%
Oil & Grease	> 93%

*Total Petroleum Hydrocarbons

Information on the pollutant removal efficiency of the filter soil/plant media is based on third party lab and field studies.

Filterra media has been TAPE and TARP tested and approved.



1. Influent Pipe from Roof Leader
2. Pipe slots allow treatment flow to media surface
3. Erosion Control
4. Perforated Underdrain for Treatment Flows
5. Protective Mulch Layer
6. Cast Iron Tree Grate for Maintenance Access

Filterra® Roofdrain Stormwater Treatment System

A Greenroof at Ground Level™

Design Guidelines

1) Use the Filterra Roofdrain Design Guidance as a reference available from design@filterra.com.

2) Select Filterra Roofdrain model according to your Regional Sizing Table, and according to the building's roof drainage area and associated roof drain pipe sizes.

3) Determine Filterra Roofdrain placement next to a building, or away from your building.

4) Ensure piping to and from Filterra Roofdrain system is free-draining at minimum 1% slope, or per local codes.

Placement Review

Because we want your project with Filterra to be a great success, we respectfully require that each Filterra Roofdrain project be reviewed by our placement/design staff. This review is mandatory, as proper placement ensures you of the most efficient and cost effective solution, as well as optimum performance and minimal maintenance

Proper Placement

1) Pipe flow of the Filterra Roofdrain System eliminates the cross-linear flow requirements necessary with standard Filterra.

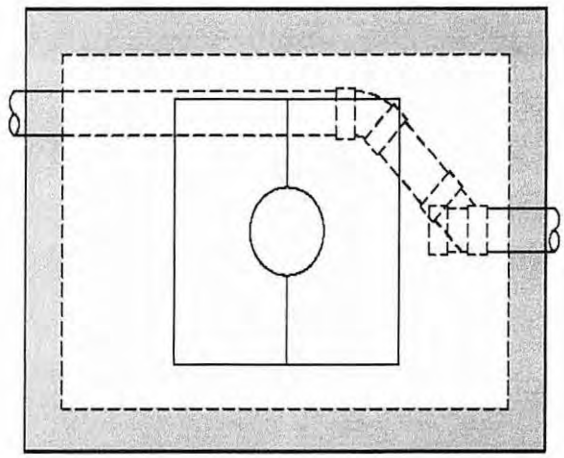
2) Filterra Roofdrain Systems should only receive piped in runoff.

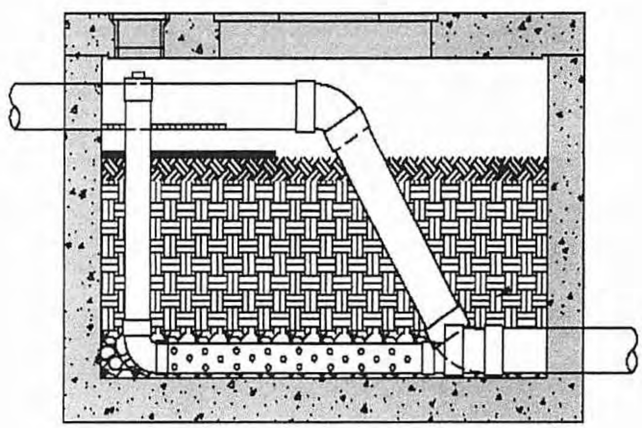
3) Rooftop drainage should still be designed with emergency bypass relief prior to the Filterra Roofdrain System (e.g.: rooftop scuppers, etc.)

Always follow local plumbing codes for roof drainage requirements.

The Filterra System is not a substitute for rooftop overflow/bypass.

4) Send completed project information form along with plans to Filterra for placement and application review.





Filterra Roofdrain System
One pipe in, one pipe out, with internal high-flow bypass.

Western Region Support
34428 Yucaipa Blvd., Suite E-312
Yucaipa, CA 92399

Corporate Headquarters & Eastern Region Support
11352 Virginia Precast Road
Ashland, VA 23005

Toll Free: (866) 349-3458 • F: (804) 798-8400

E-mail: design@filterra.com • Web: www.filterra.com

ATTACHMENT F

DMA MAP EXHIBIT

DRAINAGE MANAGEMENT AREA MAP

ATTACHMENT G

SWMDCMA

THE CITY OF SAN DIEGO

RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO
AND WHEN RECORDED MAIL TO:

JANCO, LLC
P.O. Box 231446
Encinitas, CA 92023

(THIS SPACE IS FOR RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSORS PARCEL NUMBER:	PROJECT NUMBER:
____________	____________	____________

This agreement is made by and between the City of San Diego, a municipal corporation [City] and ____________ ____________, the owner or duly authorized representative of the owner [Property Owner] of property located at

____
(PROPERTY ADDRESS)

and more particularly described as: ____________
____
(LEGAL DESCRIPTION OF PROPERTY)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Water Quality Technical Report [WQTR] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): ____________.

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): ____________.

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): ________.

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's WQTR and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s) ________.

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibit(s): ____________________

____
(Owner Signature)

____
(Print Name and Title)

____
(Company/Organization Name)

____
(Date)

THE CITY OF SAN DIEGO

APPROVED:

____
(City Control Engineer Signature)

____
(Print Name)

____
(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDGMENTS PER CIVIL CODE SEC. 1180 ET.SEQ.

ATTACHMENT H

PERMANENT STORM WATER BMP CERTIFICATE (DS-563)

City of San Diego **Development Services** 1222 First Ave., MS-501 San Diego, CA 92101 (619) 236-5500	# Permanent BMP Construction **Self Certification Form**	**FORM DS-563** FEBRUARY 2013

THE CITY OF SAN DIEGO

Date Prepared:	Project No.:
Project Applicant:	Phone:
Project Address:	
Project Engineer:	Phone:

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Standard Urban Storm Water Mitigation Plan (SUSMP) documents and drawings.

This form must be completed by the engineer and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2007-0001. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of San Diego.

CERTIFICATION:
As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and treatment control BMP's required per

the approved SUSMP and Construction Permit No. ____________________; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2007-0001 of the San Diego Regional Water Quality Control Board.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

Signature: ______________________________

Date of Signature: ______________________________

Printed Name: ______________________________

Title: ______________________________

Phone No. ______________________________

Engineer's Stamp

Drainage Study
“B” Street Site Development

Portion of Block 63, Morse’s Subdivision of Pueblo Lot 1150 and a Portion of Pueblo Lot 1151
Map No. 547

Prepared for:
Janco, LLC
P.O. Box 231446
Encinitas, CA 92023

Prepared by:
Christensen Engineering & Surveying
7888 Silverton Avenue, Suite “J”
San Diego, CA 92126
(858) 271-9901

PTS No. 422242

April 26, 2015
Revised August 03, 2015
Revised October 13, 2015
Revised April 02, 2016
Revised July 14, 2016

TABLE OF CONTENTS

Introduction

This project involves the creation of 11 single-family apartments on a portion of Block 63, Morse's Subdivision of Pueblo Lot 1150 and a portion of the vacated alley in Block 63 and a portion of vacated 29th Street adjacent to it, all according to Map No. 547, in the City of San Diego. It involves the extension of an existing 36" concrete pipe drain with a 42" RCP drain, southeasterly into a portion of the existing drainage basin and re-routing of an existing 18" RCP drain to join the existing 36" drain, in "B" Street, along with the construction of apartments and appurtenances, including sewer, water and storm drain facilities as well as hardscape and landscaping associated with the project. It also will include the reconstruction of the curb, gutter and sidewalk and improvement of a portion of a reserved sewer easement resulting from the vacation of the alley, in Block 63.

Appendix "A" contains drainage area maps from a topographic survey by Christensen Engineering and Surveying, prepared in July 2004 and City of San Diego topographic maps. Runoff from the area of the project and a large area northerly and westerly of the site is conveyed to a basin that is located adjacent to the project. The basin is located easterly and southerly of the site. Following construction this drainage pattern will persist. Drainage from the alley westerly of the site will be picked up by a proposed 12" trench drain and conveyed to the basin to prevent run-on from flowing over the vacated alley portion of the site and the property southerly. The appendices include studies that document the expected highest water surface elevation in the channel southerly and easterly of the site based on runoff from the area northerly, easterly and westerly of the site.

This neighborhood is primarily improved with multi-family residences but the project site itself is unimproved so the runoff coefficient selected for the pre-construction site evaluation is C=0.45. Post-construction the entire area is evaluated using a runoff coefficient of C = 0.70. The area of the pre and post-construction analysis is the same and the runoff coefficient changes resulting in a change in runoff from 1.06 cfs pre-construction to 1.65 cfs post-construction.

As stated above, this study determines the expected upper water surface elevation expected by the 100-yr return frequency storm. It uses updated rainfall intensity data (specifically from NOAA for San Diego) that is part of the HydroCAD program used to evaluate the water surface elevation for the site. Attached, in Appendix “B”, is the result of these calculations. The highest water surface elevation is determined to be 171.41’ and the new development will not encroach into the area impacted by that water surface elevation. There will be no loss in basin volume, which could affect the water surface elevation. The basin will overflow if the level of runoff ever reaches an elevation of 180.0 by overtopping the sidewalk, curb and gutter at “C” Street and no properties surrounding this or the project southerly of this project would be affected by a such an incident.

Runoff to the public storm drain system in and beyond the “C” Street will increase slightly by 0.59 cfs (1.65-1.06 cfs). The pipe that will convey the additional runoff is described as either a 30” steel insert or 36” RCP drain. Conservatively assuming the pipe is the 30” steel insert with a slope of 1.5% (dwg 18321-D) the capacity of the pipe is 54 cfs (not under pressure). This increase is less than 1.1% of the calculated capacity of the drain. There will be no adverse effect to the public storm drain.

Section 404 of CWA regulates the discharge of dredged or fill material into waters of the United States. Section 404 is regulated by the Army Corps of Engineers. Section 401 of CWA requires that the State provide certification that any activity authorized under Section 404 is in compliance with effluent limits, the state’s water quality standards, and any other appropriate requirements of state law. Section 401 is administered by the State Regional Water Quality Control Board. The project does not require a Federal CWA Section 404 permit nor Section 401 Certification because it does not cause dredging or filling in waters of the United States and is in compliance with the State Water Quality Standards. See separate SWQMP.

The Rational Method was used to calculate the anticipated flow for the 100-year storm return frequency event using the method outlined in the City of San Diego Drainage Design Manual.

