

Preliminary Low Impact Development (LID) Plan

Prepared for:
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Property:
APN: 7505-010-015, 7505-010-035, 7505-010-036
TTM 84401
122-126 N. Pacific Coast Highway
Redondo Beach, CA 90278

Prepared by:
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Preparation Date: January 2024

Receipt of WDID
REPLACE THIS SHEET

To be provided prior to final approval

Notice of Intent
REPLACE THIS SHEET

To be provided prior to final approval

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**Owner/Developer
Approval and Certification
of the
Low Impact Development (LID) Plan**

Project Name: **TTM 84401, Redondo Beach**

Project Number: **Tentative Tract 84401**
APN 7505-010-015, 7505-010-035, 7505-010-036

Project Address: **122-126 N. Pacific Coast Highway**
Redondo Beach, CA 90278

This Preliminary Low Impact Development (LID) Plan for the **TTM 84401, Redondo Beach** project has been prepared for City Ventures Homebuilding, LLC by C&V Consulting, Inc. It is intended to comply with the requirements of the City of Redondo Beach's Conditions of Approval.

The undersigned is authorized to approve implementation of provisions of this plan as appropriate and will strive to have the plan carried out by successors consistent with the County of Los Angeles LID Manual and the intent of the NPDES storm water requirements.

"I certify under penalty of law that this document and all attachments were prepared under my jurisdiction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

<hr/>	<hr/>
Owner/Developer Signature	Date
Patrick Chien, Manager	(949) 258-7542
<hr/>	<hr/>
Owner/Developer's Name and Title	Telephone Number

Section 200

A. Contact Information/List of Responsible Parties

The property contact information is:

Patrick Chien
Tel: (949) 258-7542
City Ventures Homebuilding, LLC
3121 Michelson Drive, Suite 150
Irvine, CA 92612

The property owner shall have primary responsibility and significant authority for the implementation, maintenance, and inspection of the property BMPs. Duties of the Owner include but are not limited to:

- Implementing all elements of the LID, including but not limited to:
 - Implementation of prompt and effective erosion and sediment control measures
 - Implementing all non-storm water management, and materials and waste management activities, such as: monitoring, discharges, general site clean-up; vehicle and equipment cleaning, spill control; good construction housekeeping to ensure that no materials other than storm water are discharged which may have an adverse effect on receiving waters or storm drain systems, etc.
- Pre-storm inspections
- Storm event inspections
- Post-storm inspections
- Routine inspections as described in the LID
- Ensuring elimination of all unauthorized discharges
- The Owner shall be assigned authority to mobilize crews in order to make immediate repairs to the control measures.
- Coordinate all of the necessary corrections/repairs are made immediately, and that the project complies with the LID at all times.
- Managing and report any Illicit Connections or Illegal Discharges.

Section 300

A. References

The following documents are made a part of this LID by reference:

- Project plans and specifications for the City of Redondo Beach to support the **TTM 84401, Redondo Beach** project, prepared by C&V Consulting, Inc., 9830 Irvine Center Drive, Irvine, Ca 92618
- County of Los Angeles Department of Public Works, Low Impact Development Standards Manual dated February 2014
- State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ, NPDES No. CAS000002 dated July 1, 2010
- California Stormwater BMP Handbook – Construction, January 2009.
- California Stormwater BMP Handbook – New Development and Redevelopment, January 2003.
- Los Angeles County Municipal Stormwater/ NPDES Permit Order R4-2012-0175

Section 400 – Body of LID

A. Objectives

This Low Impact Development (LID) Plan has four main objectives:

- 1) Identify all pollutant sources, including sources of sediment that may affect the quality of storm water discharges associated with daily use / activity (storm water discharges) from the property site.
- 2) Identify non-storm water discharges.
- 3) Identify, construct, implement and maintain Best Management Practices (BMPs) to reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges from the property site.
- 4) Develop a maintenance schedule for BMPs designed to reduce or eliminate pollutants.

B. Project Background and Description

The proposed project is located at 122-126 N. Pacific Coast Highway in the City of Redondo Beach, County of Los Angeles, and it is comprised of approximately 1.56 net acres. The site consists of two parcels on either side of Central Court. Parcel 1 is bound on the north by Vincent Street, on the west by Pacific Coast Highway, on the east by Central Court and on the south by single family residential. Parcel 2 is bound on the north and east by single family residential, on the west by Central Court, and on the south by a Church.

City Ventures Homebuilding, LLC is proposing the construction of six (6) buildings with 35 units with 2- and 3- bedroom layouts. One private drive aisle will provide access to Parcel 1 and Central Court is proposed to provide access to the building along the eastern property line of Parcel 1. Parcel 2 will be accessed through Central Court and will consist of shared parking and a community garden. Both parcels will have guest parking areas, sidewalks, and landscaped areas.

Parcel 1 is occupied by 3 existing buildings that serve as facilities for the Sant James Group. There is an existing parking lot with a driveway entrance and exit from Central Court. There is an adjacent playground facility for the Sant James Preschool in the northeast corner of the existing parking lot. There is an existing retaining wall on the western and northern property lines and existing chain link fences around the parking lot and other facilities within the project site. Parcel 2 is currently a paved parking lot.

C. Vicinity Map

The site is located at 122-126 Pacific Coast Highway in the City of Redondo Beach, County of Los Angeles. Parcel 1 is located on the east side of Pacific Coast Highway and it is bounded by Vincent Street to the north, Central Court to the east, and single

family residential to the south. Parcel 2 is located on the east side of Central Court and is bounded by single family residential to the north and east, and a church to the south.

Please refer to Figures 1 & 2 for Vicinity and Location maps.

D. Existing Site Drainage Condition

The entirety of the project site is relatively flat, but the elevations of the surrounding streets are significantly lower. There is an open space area in the northwest corner that is on a lower elevation compared to the rest of the property site. The grade gets steeper along the hillside located along the western property line adjacent to North Pacific Coast highway. Based on the ALTA/ Topographic Survey prepared by C&V Consulting, Inc. dated February 14, 2023, the site elevation ranges from approximately 80 feet above sea level (msl) in the northwest corner to approximately 100 feet at the highest point near the northernmost driveway entrance in Central Court.

The project site appears to sheet flow in the northwest direction towards Vincent Street and North Pacific Coast Highway. There appears to be a high point for Central Court near the entrance into the existing project site. North of the driveway entrance, Central Court appears to sheet flow in the northwest direction towards Vincent Street. South of the driveway entrance, Central Court appears to sheet flow in the southeast direction towards Emerald Street. The existing elevations are higher northeast of Central Court compared to the elevations of the project site. Vincent Street appears to sheet flow in the southwesterly direction and North Pacific Coast Highway appears to sheet flow in the northwesterly direction towards the intersection. The existing surface of Vincent Street is steeper compared to the existing surface of North Pacific Highway.

The existing site is graded so storm water drains to Vincent Street and North Pacific Coast Highway over the surface or through existing storm drain inlets that curb core and direct the runoff to the streets. Runoff from Central Court will drain over the surface to Vincent Street or Emerald Street. Runoff will run along the existing gutters along the site frontage and will converge at the North Pacific Coast Highway and Vincent Street Intersection; Runoff will continue to flow along Vincent Street in the westerly direction.

According to the Los Angeles County Storm Drain System GIS, the nearest downstream catch basin is located south of Vincent Street near the Vincent Street and Broadway Avenue Intersection; approximately 540' away from the project site. This catch basin connects to another catch basin east of Broadway Avenue before connecting to a 48" Los Angeles County Flood Control District (LACFCD) maintained reinforced concrete pipe (RCP) that confluences with the 69" RCP Vincent Street Drain into a 78" RCP storm drain pipe. The runoff continues to flow in the northwest direction and then wraps into Beryl Street and continues to flow in the southwest direction until it ultimately discharges into the Pacific Ocean. The site is in the South Santa Monica Bay Watershed according to the Los Angeles County Low Impact Development Standards Manual.

Water bodies to which site runoff is tributary to are listed on the most current 303(d) list for the following:

- Santa Monica Bay
 - Mercury
 - Arsenic
 - PCBs (TMDL)
 - Trash (TMDL)
 - DDT (Sediment) (TMDL)
 - Chlordane
 - Toxicity
 - PAHs (Polycyclic Aromatic Hydrocarbons)
 - Selenium
 - Nickel
 - Nitrogen
 - ammonia
 - Lead
 - Zinc
 - Cadmium
 - Silver
 - Chromium
 - Copper

Surface runoff from the site drains through only engineered facilities to the Pacific Ocean, therefore Hydromodification Control requirements are not applicable for this project.

E. Proposed Site Drainage Conditions

The proposed project consists of six (6) multi-family residential buildings consisting of 35 attached condominiums. The proposed 1.56-acre site will include private drive aisles, private garages, sidewalks, guest parking, and associated landscaping and open space areas. The proposed site consists of one Drainage Management Area (DMA). The proposed drainage will sheet flow overland towards localized sumps equipped with catch basins which will convey stormwater to proposed Dual-Chamber Maxwell Plus Drywell systems. The drywell systems are designed to infiltrate the entire Storm Water Quality Design Volume (SWQDV) produced by the DMA over a drawdown time of 72 hours. A Proposed storm drain detention pipe will also provide enough static storage to retain 100% of the SWQDV. During larger storm events and when the drywell system and detention pipe are at capacity, stormwater will overflow out of the catch basins and into the right-of-way via proposed parkway culverts, following the historic drainage pattern.

Refer to Figure 3, Preliminary DMA Exhibit for additional information.

F. LID Project Types, Characteristics, & Activities

Per the Los Angeles Department of Public Works (LACDPW), *Low Impact Development Standards Manual*, dated February 2014, the proposed project is classified as a “Designated Project.” A “Designated Project” is defined by the LACDPW as follows:

“Redevelopment projects, which are developments that result in creation or addition or replacement of either: (1) 5,000 square feet or more of impervious surface on a site that was previously developed as described in the above bullets; or (2) 10,000 square feet or more of impervious surface area on a site that was previous developed as a single family home.”

G. Pollutant Source Identification and BMP Selection

The following is a list of materials to be used in the daily construction activities at the project site, which will potentially contribute to pollutants, other than sediment, to storm water runoff. Control Practices for each activity are identified below:

- Vehicle fluids, including oil, grease, petroleum, and coolants from personal vehicles
- Landscaping materials and wastes (topsoil, plant materials, herbicides, fertilizers, mulch, pesticides)
- General trash debris and litter
- Pet waste (bacteria/ fecal coliforms)

The Best Management Practices (BMPs) that have been selected for implementation on this project are detailed in the following sections.

H. Source Control BMPs

Project proponents shall implement Site Design concepts that achieve each of the following:

- Minimize Urban Runoff
- Minimize Impervious Footprint
- Conserve Natural Areas
- Minimize Directly Connected Impervious Areas (DCIAs)

Table-1 identifies the source control and treatment BMPs and how each is implemented to achieve each Site Design concept. BMP fact sheets are provided by the LACDPW *Low Impact Development Standards Manual* and the California Stormwater Quality Association.

Table-1: Source Control BMPs

BMP	BMP DESCRIPTION	CHECK ONE		IF NOT APPLICABLE, STATE BRIEF REASON
		INCLUDED?	NOT APPLICABLE	
	Non-Structural Source Control BMPs:			
	Education for Leasers', Operators, Occupants, or Employees	X		
	Activity Restrictions (CC&Rs)	X		
S-8	Landscape Irrigation Practices	X		
SD-32	Common Area Litter Control		X	No proposed trash enclosures.
SE-7	Street Sweeping Private Streets and Parking Lots	X		
	Drainage Facility Inspection and Maintenance	X		
	Structural Source Control BMPs:			
S-1	Storm Drain Message and Signage	X		
S-8	Landscape Irrigation Practices	X		
SD-11	Roof Runoff Controls	X		
	Protect Slopes and Channels		X	No proposed slopes and channels.
S-6	Outdoor Vehicle/Equipment/ Accessory Washing Area		X	Car Wash Racks are not permitted within the proposed development – Not Applicable.
	Proper Site Design:			
S-7	Fuel and Maintenance Area		X	No Fueling Areas
SD-33	Air/Water Supply Area Drainage		X	No Air/Water Supply
S-3	Outdoor Trash Storage and Waste Handling Area		X	No proposed trash enclosures
S-4	Outdoor Loading/ Unloading Dock Area		X	Not Applicable

BMP	BMP DESCRIPTION	CHECK ONE		IF NOT APPLICABLE, STATE BRIEF REASON
		INCLUDED?	NOT APPLICABLE	
S-5	Outdoor Vehicle/Equipment Repair/Maintenance Area		X	No Maintenance Bays
S-6	Outdoor Vehicle/Equipment/ Accessory Washing Area		X	No Wash Areas
S-2	Outdoor Material Storage Area		X	No Material Storage
SD-36	Outdoor Work Areas or Processing Areas		X	No Work Areas
	Provide Wash Water Controls for Food Preparation Areas		X	No Food Prep Areas

Non-Structural Measures

Non-structural BMPs are generally managerial, educational, inspection and/ or maintenance oriented. These items consist of educating employees and occupants, developing, and implementing HOA guidelines, implementing BMPs and enforcing Code requirements. Non-structural BMPs used for this project are summarized below:

Education for Employees and Occupants

Practical informational materials will be provided to homeowners, HOA and employees on general good housekeeping practices that contribute to protection of storm water quality. Among other things, these materials will describe the use of chemicals (including household type) that should be limited to the property, with no discharge of specified wastes via hosing or other direct discharge to gutters, catch basins and storm drains. Initially, the Owner will provide these materials. Thereafter, such materials will be available through the HOA education program.

This program must be maintained, enforced, and updated periodically by the HOA. Educational materials including, but not limited to, the materials included in the Appendix F of this plan will be made available to the employees and contractors of the HOA.

Activity Restrictions

Activities on this site will be limited to activities related to residential living. The project’s Conditions, Covenants, and Restrictions (CC&Rs) will outline the activities that are restricted on the property. Such activities related to the LID include car washing, car maintenance and disposal of used motor fluids, pet waste cleanup, and trash container areas.

Efficient Landscape System & Landscape Maintenance

Management programs will be designed and established by the HOA, who will maintain the common areas within the project site. These programs will include how to mitigate the potential dangers of fertilizer and pesticide usage (refer to the Maintenance and Frequency Table). Ongoing maintenance will be consistent with the State of California Model- Water Efficient Landscape Ordinance. Fertilizer and pesticide usage shall be consistent with County Management Guidelines for use of Fertilizers and Pesticides.

Common Area Litter Control

The HOA will be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. The HOA may also contract with their landscape maintenance firm to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations and reporting the violations to the HOA for remediation.

Street Sweeping in Private Streets and Parking Lots

The HOA shall have all streets and parking lots swept on a weekly basis. This procedure will be intensified around October 15th of each year prior to and throughout rain storm period.

Drainage Facility Inspection & Maintenance

The HOA will be responsible for implementing each of the BMPs detailed in this plan. The HOA will also be responsible for cleaning and maintaining the BMPs on a regular basis. Refer to Appendix G for the Operation and Maintenance Plan. Refer to Appendix C for site specific drainage BMP information.

Storm Drain Stenciling/ Signage

Phrase "No Dumping – Drains to Ocean" or equally effective phrase to be stenciled on catch basins to alert the public to the destination of pollutants discharged into storm water. This stenciling will be inspected and re-stenciled on a periodic basis by the HOA. Refer to Table 4 for maintenance frequency.

Landscape & Irrigation System Design

As part of the design of all common area landscape irrigation shall employ water conservation principals, including, but not limited to, such provisions as water sensors, programmable irrigation times (for short cycles), etc. will be used. Such common areas will be maintained by the HOA.

Roof Runoff Controls

All roof runoff will be collected and directed to splash blocks then on to grass or landscaping before discharge to an area drain system. The area drain system will be directed to the treatment system on site.

Title 22 CC&R Compliance

The HOA will comply with this Regulation as part of the development's CC&Rs. CC&Rs will be prepared as a separate document and reviewed by the City's Attorney.

Uniform Fire Code Implementation

The HOA will comply with this Code as part of the development’s CC&Rs. CC&Rs will be prepared as a separate document and reviewed by the City’s Attorney.

Employee Training

A training program will be established as it would apply to future employees, contractors, and homeowners of the HOA to inform and train in maintenance activities regarding the impact of dumping oil, paints, solvents, or other potentially harmful chemicals into storm drains; the proper use of fertilizers and pesticides in landscaping maintenance practices; and the impacts of littering and improper water disposal.

The HOA (or a hired firm) will conduct the training program which will include targeted training sessions with specific construction disciplines (landscaping, concrete finishers, painters, etc.). See Appendix F for examples of educational materials that will be provided to the Employees.

The project’s CC&Rs will include provisions for future employee training programs conducted on a yearly based prior to the rainy season.

I. Structural BMPs

Structural BMPs shall be installed by the developer, through the construction and development of the project, for instance; landscaping and irrigation systems shall be designed by licensed landscape architects and installed by qualified contractors to specifications and standards of the City of Redondo Beach. The structural BMPs used for this project are summarized below:

Expected pollutants associated with this development include vehicle discharge fluids, landscaping materials and waste, litter, and pet waste. To mitigate these pollutants, the structural best management practices summarized in Table-2 are proposed.

Table-2: Design BMPs

<u>BMP</u>	<u>TECHNIQUE</u>	<u>INCLUDED?</u>		<u>BRIEF DESCRIPTION OF METHOD</u>
		<u>YES</u>	<u>YES</u>	
SD-10	Minimize Impervious Area/Maximize Permeability (C-Factor Reduction)	X		We have incorporated landscape areas wherever possible within the project site. See Appendix B for details.
	Minimize Directly Connected Impervious Areas (DCIAs) (C-Factor Reduction)	X		We minimize DCIAs by limiting sidewalks and parking areas to the minimum necessary for proper use. Stepping stones are used in areas with minimal foot traffic.

BMP	TECHNIQUE	INCLUDED?		BRIEF DESCRIPTION OF METHOD
		YES	YES	
	Create Reduced or “Zero Discharge” Areas (Runoff Volume Reduction)	X		The entire SWQDv will be retained onsite through infiltration.

Table-3: Treatment BMPs

BMP	NAME	INCLUDED?		IF NOT APPLICABLE, PROVIDE BRIEF REASON
		YES	NO	
VEG-1	Green Roof		X	
VEG-2	Stormwater Planter		X	
VEG-3	Tree-Well Filter		X	
VEG-4	Vegetated Swale		X	Space not available for BMP
VEG-5	Vegetated Filter Strip		X	Space not available for BMP
MP-40	Media Filter		X	Alternative BMP selected
MP-52	Drain Inserts	X		Oldcastle Flogard Catch Basin Insert Filters will be utilized at each proposed catch basin
T-1	Sand Filter		X	Space not available for BMP
T-2	Constructed Wetland		X	This is not a wetland area/ development.
T-3	Extended Detention Basin		X	Space not available for BMP
T-4	Wet Pond		X	This is not a wetland area/ development
T-5	Permeable Pavement with an Underdrain		X	This is not a wetland area/ development.
T-6	Proprietary Treatment Control Measures		X	Space not available for BMP
RET-1	Bioretention		X	
RET-2	Infiltration Basin		X	Alternative BMP utilized
RET-3	Infiltration Trench		X	Alternative BMP utilized
RET-4	Dry-Well	X		Maxwell Plus Drywell systems will be utilized onsite to infiltrate the SWQDV.

RET-5	Permeable Pavement without an Underdrain		X	Space not available for BMP, Infiltration has been determined infeasible – Refer to Appendix H for site percolation testing results.
TC-40	Media Filter		X	Alternative BMP utilized
BIO-1	Biofiltration		X	Alternative BMP utilized

Drainage Management Area (DMA)	Size (ac)	Storm Water Quality Design Volume (SWQDv) (cf)	System Detention Capacity (cf)	Treatment Capacity over 72 hrs (cf)
1	1.56	3,294	3,337	7,017
Total	1.56	3,294	3,337	7,017

The proposed Lot One will generate a Storm Water Quality Design Volume (SWQDv) of approximately 3,294 cubic feet. Stormwater runoff will be collected and conveyed to a proposed Maxwell Plus Drywell system working in conjunction with proposed detention storm drain pipe that have a detention capacity of 3,337 cf and provide approximately 7,017 cf of infiltrated volume over 72 hours. The Infiltration/ Detention System as designed will provide more than enough treatment and storage capacity for the site.

The proposed Maxwell Plus Drywell systems will be installed within the proposed private drive aisle (refer to Figure 3). Drainage from roof tops and landscape areas will be collected through area drains and piped to the proposed storm drain line which will convey low flows to the proposed infiltration systems. Runoff is filtered and treated through engineered soil media, and all catch basins will be equipped with Oldcastle Flogard Catch Basin Insert Filters for pretreatment of pollutants of concern.

Biofiltration

The project does not propose biofiltration because the entire SWQDv will be retained onsite and will infiltrate within 72 hours.

Catch Basin Inspection

The HOA will maintain the drainage systems, including catch basins and culverts. The HOA is required to have catch basins inspected and, if necessary, cleaned prior to the storm season, no later than October 15th each year or prior to the first 24-hour storm event, whichever occurs first. These duties may be contracted out to the landscape maintenance firm hired by the HOA. Please see Appendix E for maintenance program. Refer to Appendix G for the Operation and Maintenance Plan.

Runoff-Minimizing Landscape Design

As part of the design of all common area landscape areas, similar planting material with similar water requirements will be used in order to reduce excess irrigation runoff and promote surface filtration. Such common areas will be maintained by the HOA.

Community Car Wash Racks

No community car wash rack or area will be provided, therefore, washing of vehicles by residents on the property will not be allowed per the CC&Rs.