______________________________ 07-14-16

Antony K. Christensen Date

RCE 54021 Exp. 12-31-17

JN A2015-07

Calculations

1. Intensity Calculation

(From the City of San Diego Drainage Design Manual, Page 86)
Tc = Time of concentration (site disturbed currently)

$Tc = 1.8\ (1.1\text{-}C)\ (D)^{1/2}/(S)^{1/3}$

For Pre-Construction C=0.45
For Post-Construction C=0.70

Since the difference in elevation is 33' (201'-168') and the distance traveled is 230' (pre-construction) and 320' (post-construction)
.
$Tc_{\text{pre-construction}}$ = 7.3 minutes

$Tc_{\text{post-construction}}$ = 5.9 minutes

From table on Page 83

$I_{100\ \text{pre-construction}}$ = 4.0 inches/hr
(used for both pre- and post-construction for areas W & X since they are offsite and are not affected by proposed development. Their Time of Concentration will not change.
$I_{100\ \text{post-construction}}$ = 4.1 inches/hr

2. Coefficient Determination

Pre-Construction:
From Page 82 for Multi-Family Residence

C= 0.70 (for developed areas offsite east and west)

C= 0.45 (onsite)

Post construction:
From Page 82 for Multi-Family Residence

C = 0.70

3. Volume calculations

Q = CIA

Areas of Drainage

The area of this study is set to the same location occupied by the proposed improvements because the rest of the area will remain unchanged and will not affect runoff. Runoff from the area northerly of the site, conveyed to it by the 18” and 36” drain will not change.

Pre-Construction

Area offsite westerly draining to basin	PC-W = 1.068 Ac
Area offsite easterly draining to basin	PC-E = 0.461 Ac
Area onsite draining to basin	PC-SITE = 0.589 Ac

Post-Construction

Area offsite westerly draining to 12” alley trench drain and then to basin	PC-W = 1.068 Ac
Area offsite easterly draining to basin	PC-E = 0.461 Ac
Area of southerly driveway draining IMP A and then to basin	A = 0.032 Ac
Area onsite draining to IMP-B	B = 0.229 Ac
Area onsite draining to IMP-C	C = 0.271 Ac
Area onsite draining to basin	D = 0.057 Ac

Pre-Construction

$Q_{100PC\text{-}W}$ = (0.70) (4.0) (1.068)
$Q_{100PC\text{-}E}$ = (0.70) (4.0 (0.461)
$Q_{100PC\text{-}SITE}$ = (0.45) (4.0) (0.589)

$Q_{100PC\text{-}W}$ = 2.99 cfs
$Q_{100PC\text{-}E}$ = 1.29 cfs
$Q_{100PC\text{-}SITE}$ = 1.06 cfs

Post-Construction

$Q_{100PC\text{-}W}$ = (0.70) (4.0) (1.068) (not affected by development)
$Q_{100PC\text{-}E}$ = (0.70) (4.0) (0.461) (not affected by development)
Q_{100A} = (0.70) (4.1) (0.032)
Q_{100B} = (0.70) (4.1) (0.229)
Q_{100C} = (0.70) (4.1) (0.271)
Q_{100D} = (0.70) (4.1) (0.057)

$Q_{100PC\text{-}W}$ = 2.99 cfs
$Q_{100PC\text{-}E}$ = 1.29 cfs
Q_{100A} = 0.09 cfs
Q_{100B} = 0.64 cfs
Q_{100C} = 0.76 cfs
Q_{100D} = 0.16 cfs

4. Discussion

The entire site currently conveys its runoff to the public storm drain basin located southeasterly before continuing under “C” Street, within the public storm drain. There exists run-on from the area westerly and easterly of the project and that runoff quantity will not change with the development of the site. The site runoff will continue to flow to the basin. Runoff from impervious surfaces will be conveyed to biofiltration basins (IMP-A, B & C) and continue to flow to the existing storm drain basin, where it will enter the same public storm drain system it does before development.

The extension of the 36” drain with a 42” RCP drain will have no adverse effect on the public storm drain system as there will be no change in total runoff from the outlet of the drain. For the outlet from the basin it is assumed that it is conveyed by a 30” steel insert in a 36 concrete pipe with a slope of 1.5% (dwg 18321-D) the capacity of the pipe is 54 cfs (not under pressure). This increase of 0.59 cfs is less than 1.1% of the calculated capacity of the drain. There will be no adverse effect to the public storm drain.

5. Test for Adequacy

The proposed system requires the use of a pump to convey 1.66 cfs (100 year storm) of runoff from 3636 catch basin onsite to the sidewalk underdrain in the street. The pump needs to overcome head loss from elevation changes, friction and small bends. Entrance and exit losses are ignored since they are insignificant.

The pump in this system delivers flow through a 6” PVC drain to the sidewalk underdrain. The sum of the head losses results in the Total Dynamic Head.

The total elevation change is (182.2’ – 168.0’) = 14.2’.

To determine other head losses, the velocity in each pipe must be known. To provide conservative values for each head loss it will be assumed that the flow from the pump is at the approximate TDH value. For the 15 HP Carry Pump the maximum flow for a static head of 24 feet is 900 gpm. This is equivalent to 2.0 cfs.

$V=Q/A$

$A= \pi r^2$

For a 6” pipe $r = .25$

$A =\pi (0.25)^2$

$A = 0.196\ ft^2$

$V = 2.0/0.196$

$V = 10.2$ fps

The friction loss for the a length of pipe can be calculated using the following Hazen – Williams formula:

$h_f = 3.02LD^{-1.167} (V/C_h)^{1.85}$

for a 6” pipe

L = 150 ft (from catch basin to sidewalk underdrains)

D = 6” = 0.5’

V=10.2

C_h = 140 (plastic pipe)

$h_f = 3.02(150)(0.5)^{-1.167} (10.2/140)^{1.85}$

$h_f = 8.0'$

Therefore the elevation and frictional headloss is

TDH = 14.2 + 8.0 = 22.2’

Say 22 feet.

Since the Q = 1.66 cfs = 7.48 gal/ft^3(1.66)(60sec/min) = 745 gpm

Therefore a pump must be capable of conveying 745 gpm with a total dynamic head of 22 feet.

Each 15 hp Carry pump is capable of conveying 900 gpm at a head of 22 feet and is therefore adequate. Even assuming some loss for the manifold in the system the pump will be adequate.

The pump will be placed in a catch basin and an alarm system will be needed to alert the homeowners to the failure of the pump. A check valve will be needed to keep the runoff from flowing back into the catch basin, once the pump shuts off. Should the pump fail the is a provision for an overflow at the rear of the curb inlet to allow runoff to flow to the basin.

The PVC drains throughout the site were tested to determine if they could convey the maximum expected runoff and all were found capable of conveying the maximum expected quantity. The program used to test each conveyance and the test results are included at the end of this report.

APPENDIX “A”

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Type (1)
Residential:	D
Single Family	.55
Multi-Units	.70
Mobile Homes	.65
Rural (lots greater than 1/2 acre)	.45
Commercial (2) 80% Impervious	.85
Industrial (2) 90% Impervious	.95

NOTES:

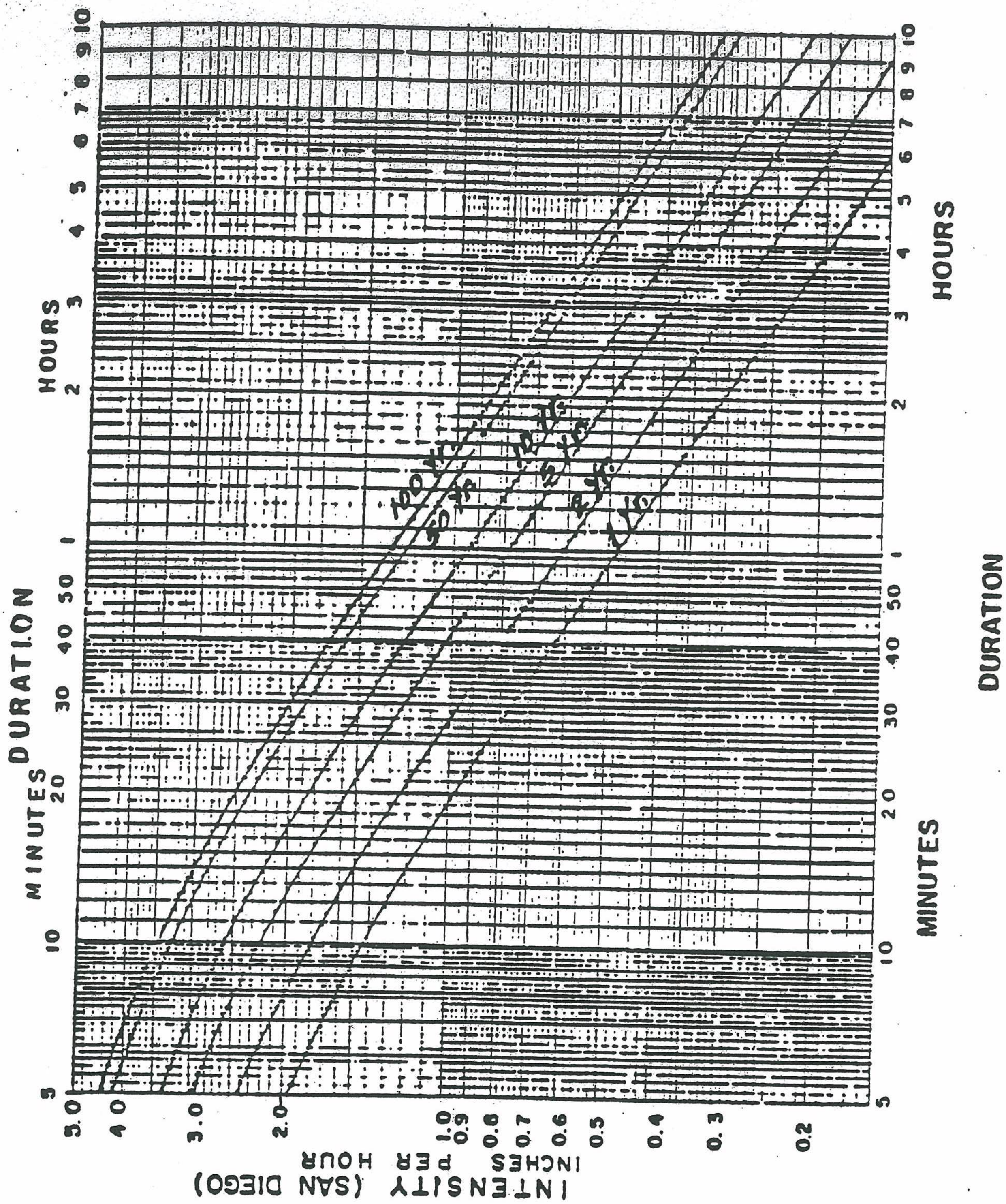
(1) Type D soil to be used for all areas.

(2) Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%

Tabulated imperviousness = 80%

$$\text{Revised C} = \frac{50}{80} \times 0.85 = 0.53$$

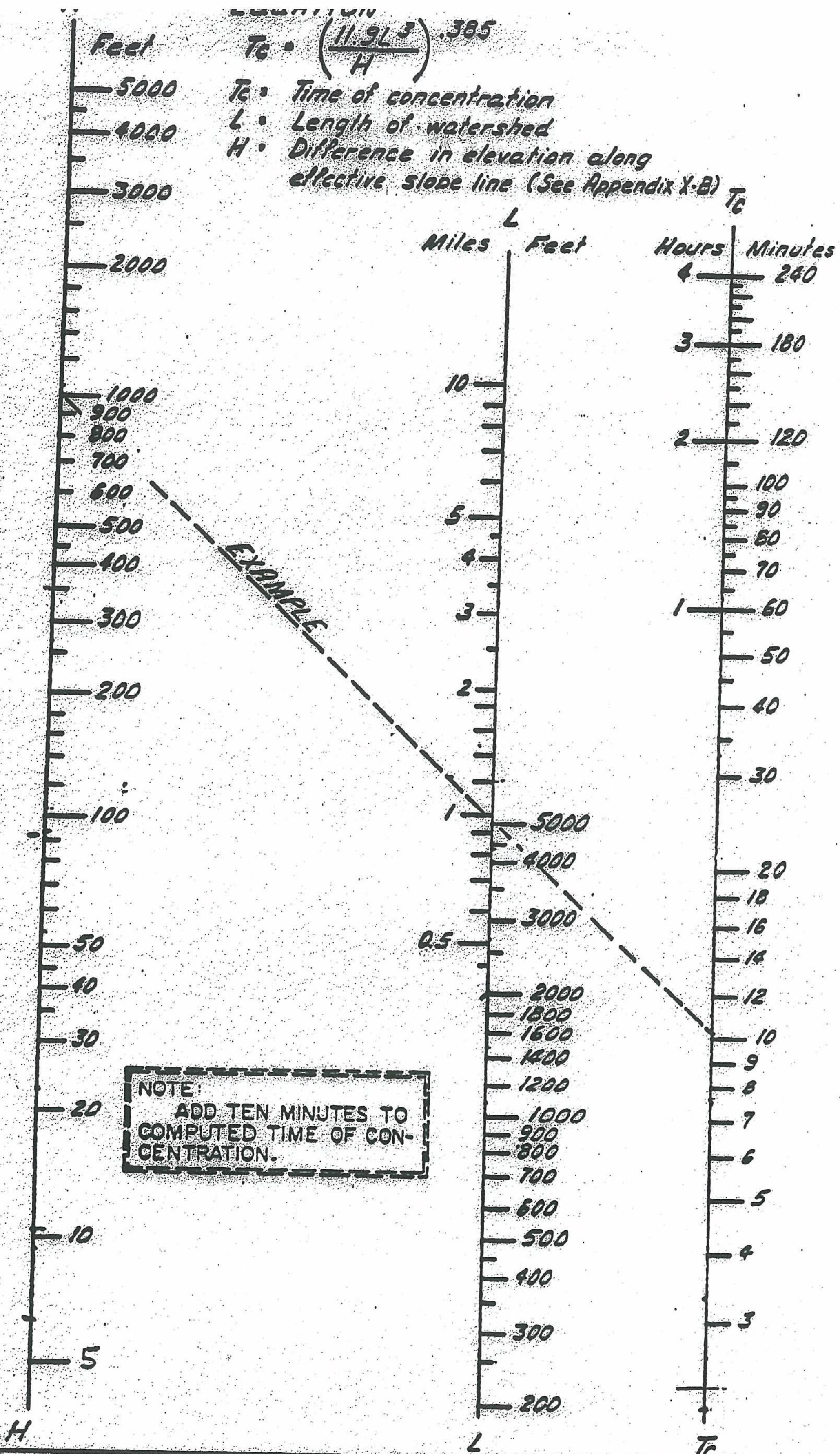


ELEV.	FACTOR
0–1500	1.00
1500–3000	1.25
3000–4000	1.42
4000–5000	1.60
5000–6000	1.70
DESERT	1.25

To obtain correct intensity, multiply intensity on chart by factor for design elevation.

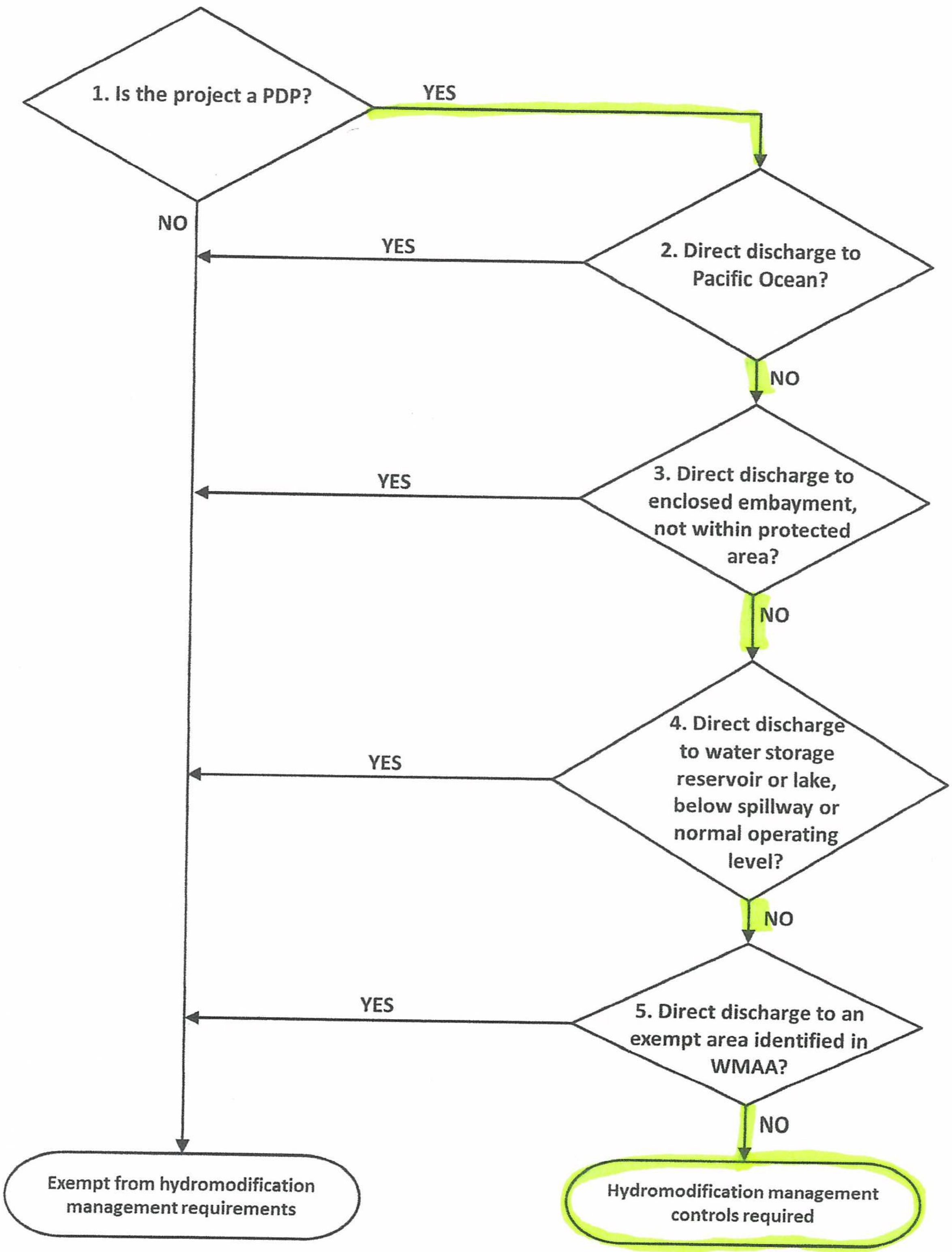
RAINFALL INTENSITY – DURATION – FREQUENCY CURVES for COUNTY OF SAN DIEGO

APPENDIX I-



SAN DIEGO COUNTY DEPARTMENT OF SPECIAL DISTRICT SERVICES DESIGN MANUAL	NOMOGRAPH FOR DETERMINATION OF TIME OF CONCENTRATION (Tc) FOR NATURAL WATERSHEDS	
APPROVED [illegible signature]	DATE ______	APPENDIX