Wash Water Controls for Food Preparation Areas

A sign will be posted indicating that discharge of wash water to the municipal storm drain system is prohibited. All wash water should be disposed of to the sanitary sewer system. Restrictions will be enforced per the CC&Rs.

Self-Contained Washing

Self-contained washing of vehicles by residents or owners on the property will not be allowed per the CC&Rs.

Outdoor Material Storage Areas

Outdoor material storage areas refer to storage areas or storage facilities solely for the storage of materials. Improper storage of materials outdoors may provide an opportunity for toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to enter the storm water conveyance system. Outdoor Storage by residents or owners on the property will not be allowed per the CC&Rs.

J. BMP Maintenance, Inspection, and Repair

Inspections will be conducted as follows:

- Annually and prior to the start of the rainy season
- Every (1) month during rainy season
- At any other time(s) or intervals of time specified in the contract documents

Repairs and/ or maintenance procedures shall be carried out at the soonest possible time.

K. Inspection, Maintenance, and Responsibility for BMPs

Table-4 and Table-5 show the lists of the post-construction BMPs (routine non-structural and structural), the required ongoing maintenance, the inspection and maintenance frequency, the inspection criteria, and the entity or party responsible for implementation, maintenance, and/or inspection.

Table-4: Non-Structural BMP Maintenance Responsibility/Frequency Matrix

BMP	RESPONSIBILITY	FREQUENCY
Homeowner/ Business owner Education, Activity Restrictions	HOA will provide educational materials. Those materials and responsibilities must be passed onto subsequent property owners.	Continuous. CC&Rs to be provided to homeowners at the time they purchase the property and updates provided by the HOA as they occur.

BMP	RESPONSIBILITY	FREQUENCY
Common Area Landscape Management	HOA will appoint a landscape maintenance contractor	Monthly during regular maintenance and use with management guidelines for use of fertilizers and pesticides.
Parking Areas and Drives Management	HOA will appoint a landscape maintenance contractor	The Drives Aisles are to be swept on a routine scheduled basis to facilitate the pickup of trash and debris (plant or otherwise) and to remove excessive oil, grease and build-up. During sweeping, debris is to be removed from the parking areas and drives and then scrubbed and rinsed. This sweeping schedule will be at a minimum occurrence of once a week and as necessary to rid / reduce active pollutants from the pavement areas. This maintenance requirement will be listed in the Convent, Conditions and Restrictions (CC&Rs) of this project. These CC&Rs will be recorded to the property at the County Recorder's Office and be included on the final Title report of these properties.
Litter Control by Sweeping	HOA will appoint a landscape maintenance contractor.	Weekly inspection of trash receptacles to ensure that lids are closed and pick up any excess trash on the ground, noting trash disposal violations to the HOA for remediation.
Employee Training	HOA will appoint a landscape contractor after construction.	Monthly for maintenance personnel and employees to include the educational materials contained in the approved LID.
Common Area Catch Basin Inspection & Cleaning	HOA will appoint a landscape maintenance contractor for common areas and storm drain facilities.	Inspect basins once a month. Clean debris and silt in bottom of catch basins as needed. Intensified on or about October 15th each year or prior to the first 24-hour storm event, whichever occurs first. Refer to Appendix E.

Table-5: Structural BMP Maintenance Responsibility/ Frequency Matrix

BMP	RESPONSIBILITY	FREQUENCY
Common Area Efficient Irrigation	HOA will appoint a landscape contractor after construction	Once a week, in conjunction with maintenance activities. Verify that runoff minimizing landscape design continues to function by checking that water sensors are functioning properly, that irrigation

BMP	RESPONSIBILITY	FREQUENCY
		heads are adjusted properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather and day or night time temperatures.
Common Area Runoff Efficient Landscape Design	HOA will appoint a landscaping contractor	Once a week in conjunction with maintenance activities and prior to finalizing any replanting schemes. Verify that plants continue to be grouped according to similar water requirements in order to reduce excess irrigation runoff.
Oldcastle Flogard Catch Basin Insert Filters	HOA	Inspection three times per year, at minimum or per manufacturer’s specifications. Replacement of filter once per year, prior to start of rainy season (October 1 st). Repair and/ or replacement of components as needed. Clean and remove all debris within basins at least once per month.
Maxwell Plus Drywell Systems	HOA	HOA to provide maintenance of drywell systems as suggested by the manufacturer. Remove trash debris, sediment accumulation and any standing water within chambers after storm events. Regular maintenance once per week and month inspection to determine deficiencies and/ or damage.
ADS Detention Piping	HOA	HOA to conduct regular inspections and schedule cleanings. Inspections should occur at least once per year and after major rain events. Cleanings should be conducted at the inspector’s discretion.

L. Operation/Maintenance Funding after Project Completion

The post-construction BMPs as described above will be funded and maintained by:

Patrick Chien
Tel: (949) 258-7542
City Ventures Homebuilding, LLC
3121 Michelson Drive, Suite 150
Irvine, CA 92612

Maintenance and requirements of the maintenance for the properties will be listed in the Convent, Conditions and Restrictions (CC&Rs) of this project and will be the responsibility of the property owner at all times. These CC&Rs will be recorded to the property at the County Recorder’s Office and be included on the Title report of these properties.