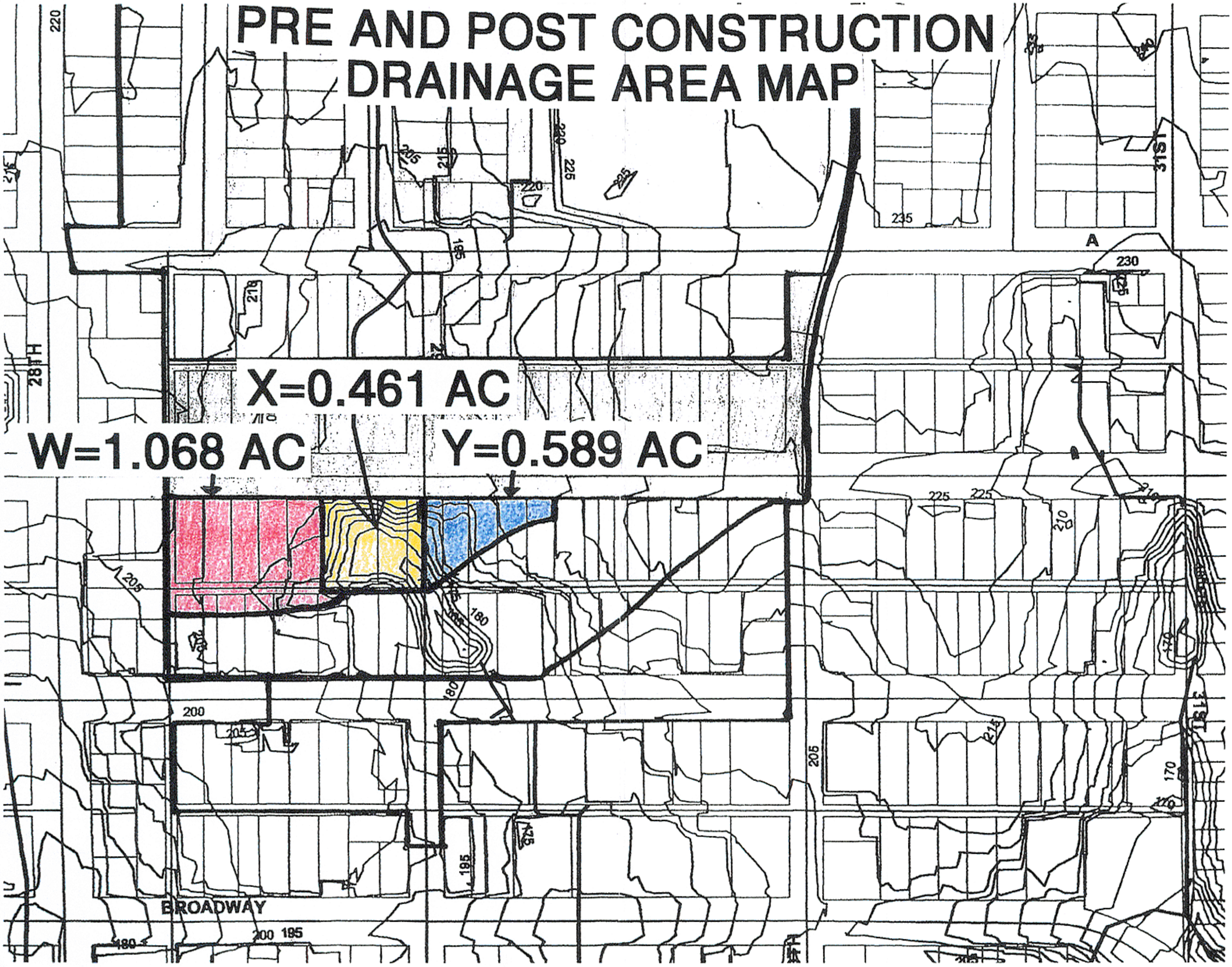
DRAINAGE STUDY ATTACHMENTS

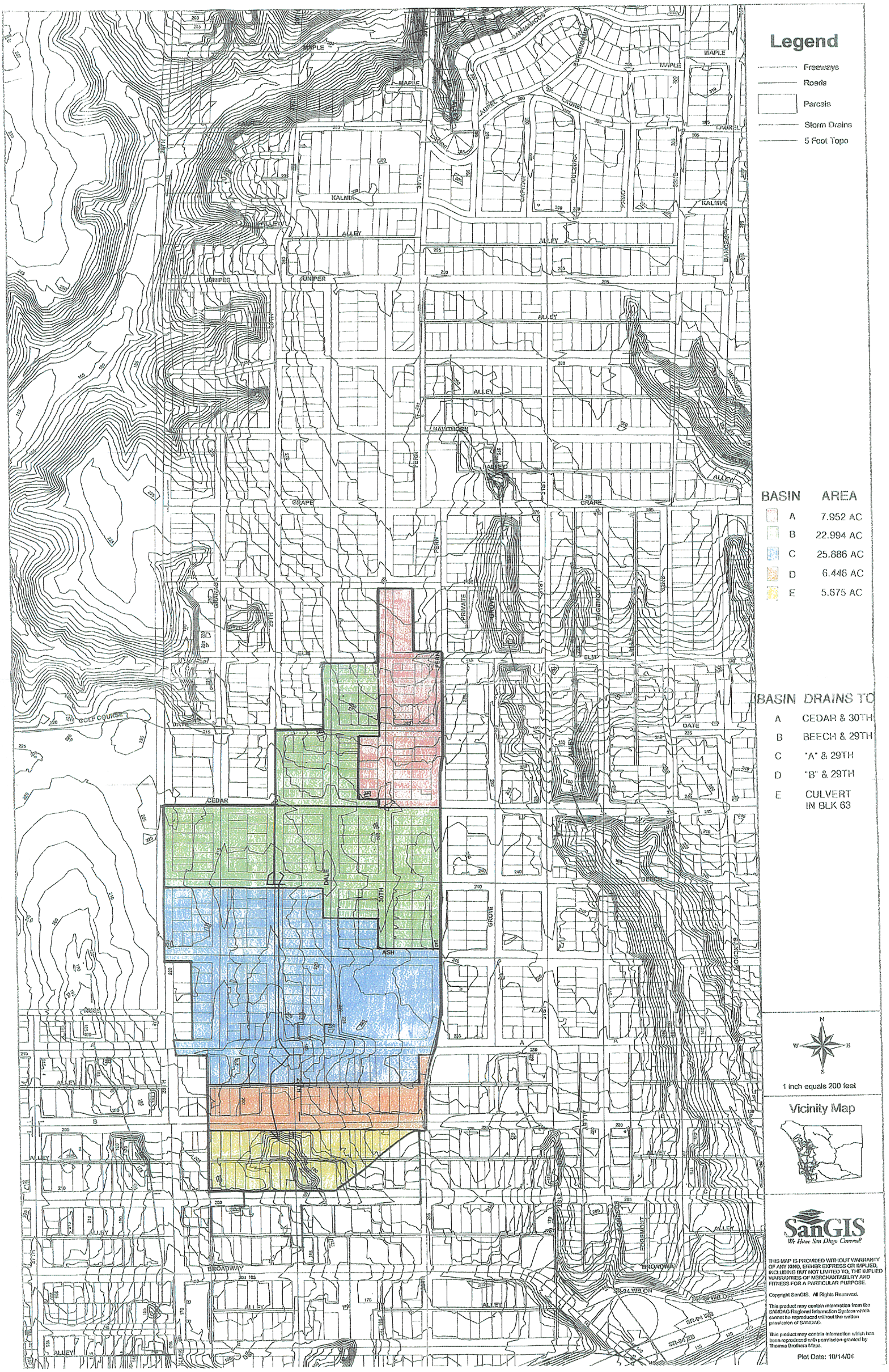


*Direct discharge refers to an uninterrupted hardened conveyance system; Note to be used in conjunction with Node Descriptions.

Figure 1-2. Applicability of Hydromodification Management BMP Requirements

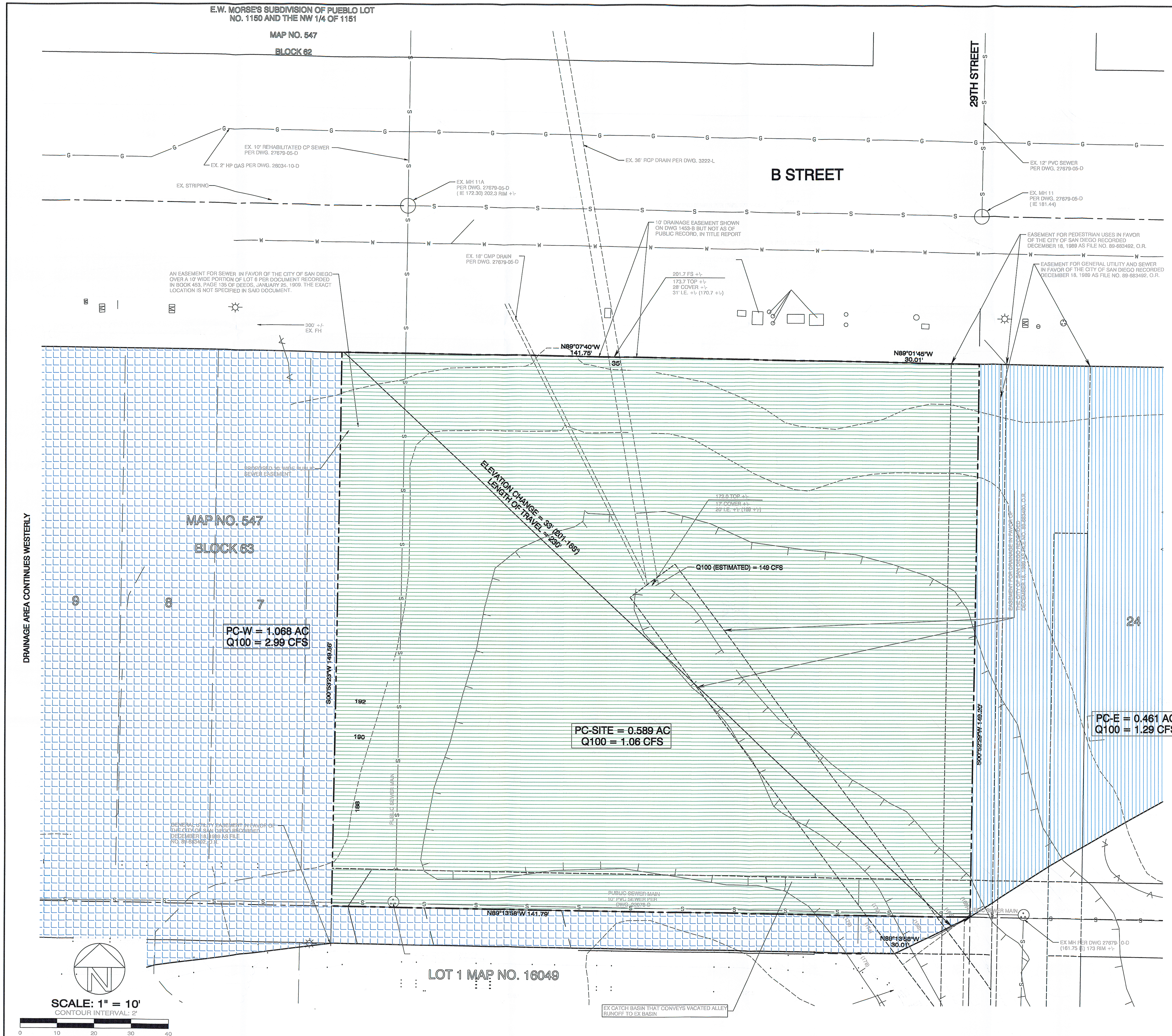
PRE AND POST CONSTRUCTION DRAINAGE AREA MAP





Legend
Freeways
Roads
Parcels
Storm Drains
5 Foot Topo
BASIN AREA
A 7.952 AC
B 22.994 AC
C 25.886 AC
D 6.446 AC
E 5.675 AC
BASIN DRAINS TO
A CEDAR & 30TH
B BEECH & 29TH
C "A" & 29TH
D "B" & 29TH
E CULVERT IN BLK 63
1 inch equals 200 feet
Vicinity Map
SanGIS
We Have San Diego Covered!
THIS MAP IS PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
Copyright SanGIS. All Rights Reserved.
This product may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.
This product may contain information which has been reproduced with permission granted by Thomas Brothers Maps.
Plot Date: 10/14/04
MAPLE
LAUREL
KALMIA
JUNIPER
HAWTHORN
GRAPE
FIR
ELM
DATE
CEDAR
BEECH
ASH
BROADWAY
ALLEY
FERN
30TH
29TH
31ST
GROVE
DALE

PRE-CONSTRUCTION DRAINAGE AREA MAP



ANTONY K. CHRISTENSEN, RCE 54021

JUNE 22, 2016
Date

No. 54021
Exp. 12-31-17
CIVIL
STATE OF CALIFORNIA

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858) 271-9901 FAX (858) 271-8912