Figure -1:
Project Vicinity Map





VICINITY MAP
NTS

Figure -2:
Project Location Map

TTM 84401
Location Map
122-126 N. Pacific Coast Highway
Redondo Beach, Ca 90278

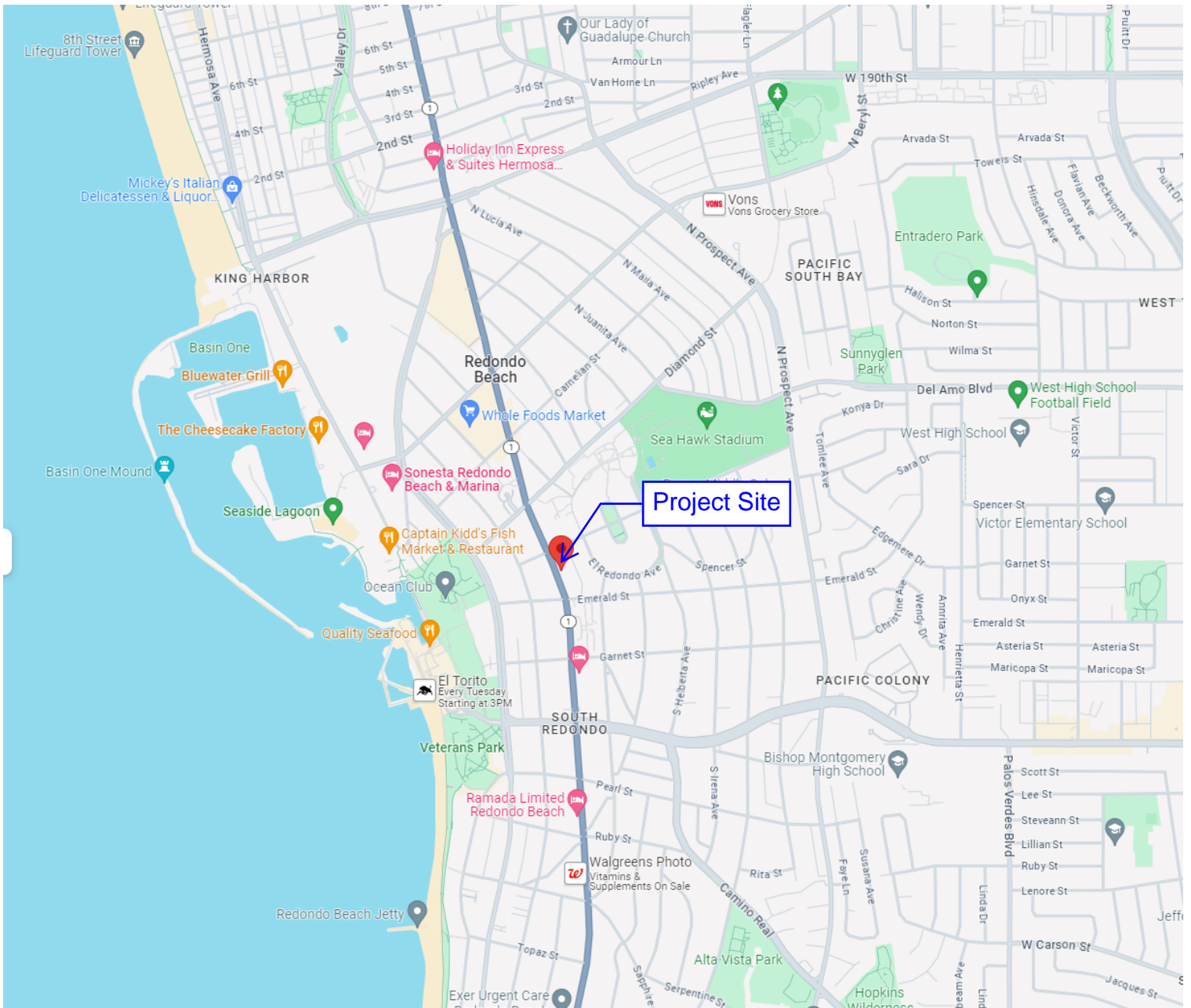
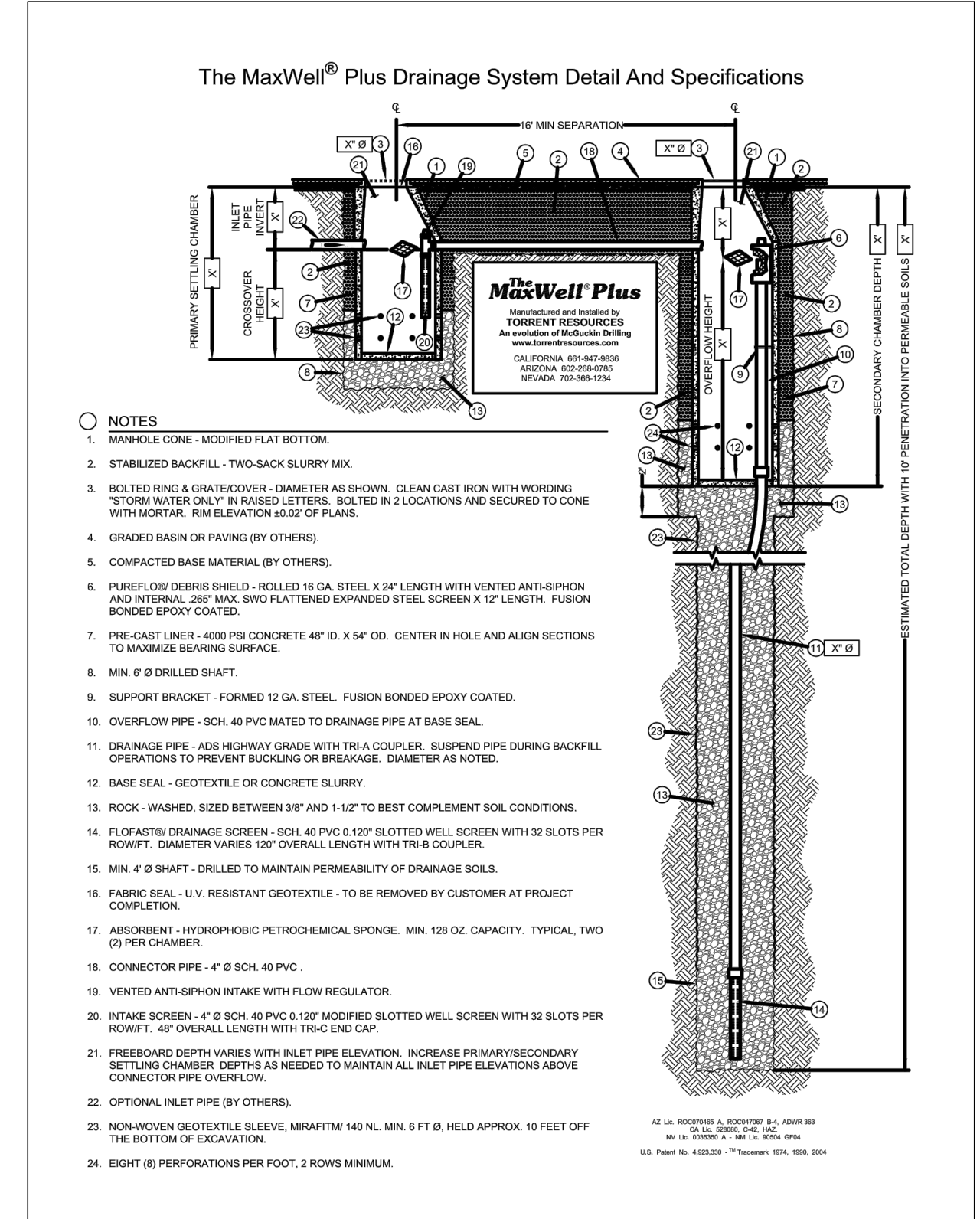
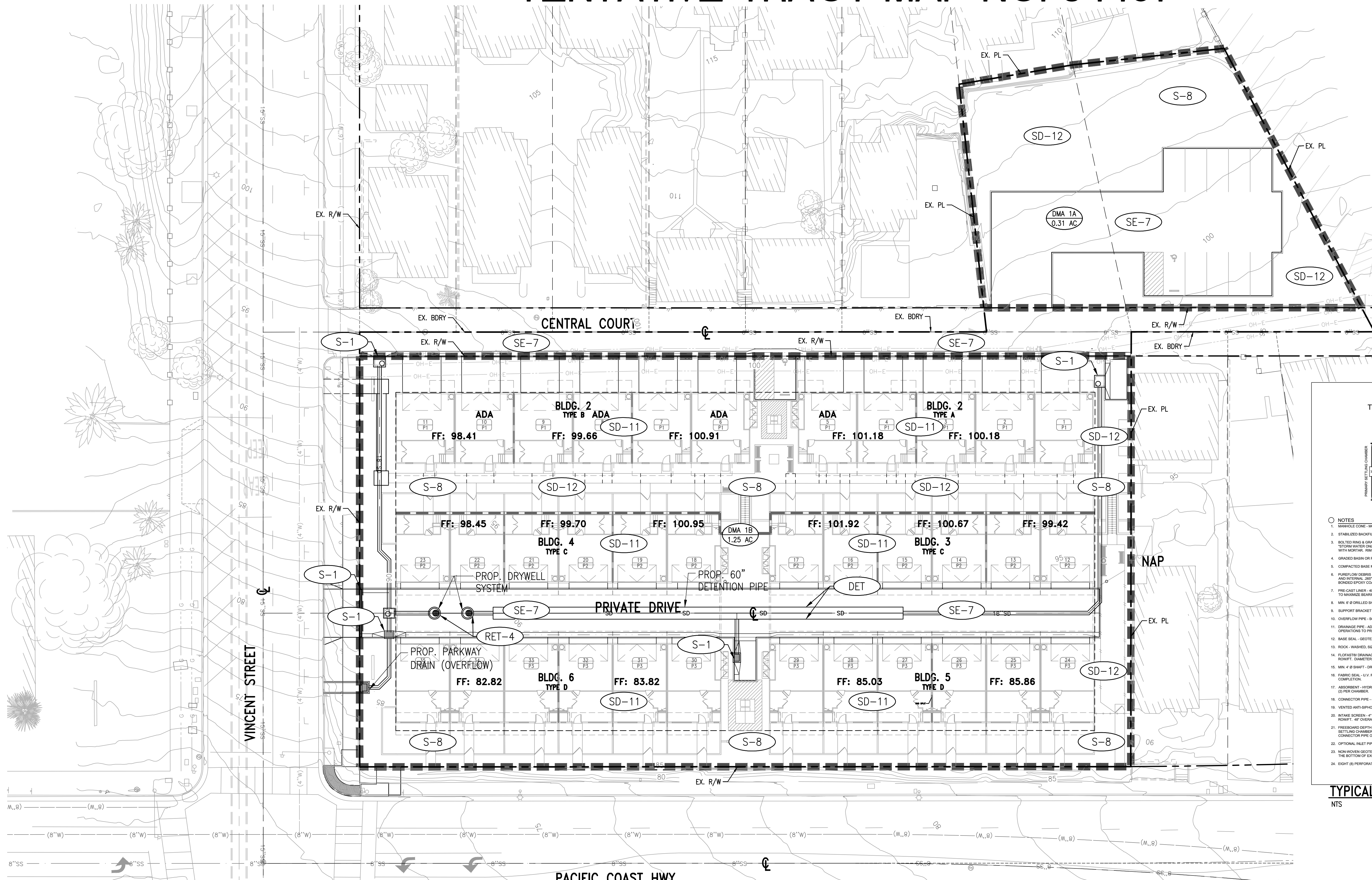


Figure -3:
Preliminary DMA Exhibit

PRELIMINARY LOW IMPACT DEVELOPMENT EXHIBIT TENTATIVE TRACT MAP NO. 84401

- LEGEND**
- EXISTING RIGHT-OF-WAY/ BOUNDARY
 - - - PROPOSED RIGHT-OF-WAY/ BOUNDARY
 - ▬▬▬ DRAINAGE MANAGEMENT AREA (DMA)
 - ▬▬▬ EXISTING STORM DRAIN
 - ▬▬▬ PROPOSED STORM DRAIN
 - DRAINAGE FLOW ARROWS
 - PROPOSED DRYWELL INFILTRATION SYSTEM
 - PROPOSED CATCH BASIN
 - DMA X
X.XX AC DRAINAGE MANAGEMENT AREA (DMA)

- BEST MANGEMENT PRACTICES (BMPs)**
- S-8 SITE DESIGN & LANDSCAPE PLANNING
 - SD-11 ROOF RUNOFF CONTROLS
 - SD-12 EFFICIENT IRRIGATION
 - S-1 STORM DRAIN SIGNAGE
 - SE-7 STREET SWEEPING & VACUUMING
 - RET-3 DRYWELL INFILTRATION SYSTEM
 - DET UNDERGROUND DETENTION SYSTEM



TYPICAL DRYWELL INFILTRATION SYSTEM DETAIL
NTS

1" = 20'

PREPARED BY:

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IRVINE, CA 92612
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CITY OF REDONDO BEACH
DEPARTMENT OF PLANNING AND DEVELOPMENT

TENTATIVE TRACT MAP NO. 84401

PRELIMINARY LID EXHIBIT
REDONDO BEACH 1
122-126 N. PACIFIC COAST HIGHWAY
REDONDO BEACH, CALIFORNIA

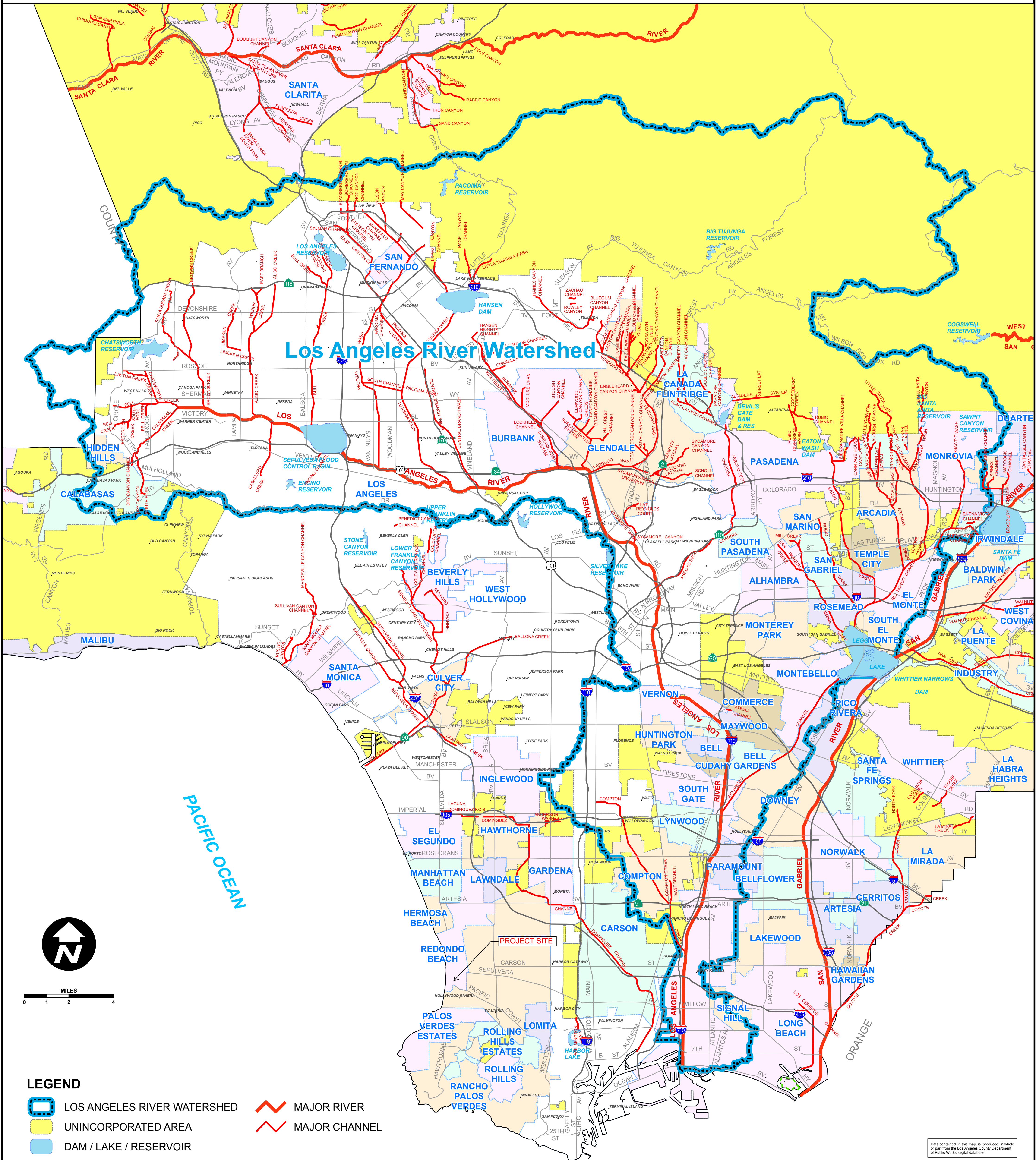
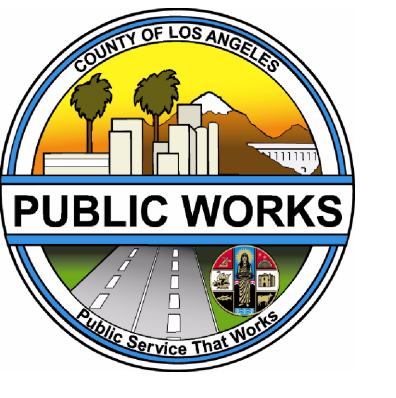
PROJECT NO. CVEN-167
SHEET 1 OF 1
DATE: 1/7/2024

Figure -4:
Impaired Waters

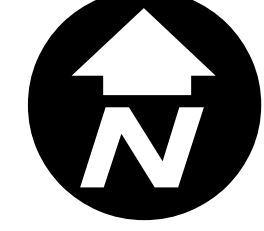


COUNTY OF LOS ANGELES

LOS ANGELES RIVER WATERSHED



PACIFIC OCEAN



0 1 2 4
MILES

- LEGEND**
- LOS ANGELES RIVER WATERSHED
 - UNINCORPORATED AREA
 - DAM / LAKE / RESERVOIR
 - MAJOR RIVER
 - MAJOR CHANNEL

Data contained in this map is produced in whole or part from the Los Angeles County Department of Public Works' digital database.

Appendix A:
Volume and Flow Rate Calculations & Hydrologic Report

Per the Geotechnical Investigation Report dated June 15, 2023, the percolation test results yielded infiltration rates of 5.1 inches/hour and 7.7 inches/hour for the site. For conservative purposes, 5.1 inches/hour was utilized for infiltration sizing calculations for both DMAs. After applying a minimum Factor of Safety of 3, the infiltration rate to be used for design is 1.7 inches/hour.

DMA 1

Infiltration Calculations:

$A = 1.56 \text{ ac}$

$\% \text{ Imp} = 85\%$

$V_{85\text{th Percentile}} = 3,075 \text{ cf}$

$V_{0.75 \text{ inch}} = \mathbf{3,294 \text{ cf}} \checkmark$

One Dual Drywell Chamber Systems:

1. 20' Primary Settling Chamber at 4' diameter
2. 20' Overflow Chamber at 4' diameter and 15' Drywell at 6' diameter (effective depth = 35')

$V_{\text{Settling}} = \pi(2^2)(20) = 251 \text{ cf}$

$V_{\text{Overflow}} = \pi(2^2)(20) = 251 \text{ cf}$

$V_{\text{Drywell}} = \pi(3^2)(15) = 170 \text{ cf}$, where void ratio, n is 0.40

$\Sigma \text{Storage Volume per Drywell System} = 251 \text{ cf} + 251 \text{ cf} + 170 \text{ cf} = 672 \text{ cf}$

Infiltration Chamber Depth, d (ft) = 15'

$V_{\text{INFILTRATED-72 hrs}} = (\text{Infiltration Surface Area, sf})(K_{\text{design, in/hr}})(T, \text{hr})(1\text{ft}/12\text{in})$

Where $T = 72$ hour drawdown time

$V_{\text{INFILTRATED-72 hrs}} = (1 \text{ ft}/12 \text{ in})(1.7 \text{ in/hr})(688 \text{ sf})(72 \text{ hrs}) = \mathbf{7,017 \text{ cf}} > \mathbf{SWQDV = 3,294 \text{ cf}} \checkmark$

Storage Calculations:

Required Amount of Storage in Detention Pipe = SWQDV-Drywell System Storage

$V_{\text{Storage}} = 3,294 - 672 = 2,622 \text{ cf}$

170 lf of 60" HDPE pipe

$\text{Detention Pipes} = \pi(2.5^2)(160) = 3,337 \text{ cf} > 2,622 \text{ cf} \checkmark$

Refer to Geotechnical Investigation Report dated June 15, 2023, located within Appendix H of this report for percolation results.

Refer to Appendix B of this report for additional BMP information.

Peak Flow Hydrologic Analysis

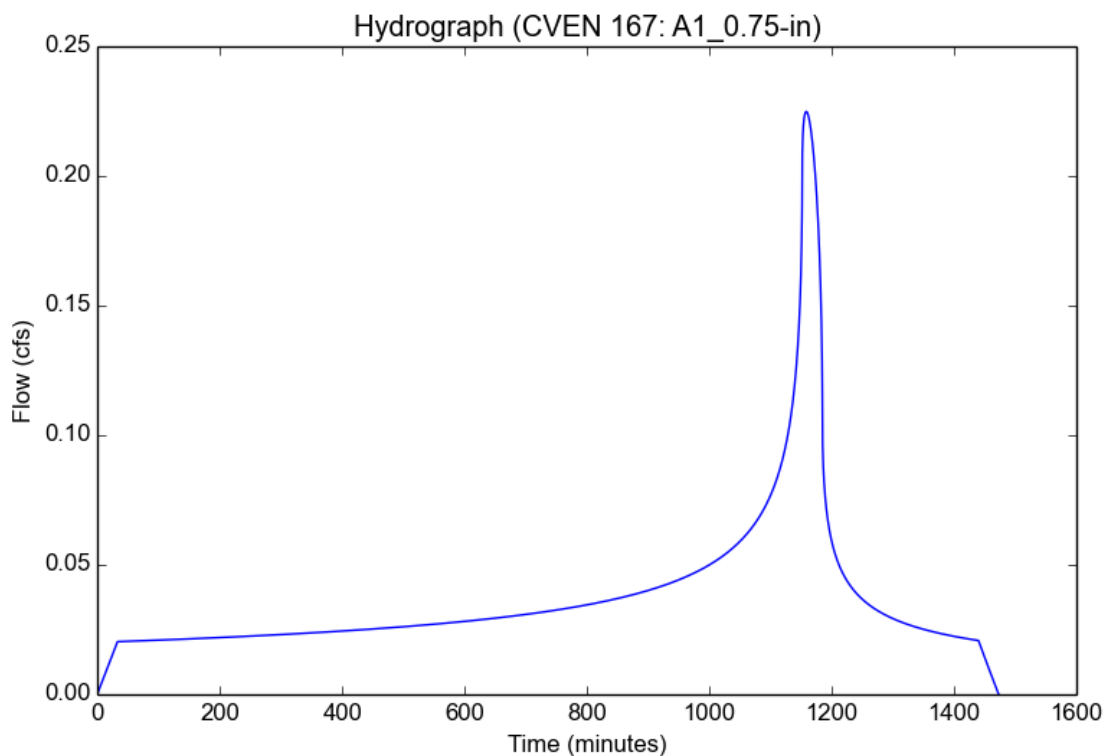
File location: C:/Users/smcmasters/OneDrive - C & V Consulting/Desktop/CVEN 167 - A1_0.75-in.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	CVEN 167
Subarea ID	A1_0.75-in
Area (ac)	1.564
Flow Path Length (ft)	550.0
Flow Path Slope (vft/hft)	0.01
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.85
Soil Type	10
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1843
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.78
Time of Concentration (min)	33.0
Clear Peak Flow Rate (cfs)	0.2249
Burned Peak Flow Rate (cfs)	0.2249
24-Hr Clear Runoff Volume (ac-ft)	0.0756
24-Hr Clear Runoff Volume (cu-ft)	3293.8298



Peak Flow Hydrologic Analysis

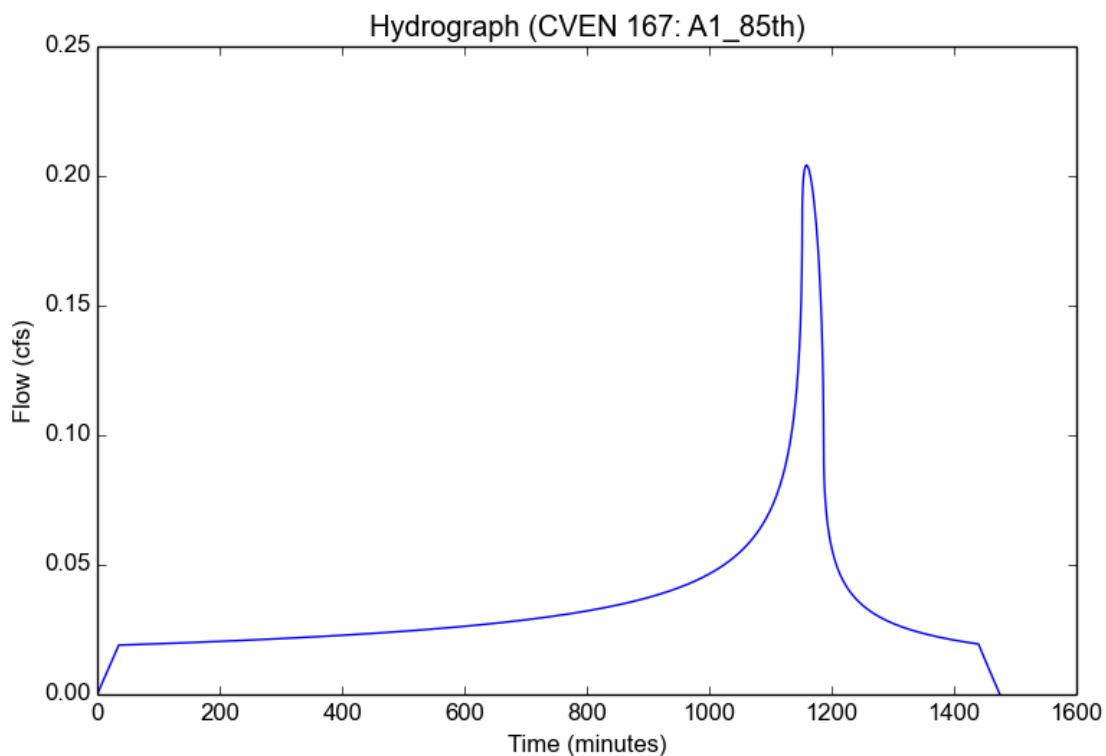
File location: P:/C/CVEN-167/Admin/Reports/LID/Preliminary/_Appendix A - Calculations/CVEN 167 - A1_85th.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	CVEN 167
Subarea ID	A1_85th
Area (ac)	1.564
Flow Path Length (ft)	550.0
Flow Path Slope (vft/hft)	0.01
85th Percentile Rainfall Depth (in)	0.7
Percent Impervious	0.85
Soil Type	10
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.7
Peak Intensity (in/hr)	0.1673
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.78
Time of Concentration (min)	35.0
Clear Peak Flow Rate (cfs)	0.2041
Burned Peak Flow Rate (cfs)	0.2041
24-Hr Clear Runoff Volume (ac-ft)	0.0706
24-Hr Clear Runoff Volume (cu-ft)	3074.2466



Appendix B:
Site BMPs

S-1: Storm Drain Message and Signage

Purpose

Waste material dumped into storm drain inlets can adversely impact surface and ground waters. In fact, any material discharged into the storm drain system has the potential to significantly impact downstream receiving waters. Storm drain messages have become a popular method of alerting and reminding the public about the effects of and the prohibitions against waste disposal into the storm drain system. The signs are typically stenciled or affixed near the storm drain inlet or catch basin. The message simply informs the public that dumping of wastes into storm drain inlets is prohibited and/or that the drain ultimately discharges into receiving waters.