Project Address:

"B" STREET AT 29TH STREET
SAN DIEGO, CA 92101

Project Name:

"B" STREET ROW HOMES

Sheet Title:

Revision 6:
Revision 5:
Revision 4:
Revision 3: 04-02-16 REVISE DESIGN
Revision 2: 11-02-15 ADDRESS CITY COMMENTS
Revision 1: 08-03-15 REVISE PROJECT DESIGN

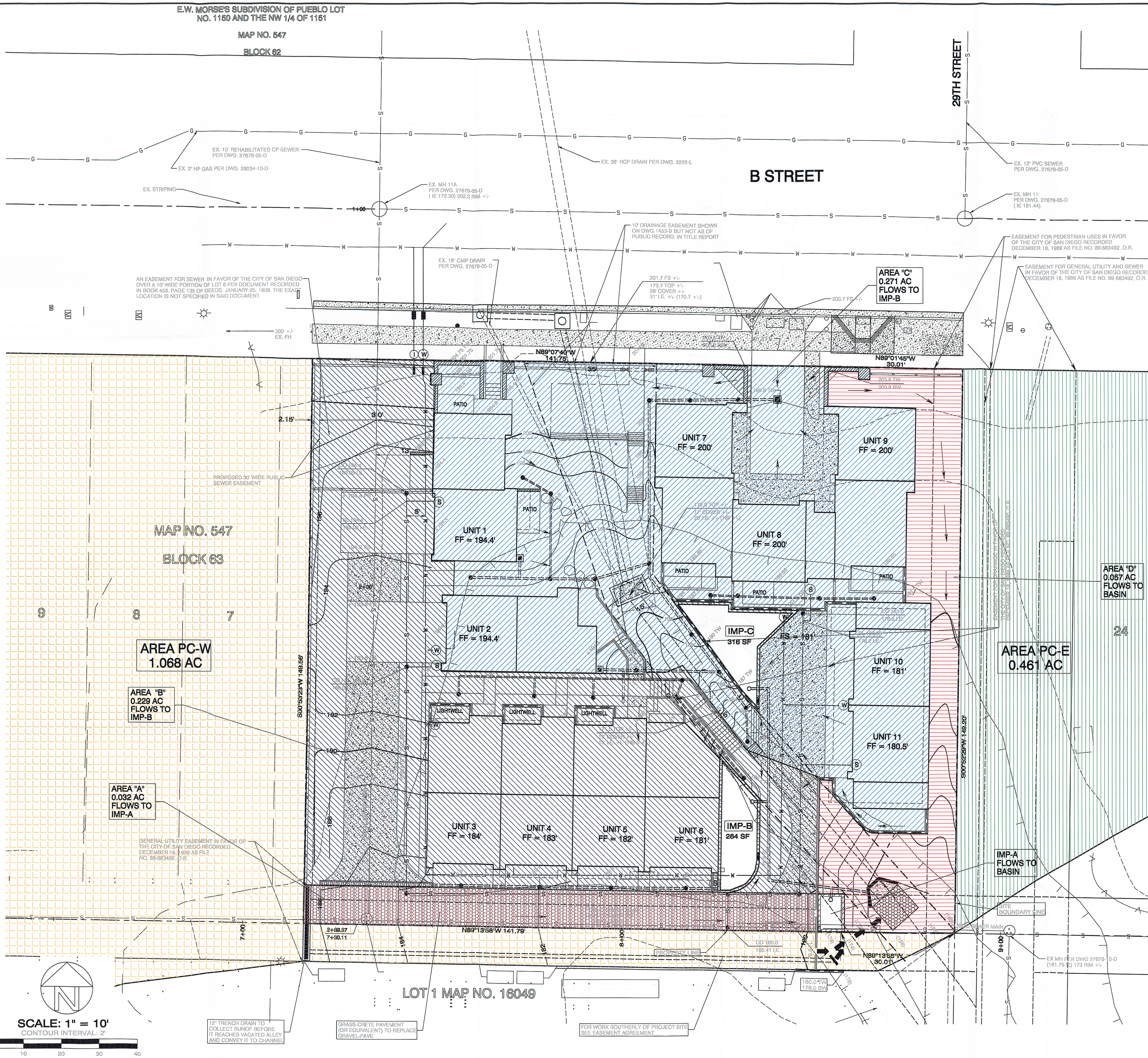
Original Date: APRIL 06, 2015

Sheet 3 of 3 Sheets

DEP# ____________________

JN 2015-07

POST CONSTRUCTION DRAINAGE AREA MAP



SITE DEVELOPMENT
PRELIMINARY GRADING PLAN

ANTONY K. CHRISTENSEN, RCE 54021 — JUNE 22, 2016 — Date

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858) 271-9901 FAX (858) 271-8912

Project Address:

"B" STREET AT 29TH STREET
SAN DIEGO, CA 92101

Project Name:

"B" STREET ROW HOMES

Revision 6:
Revision 5:
Revision 4:
Revision 3: 04-02-16 REVISE DESIGN
Revision 2: 11-02-15 ADDRESS CITY COMMENTS
Revision 1: 08-03-15 REVISE PROJECT DESIGN

Original Date: APRIL 06, 2015

Sheet Title:

Sheet 3 of 3 Sheets

PRELIMINARY GRADING PLAN

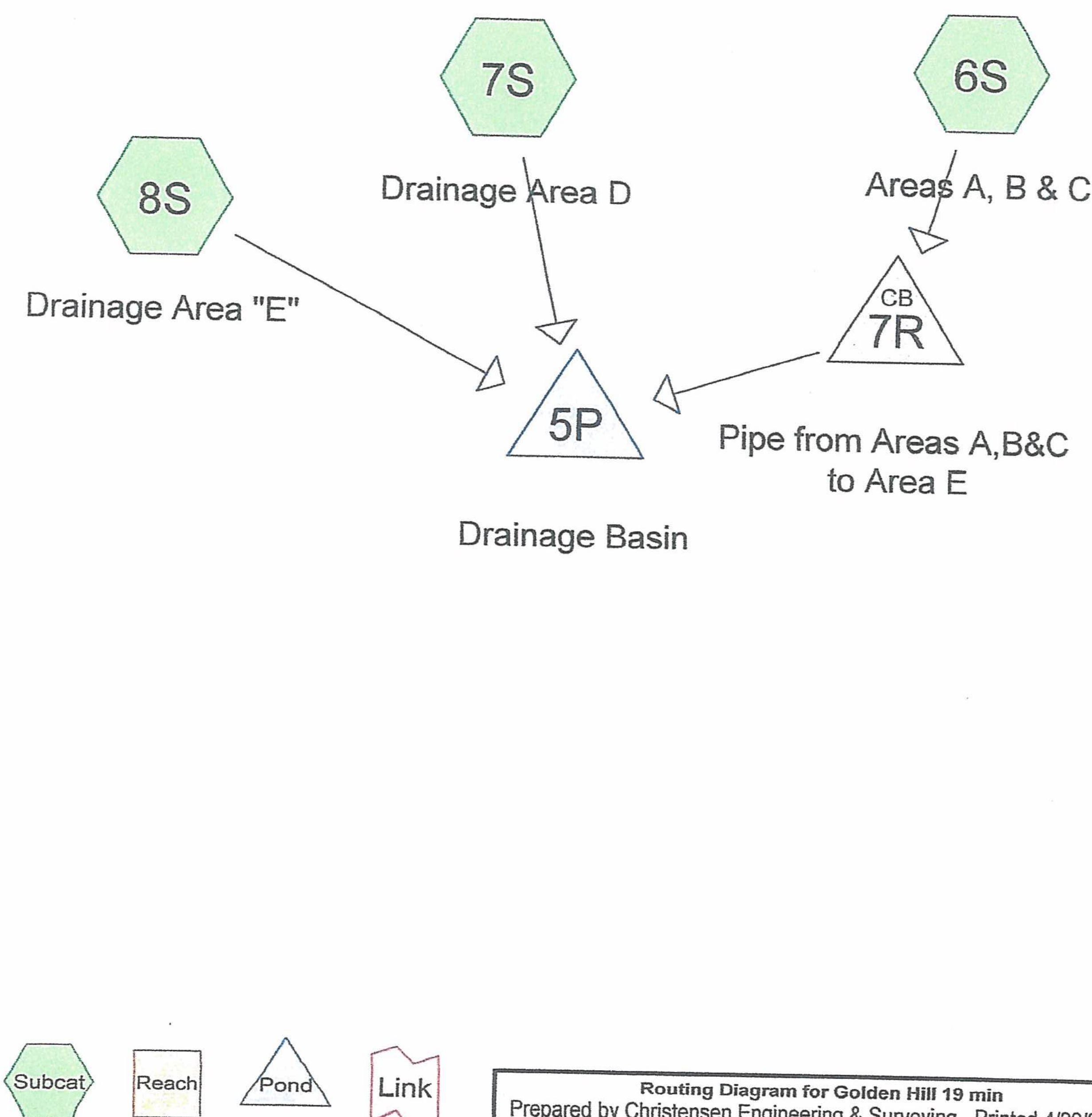
DEP#

JN 2015-07

APPENDIX “B”

DATA SUPPORTING FLOW TO SITE BASIN AND WATER SURFACE ELEVATION DETERMINATION

CURRENT HYDROCAD RESULTS



Routing Diagram for Golden Hill 19 min
Prepared by Christensen Engineering & Surveying, Printed 4/26/2015
HydroCAD® 10.00-12 s/n 03744 © 2014 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
68.953	0.79	(6S, 7S, 8S)
68.953	**0.79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
68.953	Other	6S, 7S, 8S
68.953		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	68.953	68.953		6S, 7S, 8S
0.000	**0.000**	**0.000**	**0.000**	**68.953**	**68.953**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	5P	158.00	155.53	139.0	0.0178	0.012	30.0	0.0	0.0
2	7R	174.20	169.20	200.0	0.0250	0.013	36.0	0.0	0.0

Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 6S: Areas A, B & C Runoff Area=56.832 ac Runoff Depth=0.64"
Tc=19.2 min C=0.79 Runoff=115.33 cfs 3.046 af

Subcatchment 7S: Drainage Area D Runoff Area=6.446 ac Runoff Depth=0.65"
Tc=10.7 min C=0.79 Runoff=13.34 cfs 0.349 af

Subcatchment 8S: Drainage Area "E" Runoff Area=5.675 ac Runoff Depth=0.65"
Tc=8.3 min C=0.79 Runoff=11.75 cfs 0.307 af