General Guidance

- The signs must be placed so they are easily visible to the public.
- Be aware that signs placed on sidewalk will be worn by foot traffic.

Design Specifications

- Signs with language and/or graphical icons that prohibit illegal dumping, must be posted at designated public access points along channels and streams within the project area. Consult with Los Angeles County Department of Public Works (LACDPW) staff to determine specific signage requirements for channels and streams.
- Storm drain message markers, placards, concrete stamps, or stenciled language/icons (e.g., “No Dumping – Drains to the Ocean”) are required at all storm drain inlets and catch basins within the project area to discourage illegal or inadvertent dumping. Signs should be placed in clear sight facing anyone approaching the storm drain inlet or catch basin from either side (see Figure D-1 and Figure D-2). LACDPW staff should be contacted to determine specific requirements for types of signs and methods of application. A stencil can be purchased for a nominal fee from LACDPW Building and Safety Office by calling (626) 458-3171. All storm drain inlet and catch basin locations must be identified on the project site map.

Maintenance Requirements

Legibility and visibility of markers and signs should be maintained (e.g., signs should be repainted or replaced as necessary). If required by LACDPW, the owner/operator or homeowner’s association shall enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards and signs.

S-1: Storm Drain Message and Signage

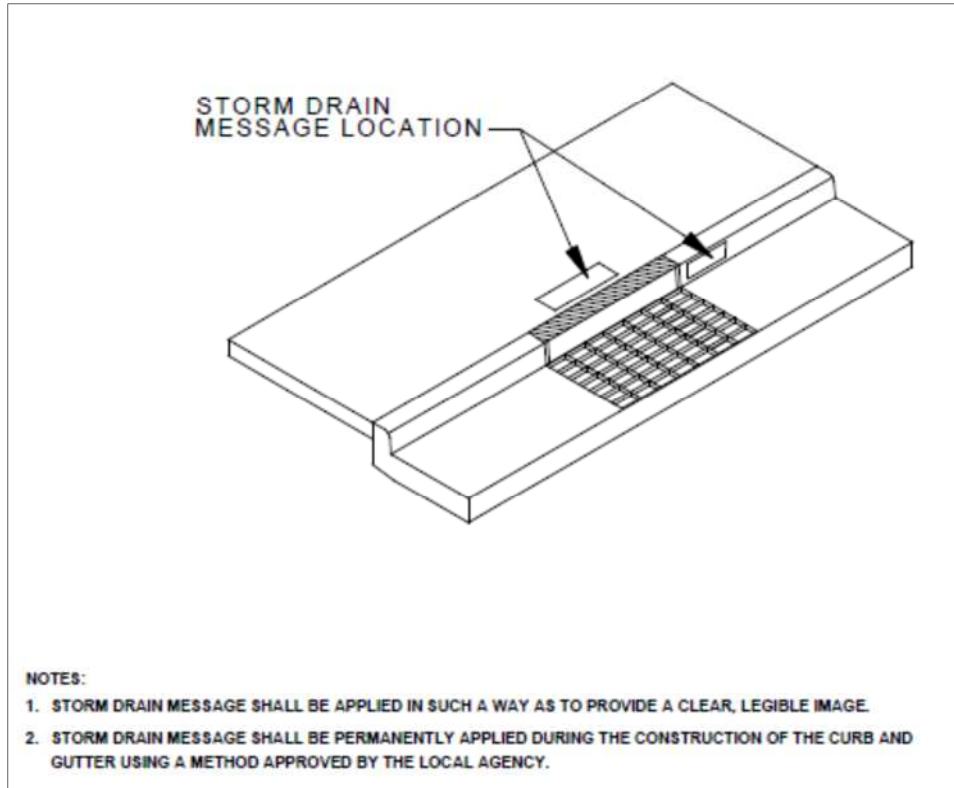


Figure D-1. Storm Drain Message Location – Curb Type Inlet

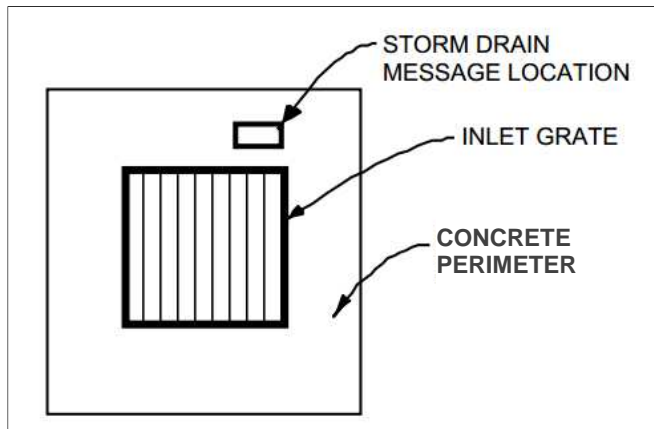


Figure D-2. Storm Drain Message Location – Catch Basin/Area Type Inlet

S-3: Outdoor Trash Storage and Waste Handling Area

Purpose

Stormwater runoff from areas where trash is stored or handled can be polluted. Loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or receiving waters. Waste handling operations (i.e., dumpsters, litter control, waste piles) may be sources of stormwater pollution.

Design Specifications

Wastes from commercial and industrial sites are typically hauled away for disposal by either public or commercial carriers that may have design or access requirements for waste storage areas. Design specifications for waste handling areas are regulated by local building and fire codes and by current County ordinances and zoning requirements. The design specifications, listed below in Table D-3, are recommendations and are not intended to conflict with requirements established by the waste hauler. The design specifications are intended to enhance local codes and ordinances while addressing stormwater runoff concerns. The waste hauler should be contacted prior to the design of trash storage and collection areas to determine established and accepted guidelines for designing trash collection areas. All hazardous waste must be handled in accordance with the legal requirements established in Title 22 of the California Code of Regulations. Conflicts or issues should be discussed with LACDPW staff.

Table D-3. Design Specifications for Outdoor Trash Storage and Waste Handling Area

Design Feature	Design Specifications
Surfacing	<ul style="list-style-type: none"> • Construct/pave outdoor trash storage and waste handling area with Portland cement concrete or an equivalent impervious surface.
Screens/Covers	<ul style="list-style-type: none"> • Install a screen or wall around trash storage area to prevent off-site transport of loose trash. • Use lined bins or dumpsters to reduce leaking of liquid wastes. • Use waterproof lids on bins/dumpsters or provide a roof to cover storage area enclosure (LACDPW discretion) to prevent precipitation from entering containers.
Grading/Drainage	<ul style="list-style-type: none"> • Berm and/or grade waste handling area to prevent stormwater run-on. • Locate waste handling area at least 35 feet from storm drains. • Divert drainage from adjoining roofs and pavement away from adjacent trash storage areas.
Signs	<ul style="list-style-type: none"> • Post signs on all dumpsters and/or inside enclosures prohibiting disposal of liquids and hazardous materials in accordance with any waste disposal ordinance.

S-3: Outdoor Trash Storage and Waste Handling Area

Accumulated Water

Stormwater runoff, non-stormwater runoff, and spills will accumulate in containment areas and sumps with impervious surfaces. Contaminated accumulated water must be disposed of in accordance with applicable laws and regulations, and cannot be discharged directly to the storm drain or sanitary sewer system without appropriate permitting. Contact LACDPW (1-888-CLEAN-LA) for information regarding discharge of contaminated accumulated water.

Maintenance Requirements

The integrity of structural elements that are subject to damage (e.g., screens, covers, signs) must be maintained by the owner/operator as required by local codes and ordinances. Outdoor trash storage and waste handling areas must be checked periodically to ensure containment of accumulated water and prevention of stormwater run-on. Maintenance agreements between LACDPW and the owner/operator may be required. Failure to properly maintain building and property may subject the property owner to citation.

S-8: Landscape Irrigation Practices

Purpose

Irrigation runoff provides a pathway for pollutants (i.e., nutrients, bacteria, organics, sediment) to enter the storm drain system. By effectively irrigating, less runoff is produced resulting in less potential for pollutants to enter the storm drain system.

General Guidance

- Do not allow irrigation runoff from the landscaped area to drain directly to storm drain system.
- Minimize use of fertilizer, pesticides, and herbicides on landscaped areas.
- Plan sites with sufficient landscaped area and dispersal capacity (e.g., ability to receive irrigation water without generating runoff).
- Consult a landscape professional regarding appropriate plants, fertilizer, mulching applications, and irrigation requirements (if any) to ensure healthy vegetation growth.

Design Specifications

- Choose plants that minimize the need for fertilizer and pesticides.
- Group plants with similar water requirements and water accordingly.
- Use mulch to minimize evaporation and erosion.
- Include a vegetative boundary around project site to act as a filter.
- Design the irrigation system to only water areas that need it.
- Install an approved subsurface drip, pop-up, or other irrigation system.¹ The irrigation system should employ effective energy dissipation and uniform flow spreading methods to prevent erosion and facilitate efficient dispersion.
- Install rain sensors to shut off the irrigation system during and after storm events.
- Include pressure sensors to shut off flow-through system in case of sudden pressure drop. A sudden pressure drop may indicate a broken irrigation head or water line.
- If the hydraulic conductivity in the soil is not sufficient for the necessary water application rate, implement soil amendments to avoid potential geotechnical hazards (i.e., liquefaction, landslide, collapsible soils, and expansive soils).

¹ If alternative distribution systems (e.g., spray irrigation) are approved, the County will establish guidelines to implement these new systems.

S-8: Landscape Irrigation Practices

- For sites located on or within 50 feet of a steep slope (15% or greater), do not irrigate landscape within three days of a storm event to avoid potential geotechnical instability.²
- Implement Integrated Pest Management practices.

For additional guidelines and requirements, refer to the Los Angeles County Department of Health Services.

Maintenance Requirements

Maintain irrigation areas to remove trash and debris and loose vegetation. Rehabilitate areas of bare soil. If a rain or pressure sensor is installed, it should be checked periodically to ensure proper function. Inspect and maintain irrigation equipment and components to ensure proper functionality. Clean equipment as necessary to prevent algae growth and vector breeding. Maintenance agreements between LACDPW and the owner/operator may be required. Failure to properly maintain building and property may subject the property owner to citation.

² As determined by the City of Los Angeles, Building and Safety Division

Site Design & Landscape Planning SD-10



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.



SD-10 Site Design & Landscape Planning

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

Site Design & Landscape Planning SD-10

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

SD-10 Site Design & Landscape Planning

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



Rain Garden

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain



barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say 1/4 to 1/2 inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Supplemental Information

Examples

- City of Ottawa’s Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, “Low-Impact Development”, January/February 2003.
www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD.
www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.



- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
 - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
 - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
 - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
 - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of “redevelopment” must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under “designing new installations” above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING



– DRAINS TO OCEAN” and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define “redevelopment” in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of “redevelopment”, then the requirements stated under “designing new installations” above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner’s association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.



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.

Objectives

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None



SE-7 Street Sweeping and Vacuuming

- 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 yd³ hopper) to \$88/hour (9 yd³ 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 prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- 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.

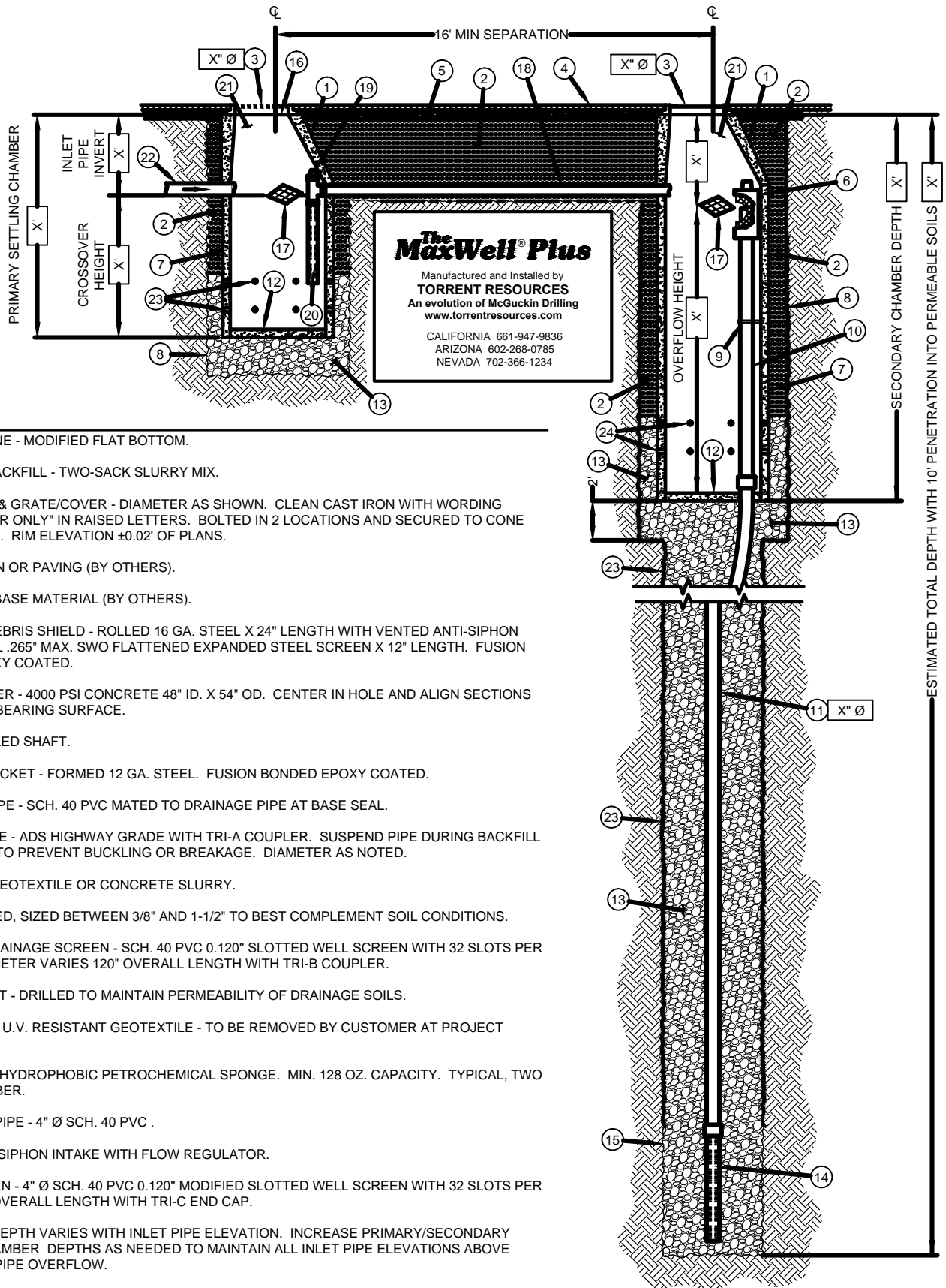
References

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.

Appendix C:
Maxwell Plus Drywell System

The MaxWell® Plus Drainage System Detail And Specifications

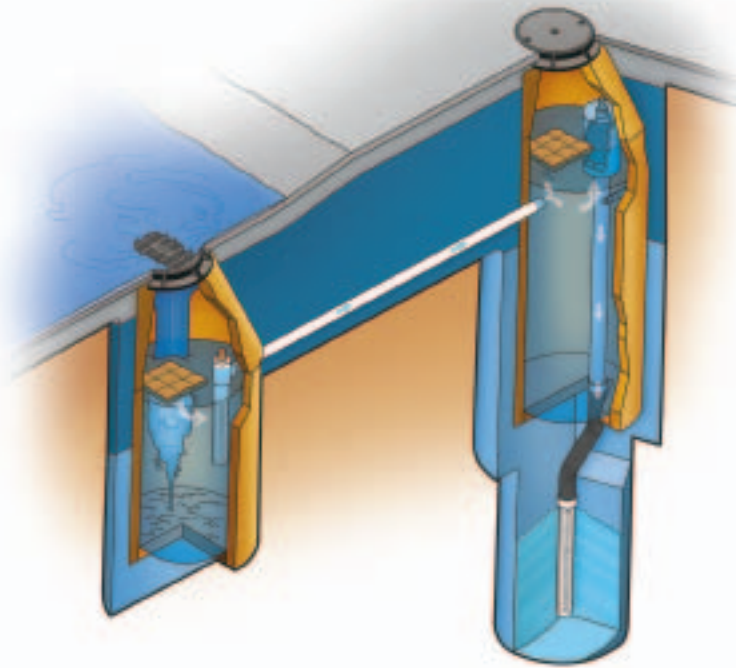


NOTES

1. MANHOLE CONE - MODIFIED FLAT BOTTOM.
2. STABILIZED BACKFILL - TWO-SACK SLURRY MIX.
3. BOLTED RING & GRATE/COVER - DIAMETER AS SHOWN. CLEAN CAST IRON WITH WORDING "STORM WATER ONLY" IN RAISED LETTERS. BOLTED IN 2 LOCATIONS AND SECURED TO CONE WITH MORTAR. RIM ELEVATION $\pm 0.02'$ OF PLANS.
4. GRADED BASIN OR PAVING (BY OTHERS).
5. COMPACTED BASE MATERIAL (BY OTHERS).
6. PUREFLO®/ DEBRIS SHIELD - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL .265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. FUSION BONDED EPOXY COATED.
7. PRE-CAST LINER - 4000 PSI CONCRETE 48" ID. X 54" OD. CENTER IN HOLE AND ALIGN SECTIONS TO MAXIMIZE BEARING SURFACE.
8. MIN. 6' Ø DRILLED SHAFT.
9. SUPPORT BRACKET - FORMED 12 GA. STEEL. FUSION BONDED EPOXY COATED.
10. OVERFLOW PIPE - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
11. DRAINAGE PIPE - ADS HIGHWAY GRADE WITH TRI-A COUPLER. SUSPEND PIPE DURING BACKFILL OPERATIONS TO PREVENT BUCKLING OR BREAKAGE. DIAMETER AS NOTED.
12. BASE SEAL - GEOTEXTILE OR CONCRETE SLURRY.
13. ROCK - WASHED, SIZED BETWEEN 3/8" AND 1-1/2" TO BEST COMPLEMENT SOIL CONDITIONS.
14. FLOFAST®/ DRAINAGE SCREEN - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. DIAMETER VARIES 120" OVERALL LENGTH WITH TRI-B COUPLER.
15. MIN. 4' Ø SHAFT - DRILLED TO MAINTAIN PERMEABILITY OF DRAINAGE SOILS.
16. FABRIC SEAL - U.V. RESISTANT GEOTEXTILE - TO BE REMOVED BY CUSTOMER AT PROJECT COMPLETION.
17. ABSORBENT - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, TWO (2) PER CHAMBER.
18. CONNECTOR PIPE - 4" Ø SCH. 40 PVC .
19. VENTED ANTI-SIPHON INTAKE WITH FLOW REGULATOR.
20. INTAKE SCREEN - 4" Ø SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. 48" OVERALL LENGTH WITH TRI-C END CAP.
21. FREEBOARD DEPTH VARIES WITH INLET PIPE ELEVATION. INCREASE PRIMARY/SECONDARY SETTLING CHAMBER DEPTHS AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE CONNECTOR PIPE OVERFLOW.
22. OPTIONAL INLET PIPE (BY OTHERS).
23. NON-WOVEN GEOTEXTILE SLEEVE, MIRAFITM/ 140 NL. MIN. 6 FT Ø, HELD APPROX. 10 FEET OFF THE BOTTOM OF EXCAVATION.
24. EIGHT (8) PERFORATIONS PER FOOT, 2 ROWS MINIMUM.

ESTIMATED TOTAL DEPTH WITH 10' PENETRATION INTO PERMEABLE SOILS

The **MaxWell™ Plus**, as manufactured and installed exclusively by Torrent Resources Incorporated, is the industry standard for draining large paved surfaces, nuisance water and other demanding applications. This patented system incorporates state-of-the-art pre-treatment technology.



THE ULTIMATE IN DESIGN

Since 1974, over 40,000 MaxWell™ Systems have proven their value as a cost-effective solution in a wide variety of drainage applications. They are accepted by state and municipal agencies and are a standard detail in numerous drainage manuals. Many municipalities have recognized the inherent benefits of the MaxWell Plus and now require it for drainage of all paved surfaces.

SUPERIOR PRE-TREATMENT

Industry research, together with Torrent Resource's own experience, has shown that initial storm drainage flows have the greatest impact on system performance. This "first flush" occurs during the first few minutes of runoff and carries the majority of sediment and debris. Larger paved surfaces or connecting pipes from catch basins, underground storage, etc. can also generate high peak flows which may strain system function. In addition, nuisance water flows require controlled processing separate from normal storm runoff demands.