Pond 5P: Drainage Basin Peak Elev=171.41' Storage=0.930 af Inflow=140.18 cfs 3.703 af
30.0" Round Culvert n=0.012 L=139.0' S=0.0178 '/' Outflow=82.42 cfs 3.704 af

Pond 7R: Pipe from Areas A,B&C to Area E Peak Elev=187.18' Inflow=115.33 cfs 3.046 af
36.0" Round Culvert n=0.013 L=200.0' S=0.0250 '/' Outflow=115.33 cfs 3.046 af

Total Runoff Area = 68.953 ac Runoff Volume = 3.703 af Average Runoff Depth = 0.64"

Summary for Subcatchment 6S: Areas A, B & C

[48] Hint: Peak<CiA due to short duration

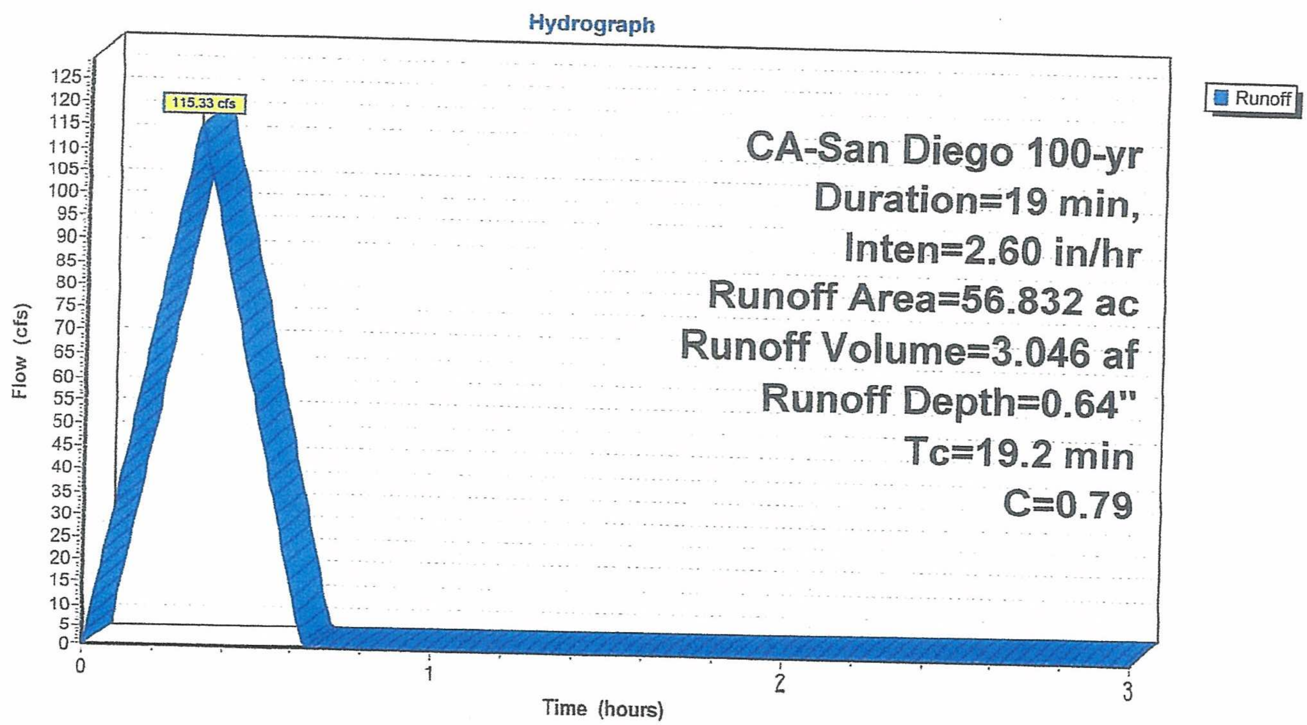
Runoff = 115.33 cfs @ 0.32 hrs, Volume= 3.046 af, Depth= 0.64"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CA-San Diego 100-yr Duration=19 min, Inten=2.60 in/hr

Area (ac)	C	Description
56.832	0.79	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.2					Direct Entry,

Subcatchment 6S: Areas A, B & C



Summary for Subcatchment 7S: Drainage Area D

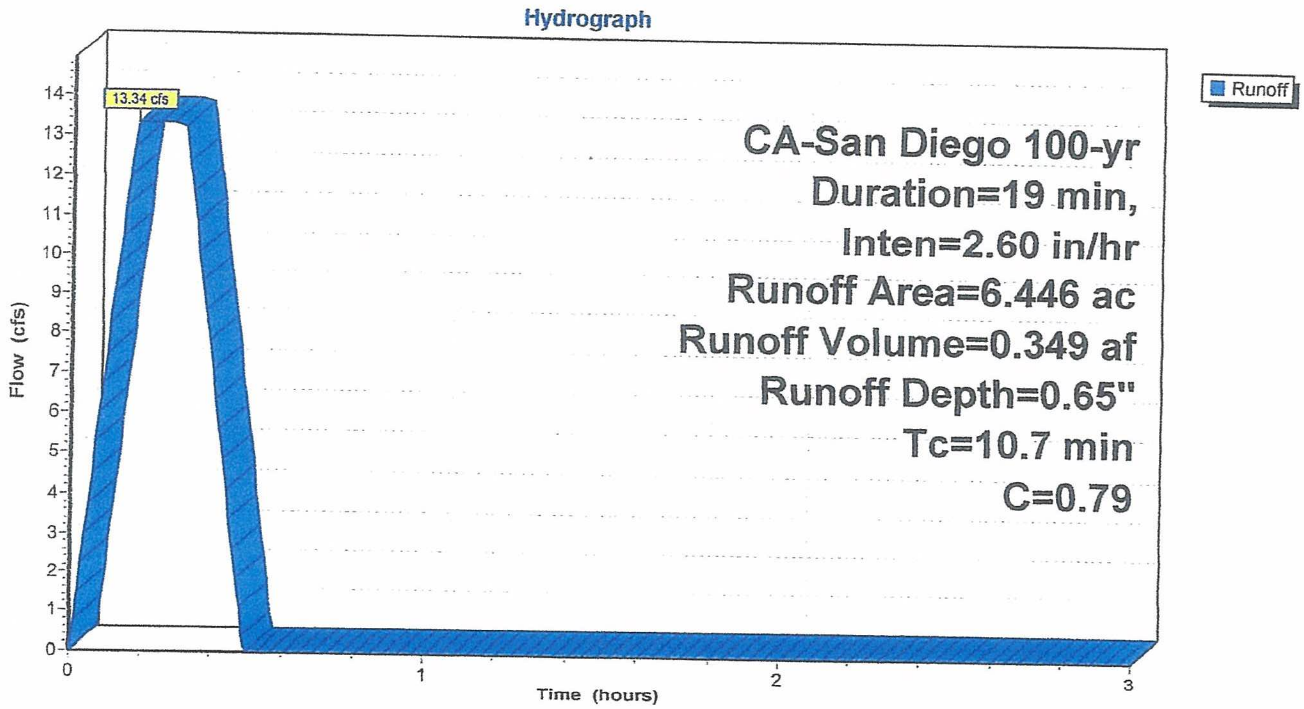
Runoff = 13.34 cfs @ 0.18 hrs, Volume= 0.349 af, Depth= 0.65"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CA-San Diego 100-yr Duration=19 min, Inten=2.60 in/hr

Area (ac)	C	Description
6.446	0.79	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7					**Direct Entry,**

Subcatchment 7S: Drainage Area D



Summary for Subcatchment 8S: Drainage Area "E"

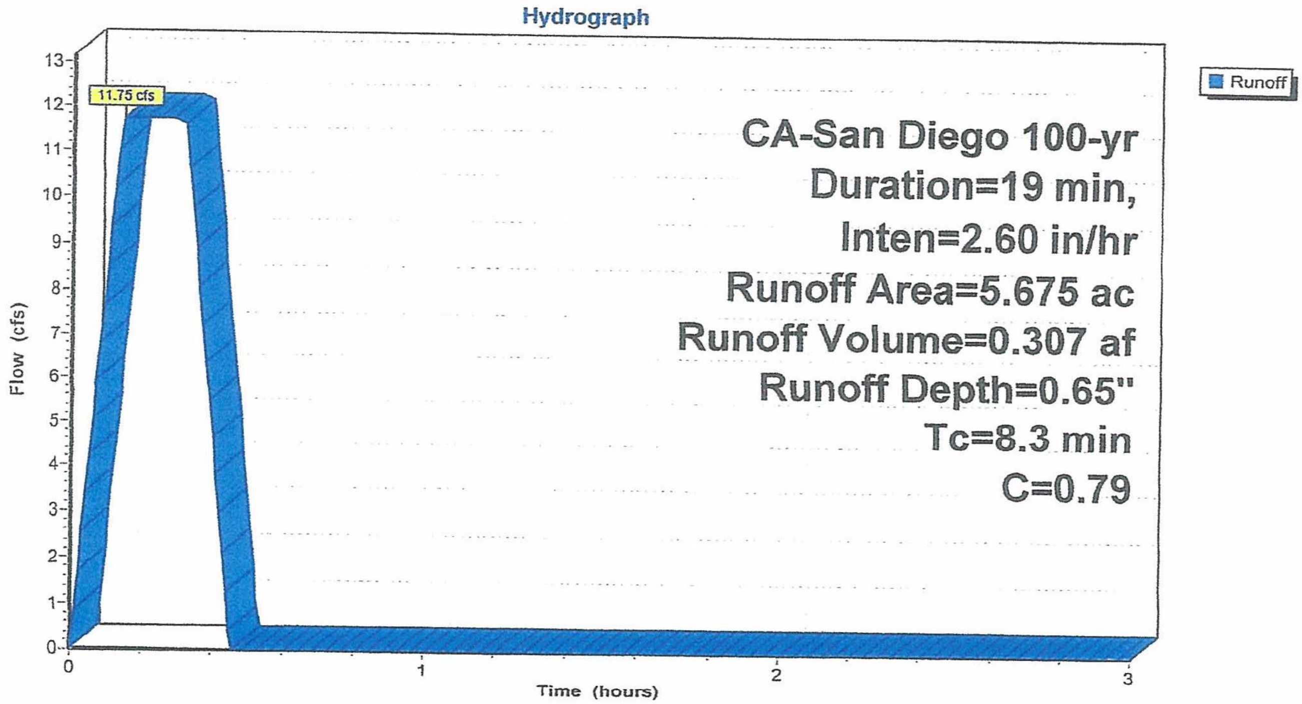
Runoff = 11.75 cfs @ 0.14 hrs, Volume= 0.307 af, Depth= 0.65"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CA-San Diego 100-yr Duration=19 min, Inten=2.60 in/hr

Area (ac)	C	Description
5.675	0.79	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3					**Direct Entry,**

Subcatchment 8S: Drainage Area "E"



Summary for Pond 5P: Drainage Basin

Inflow Area = 68.953 ac, Inflow Depth = 0.64" for 100-yr event
Inflow = 140.18 cfs @ 0.32 hrs, Volume= 3.703 af
Outflow = 82.42 cfs @ 0.43 hrs, Volume= 3.704 af, Atten= 41%, Lag= 6.8 min
Primary = 82.42 cfs @ 0.43 hrs, Volume= 3.704 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 171.41' @ 0.43 hrs Surf.Area= 0.257 ac Storage= 0.930 af
Flood Elev= 180.00' Surf.Area= 0.634 ac Storage= 4.797 af

Plug-Flow detention time= 4.8 min calculated for 3.692 af (100% of inflow)
Center-of-Mass det. time= 4.8 min (22.9 - 18.2)

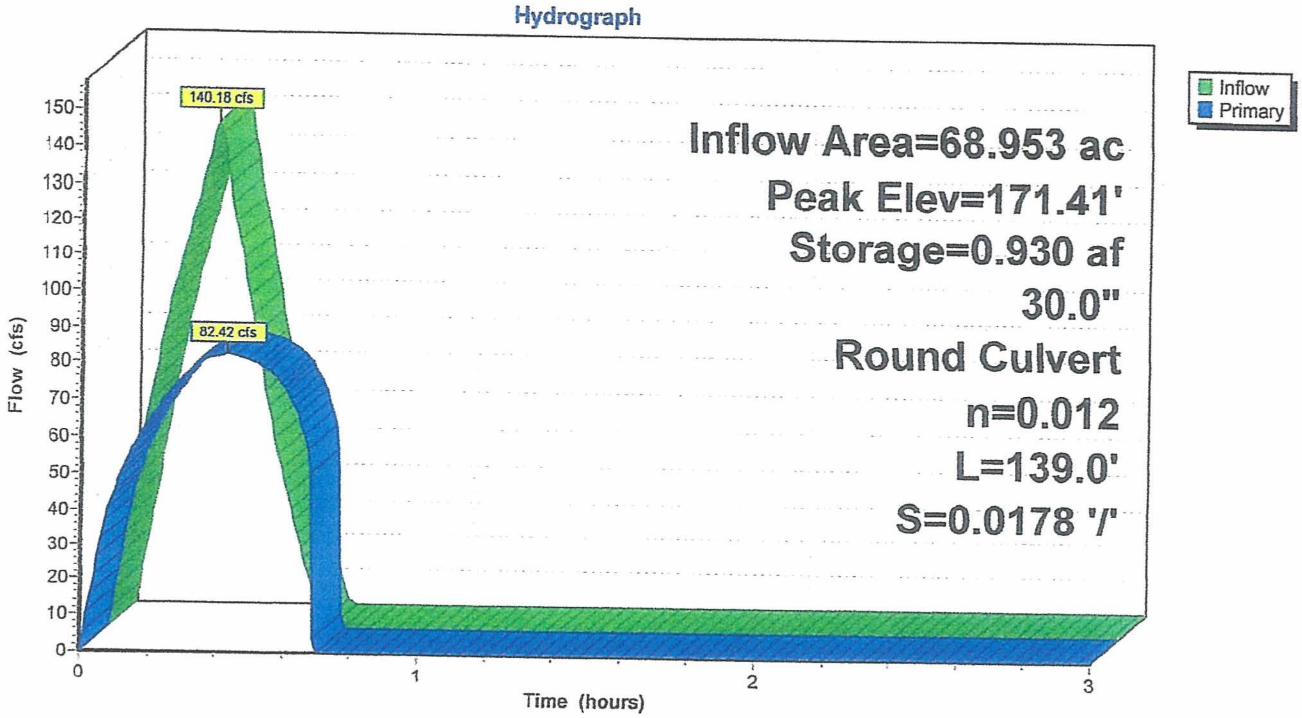
Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	4.797 af	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Perim. (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
162.00	0.004	62.0	0.000	0.000	0.004
164.00	0.026	177.0	0.027	0.027	0.055
166.00	0.072	359.0	0.094	0.121	0.233
168.00	0.115	444.0	0.185	0.306	0.359
170.00	0.195	639.0	0.306	0.613	0.746
172.00	0.285	666.0	0.477	1.090	0.817
174.00	0.384	722.0	0.667	1.757	0.962
176.00	0.464	774.0	0.847	2.603	1.109
178.00	0.549	817.0	1.012	3.615	1.239
180.00	0.634	850.0	1.182	4.797	1.346

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**30.0" Round Culvert** L= 139.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 155.53' S= 0.0178 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf

Primary OutFlow Max=82.42 cfs @ 0.43 hrs HW=171.41' (Free Discharge)
↑**1=Culvert** (Inlet Controls 82.42 cfs @ 16.79 fps)

Pond 5P: Drainage Basin



Summary for Pond 7R: Pipe from Areas A,B&C to Area E

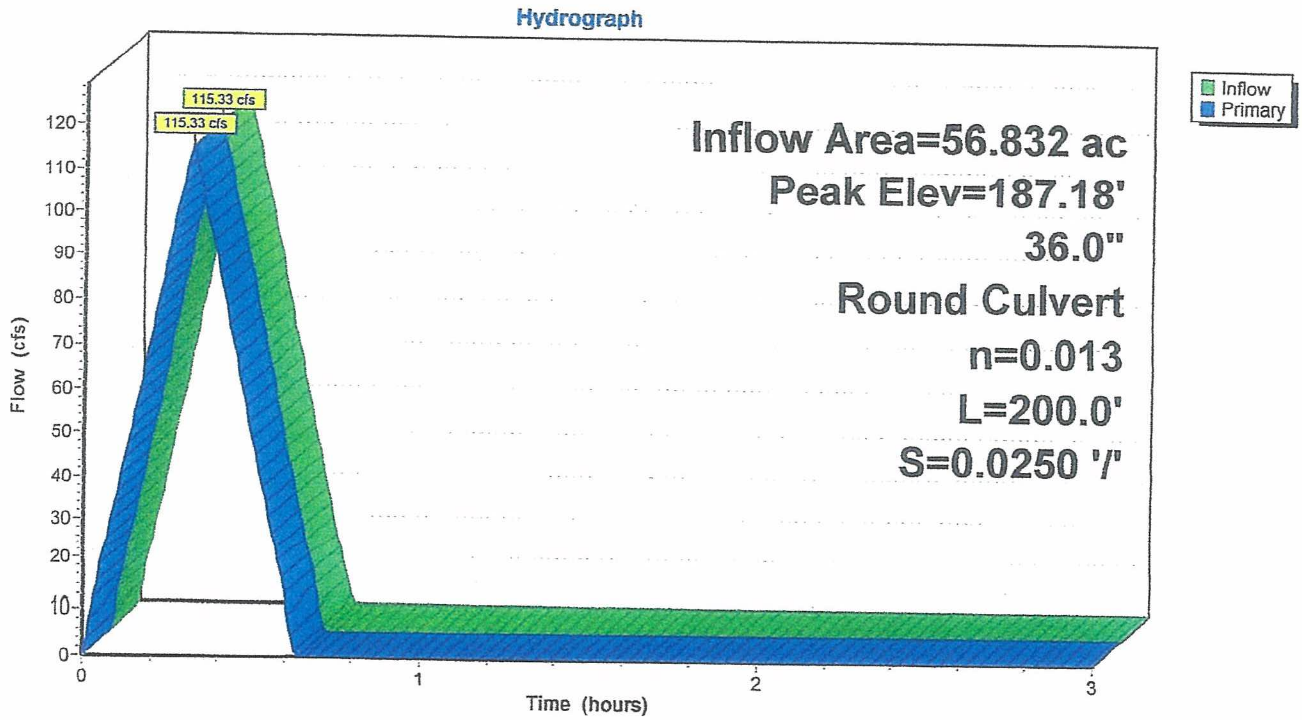
Inflow Area = 56.832 ac, Inflow Depth = 0.64" for 100-yr event
Inflow = 115.33 cfs @ 0.32 hrs, Volume= 3.046 af
Outflow = 115.33 cfs @ 0.32 hrs, Volume= 3.046 af, Atten= 0%, Lag= 0.0 min
Primary = 115.33 cfs @ 0.32 hrs, Volume= 3.046 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 187.18' @ 0.32 hrs
Flood Elev= 200.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	174.20'	**36.0" Round Culvert** L= 200.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 174.20' / 169.20' S= 0.0250 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf

Primary OutFlow Max=114.88 cfs @ 0.32 hrs HW=187.09' TW=170.18' (Dynamic Tailwater)
1=Culvert (Inlet Controls 114.88 cfs @ 16.25 fps)

Pond 7R: Pipe from Areas A,B&C to Area E



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 6S: Areas A, B & C Runoff Area=56.832 ac Runoff Depth=0.64"
Tc=19.2 min C=0.79 Runoff=115.33 cfs 3.046 af

Subcatchment 7S: Drainage Area D Runoff Area=6.446 ac Runoff Depth=0.65"
Tc=10.7 min C=0.79 Runoff=13.34 cfs 0.349 af

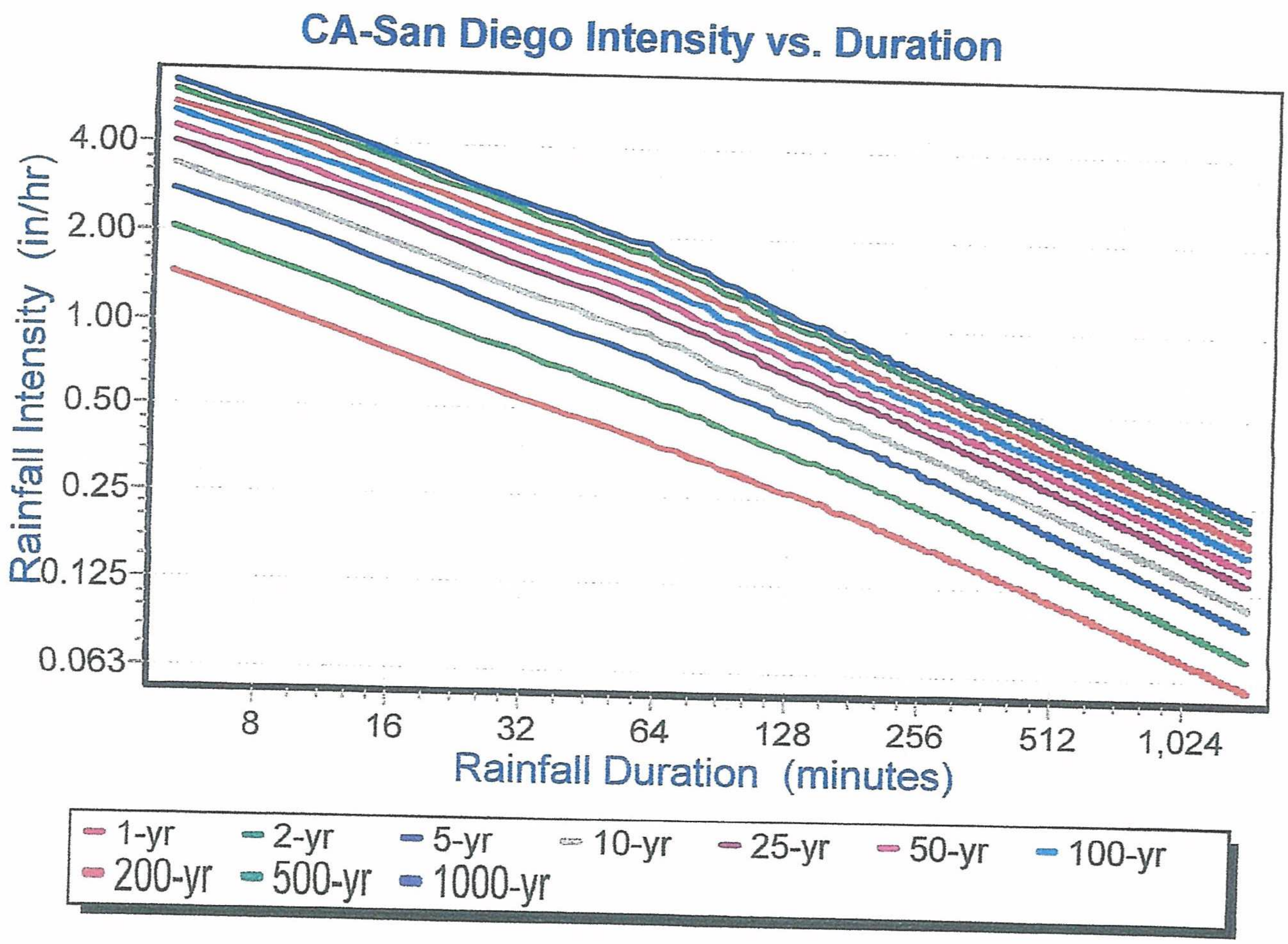
Subcatchment 8S: Drainage Area "E" Runoff Area=5.675 ac Runoff Depth=0.65"
Tc=8.3 min C=0.79 Runoff=11.75 cfs 0.307 af

Pond 5P: Drainage Basin Peak Elev=171.41' Storage=0.930 af Inflow=140.18 cfs 3.703 af
30.0" Round Culvert n=0.012 L=139.0' S=0.0178 '/' Outflow=82.42 cfs 3.704 af

Pond 7R: Pipe from Areas A,B&C to Area E Peak Elev=187.18' Inflow=115.33 cfs 3.046 af
36.0" Round Culvert n=0.013 L=200.0' S=0.0250 '/' Outflow=115.33 cfs 3.046 af

Total Runoff Area = 68.953 ac Runoff Volume = 3.703 af Average Runoff Depth = 0.64"

IDF Curve Report



APPENDIX “C”

DATA SUPPORTING HYDROMODIFICATION EXEMPTION FOR OFFITE CHANNEL BETWEEN HIGHWAY 94 AT 29TH STREET AND THE ALLEY BETWEEN G AND MARKET STREET

This portion of this Drainage Study for this project addresses the velocity of runoff (as a measure of the potential to produce hydromodification) that flows through an open channel at 29th Street and “G” Street, southerly of Highway 94 and northerly of the unnamed alley northerly of Market Street. Easterly of the open channel is a San Diego Gas and Electric Substation (Grant Hill Substation) which is shown on a City of San Diego grading plan (drawing 33696-D) from 2006. This Drainage Study demonstrates that the velocity of runoff from the 2-year and 10-year return frequency storms is lower than permissible velocity found in Table 1-104.10A (Table 1-104.10B does not apply to this channel) found in the City of San Diego Drainage Design Manual. This evidence allows the Golden Hill project to meet the exemption criteria from hydromodification requirements.

To calculate the velocity of runoff through this approximately 320’ channel that runs from a 54” RCP Caltrans storm drain running from north to south beneath Highway 94 to a City of San Diego 30”CP that then runs under an alley, the area contributing runoff and the time of concentration (T_c) for the runoff to reach the 30” CP, must be determined. The area and T_c are taken from a report prepared for the SDG&E Substation (attached). The total area contributing to the runoff collected at the end of the channel (at the 30” CP) was determined to be 105.6 Ac. The T_c to that point was determined to be 28.48 minutes.

HydroCAD, a proprietary storm water modeling system program, allows for the creation of a hydrograph for a given watershed. Using this information it is possible to determine, in this case, the maximum stage for different storm events. For this project, it was determined that the flow in the channel would be controlled by the ability of the 30” CP to convey runoff from the channel and that it would control the flow of runoff through the channel (outlet control). Using the known T_c , HydroCAD uses the San Diego 6-hr rainfall depth to calculate the rainfall intensity for each return frequency storm. Using that information and the topographic data for the channel as well as the area contributing to the runoff and its runoff coefficient, the flow through the channel is calculated from the beginning of flow to sometime beyond the time the storm reaches its greatest volume of flow, the maximum stage is determined. (See attachment for the two storm events).

Once that maximum elevation of the water surface is known the HEC-RAS program is employed to determine the actual water surface profile and the velocity profile for the channel for each storm event. (See attachment for the two storm events).

The intent of this study is to determine if the velocity at any time or location within the channel exceed the permissible velocity for this unlined channel. A geotechnical report, prepared for the SDG&E Substation (attached), describes the channel surface as being composed of fill soil (probably graded in 1964) that generally consists of “clayey to siltey sand with gravel and cobbles”. Deeper in the fill “asphalt, concrete and other debris was observed”. Below the fill material “natural surficial deposits of alluvium and colluvium consisting of “loose to dense fine silty sand to fine clayey sand with gravel and cobbles” exists. From Table 1-104.10A these type soils fall between “Silt to Gravel” and “Gravel to Cobbles” categories. These soils have a permissible velocity of between 7.0 fps and 9.0 fps, for intermittent flow (the type of flow to be found in this channel).

The output from the HEC-RAS program runs, for the 2-year storm has a maximum velocity of 4.75 fps and for the 10-yr return frequency storm of 5.12 fps. Both values are below that found to be permissible in an unlined channel. In point of fact, since the channel is covered in vegetation and debris (concrete, asphalt, mattresses, and other impediments) the actual velocity is expected to be less but is not able to be modeled. Since the vegetation found in the channel is not simply grass (as found in Table 1-104.10B), the values listed in the table, do not apply. This table is actually intended to be used in the design of grass lined channels and not for channels in the condition of this channel. Nonetheless, even if values from this table were examined the projected velocity would be less than that found in the table.

Since the velocity of the expected flow from 2 and 10-year retrun frequency storms is less than the permissible velocity for an unlined channel and because the remaining portion of the flow from the site to the exempt water body (San Diego Bay) meets the hardened conveyance system requirements and 10 year adequacy standard, the project is exempt from Hydromodification requirements.

The attached drainage study and portions of the Geotechnical Study for the SDG&E Substation are from the City records for Grading Plan Drawing No. 33696-D, PTS 78513.

Calculations

1. Intensity Calculation

Intensity values required for HydroCad come from the County of San Diego calculated 6-hr storm rainfall quantities. From the attached Drainage Study the time of concentration (Tc) from the area contributing runoff to the channel is 28.48 minutes.

Using the Tc the County of San Diego Rainfall intensity equation was used to determine the rainfall for each return frequency storm.

From the Isopluvual maps the following values were determined:

$P_{6\ (2\ year)} = 1.1$ inches

$P_{6\ (10\ year)} = 1.7$ inches

$I_X = 7.44\ P_6\ D^{-.645}$

D = 28.48

$I_{(2)} = 0.943$ inches/hr

$I_{(10)} = 1.46$ inches/hr

These values were used in HydroCAD, for processing of data.

Note: These values are in close agreement with those determined using the method used in the City of San Diego manual (Appendix I) of:

$I_{(2)} = 0.98$ inches/hr

$I_{(10)} = 1.5$ inches/hr

2. Volume calculations

Using these intensity values and the area contributing to the runoff reaching the 30” CP outlet at the end of the channel, obtained from the attached drainage study (105.6 Ac) HydroCAD determined the peak runoff value and the peak headwater elevation to be used in HEC-RAS.

Areas of Drainage

The area of this study is found in the attached drainage study prepared for the grading plan for the SDG&E substation and was determined to be 105.6 Ac.

3. Discussion

The determination of the peak elevation using HydroCAD requires that topographic information be provided to the program. This includes the area of each contour as well as its perimeter, from the lowest elevation at the outlet location to the highest potential elevation over it, before reaching the flood stage. Contours from City of San Diego drawing no. 33696-4-D were used from an elevation of 117’ to 132’. An actual overflow elevation of 135 could have been used and would have increase the potential storage volume but since the peak elevation for each storm was less than 132’ the values chosen were adequate.

For determining the flow and velocity profiles in HEC-RAS, cross-sections were prepared following those shown in the drainage study prepared for the SDG&E substation grading plan. Using this information and the peak elevation determined by HydroCAD the flow and velocity profiles were determined.

Using the maximum velocity determined by HEC-RAS modeling a comparison was made to the City of San Diego permissible velocity values found in Table 1-104.10A. The attached geotechnical report from the SDG&E substation file obtained from the City of San Diego records, provides cross-sections that demonstrate that the channel run within the fill material and nearly within the alluvium and colluvium layer, found onsite. The report indicates these soil layers include clayey to silty sand with gravel and cobbles and loose to dense fine siltey sand to fine clayey sand with gravel and cobbles, respectively.

These descriptions correspond to the categories of Silt to Gravel" and "Gravel to Cobbles", found in Table 1-104.10A of the City of San Diego Drainage Design Manual. These soils have a permissible velocity of between 7.0 fps and 9.0 fps for intermittent flow (that to be found in this channel). Therefore, the maximum velocities found in the HEC-RAS studies of 4.75 fps and 5.12 fps are less than these permitted values.

4. Conclusion

Since the greatest velocities for runoff flowing through the channel are found to be less than the permissible velocity for an unlined channel (a more conservative condition than exists) hydromodification of the channel is not expected to occur and the project, meeting the other requirements (providing energy dissipation and 10-yr storm conveyance adequacy) is demonstrated to meet the requirement for exemption from addressing hydromodification requirements.