In the **MaxWell Plus**, preliminary treatment is provided through collection and separation in deep large-volume settling chambers. The standard MaxWell Plus system has over 2,500 gallons of capacity to contain sediment and debris carried by incoming water. Floating trash, paper, pavement oil, etc. is effectively stopped by the **PureFlo™ Debris Shields** in each chamber. These shielding devices are equipped with an effective screen to filter suspended material and are vented to prevent siphoning of floating surface debris as the system drains.

EFFECTIVE PROCESSING

Incoming water from the surface grated inlets or connecting pipes is received in the Primary Settling Chamber where silt and other heavy particles settle to the bottom. A PureFlo™ Debris Shield ensures containment by trapping floating debris and pavement oil. The pre-treated flow is then regulated to a design rate of up to 0.25cfs and directed to a secondary settling chamber. The settling and containment process is repeated, thereby effectively achieving controlled, uniform treatment. The system is drained as water rises under the PureFlo Debris Shield and spills into the top of the overflow pipe. The drainage assembly returns the cleaned water to the surrounding soil through the **FloFast™ Drainage Screen**.

ABSORBENT TECHNOLOGY

To provide prompt removal of pavement oils, both **MaxWell Plus** settling chambers are equipped with absorbent sponges. These floating pillow-like devices are 100% water repellent and literally wick petrochemical compounds from the water. Each sponge has a capacity of over 128 ounces to accommodate effective, long-term treatment. The absorbent is completely inert and will safely remove runoff constituents down to rainbow sheens which are typically no more than one molecule thick.

SECURITY FEATURES

MaxWell Plus Systems include bolted, theft-resistance, cast iron gratings and covers as standard security features. Special inset castings which are resistant to loosening from accidental impact are available for use in landscaped applications. Machined mating surfaces and "Storm Water Only" wording are standard.

THE MAXWELL FIVE-YEAR WARRANTY

Innovative engineering, quality materials and exacting construction are standard with every MaxWell system produced and installed by Torrent Resources Incorporated. The MaxWell Drainage Systems Warranty is the best in the industry and guarantees against failures due to workmanship or materials for a period of five years from date of completion.

MAXWELL™ PLUS DRAINAGE SYSTEM DETAIL AND SPECIFICATIONS

CALCULATING MAXWELL PLUS REQUIREMENTS:

The type of property, soil permeability, rainfall intensity and local drainage ordinances determine the number and design of MaxWell Systems. For general applications draining retained storm water, use **one standard MaxWell Plus per the instructions below** for up to 5 acres of landscaped contributory area, and up to 2 acres of paved surface. To drain nuisance water flows in storm runoff systems, **add a remote inlet** to the System. For smaller drainage needs, refer to our **Type IV MaxWell**. For industrial drainage, our **Envibro™ System** may be recommended. For additional considerations, please refer to **"Design Suggestions For Retention And Drainage Systems"** or consult our Design Staff.

COMPLETING THE MAXWELL PLUS DRAWING

To apply the **MaxWell Plus** drawing to your specific project, simply fill in the blue boxes per the following instructions. For assistance, please consult our Design Staff.

PRIMARY SETTLING CHAMBER DEPTH

The overall depth of the Primary Settling Chamber is determined by the amount of surface area being drained. Use a standard depth of **10 feet** for the initial acre of contributory drainage area, **plus 2 feet** for each additional acre, up to the design limits of the property type noted in "Calculating MaxWell Plus Requirements" noted above. Other conditions that would require increased chamber depths are property usage, maintenance scheduling, and severe or unusual service conditions. Connecting Pipe Depth may dictate deeper chambers so as to maintain the effectiveness of the settling process.

ESTIMATED TOTAL DEPTH

The Estimated Total Depth is the approximate total system depth required to achieve 10 continuous feet of penetration into permeable soils, based upon known soil information. Torrent's specialized **"crowd"** equipped rigs get through the difficult cemented soils to reach clean drainage soils at depths up to **180 feet** and their extensive drilling log database is available to use as a reference.

SETTLING CHAMBER DEPTH

On **MaxWell Plus Systems** of over 30 feet overall depth and up to 0.25cfs design rate, the standard Settling Chamber Depth is **18 feet**.

OVERFLOW HEIGHT

The Overflow Height and Settling Chamber Depth determine the effectiveness of the settling process. The higher the overflow pipe, the deeper the chamber, the greater the settling capacity. An overflow height of **13 feet** is used with the standard settling chamber depth of **18 feet**.

DRAINAGE PIPE

This dimension also applies to the **PureFlo™** Debris Shields, the **FloFast™** Drainage Screen, and fittings. The size is based upon system design rates, multiple primary settling chambers, soil conditions, and need for adequate venting. Choices are 6", 8", or 12" diameter. Refer to our company's **"Design Suggestions for Retention and Drainage Systems"** for recommendations on which size best matches your application.

BOLTED RING & GRATE/COVER

Standard models are quality cast iron and available to fit 24" Ø or 30" Ø manhole openings. All units are bolted in two locations with wording "Storm Water Only" in raised letters. For other surface treatments, please refer to "Design Suggestions for Retention and Drainage Systems."

INLET PIPE INVERT

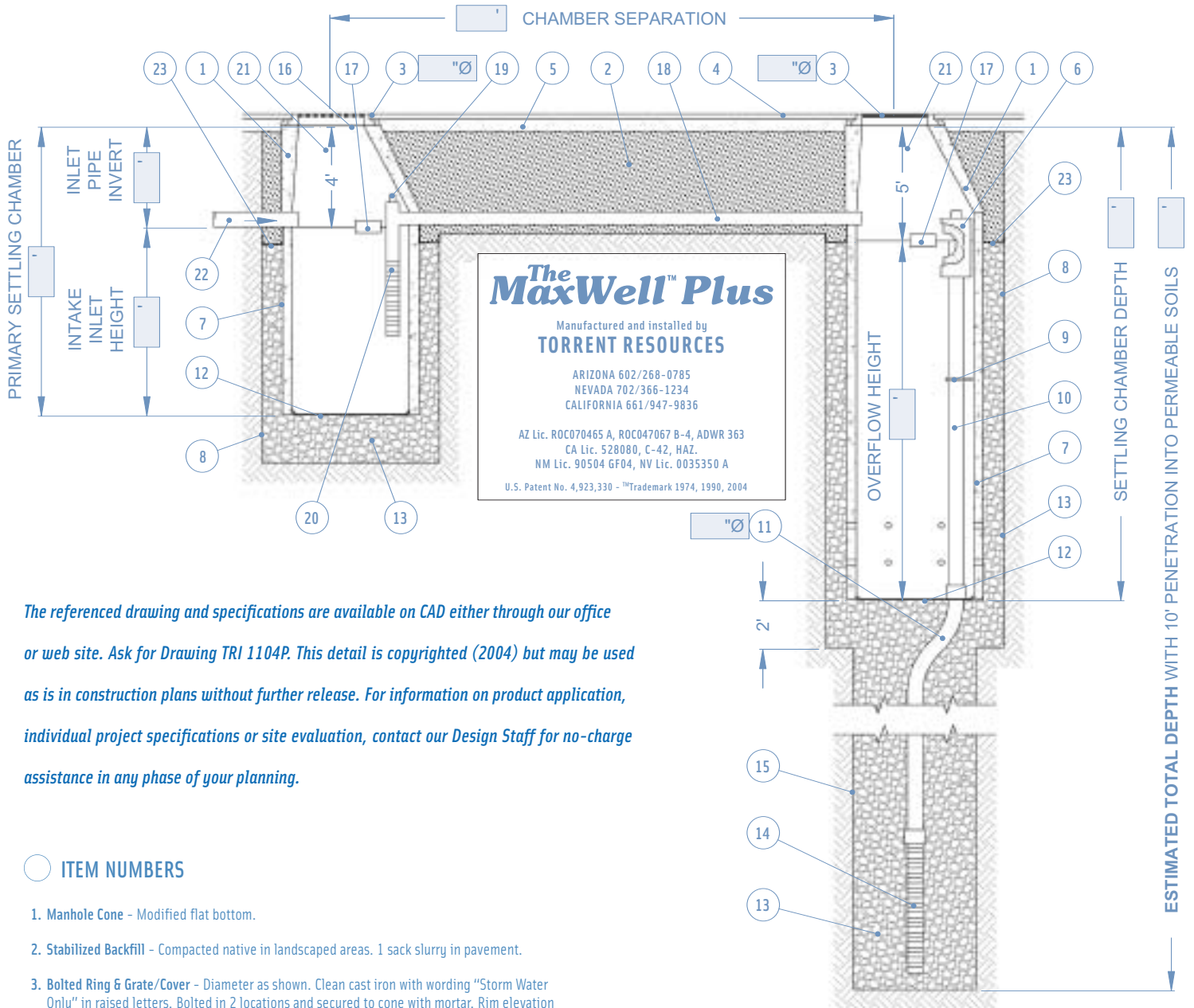
Pipes up to 24" in diameter from catch basins, underground storage, etc. may be connected into the primary settling chamber. Inverts deeper than 4 feet will require additional depth in both system settling chambers to maintain respective effective settling capacities.

INTAKE INLET HEIGHT

The Intake Inlet Height determines the effectiveness of the settling process in the Primary Settling Chamber. A minimum inlet height of **6 feet** is used with the standard primary settling chamber depth of 10 feet. Greater inlet heights would be required with increased system demands as noted in Primary Settling Chamber Depth.

CHAMBER SEPARATION

The standard separation between chambers is **15 feet** from center to center for inlet pipe inverts up to 7 feet. For deep inlet pipes or underground storage systems that result in a deeper Connector Pipe, add 5 feet of separation for each 3 feet of additional Connector Pipe depth. Maximum Connector Pipe depths and Chamber separations are 13 feet and 25 feet, respectively. A pump and lift station is recommended for systems with deeper requirements.



The referenced drawing and specifications are available on CAD either through our office or web site. Ask for Drawing TRI 1104P. This detail is copyrighted (2004) but may be used as is in construction plans without further release. For information on product application, individual project specifications or site evaluation, contact our Design Staff for no-charge assistance in any phase of your planning.

ITEM NUMBERS

- 1. Manhole Cone - Modified flat bottom.
- 2. Stabilized Backfill - Compacted native in landscaped areas. 1 sack slurry in pavement.
- 3. Bolted Ring & Grate/Cover - Diameter as shown. Clean cast iron with wording "Storm Water Only" in raised letters. Bolted in 2 locations and secured to cone with mortar. Rim elevation ±0.02' of plans.
- 4. Graded Basin or Paving (by Others).
- 5. Compacted Base Material (by Others).
- 6. PureFlo™ Debris Shield - Rolled 16 Ga. steel X 24" length with vented anti-siphon and internal .265" Max. SWO flattened expanded steel screen X 12" length. Fusion bonded epoxy coated.
- 7. Pre-cast Liner - 4000 PSI concrete 48" ID. X 54" OD. Center in hole and align sections to maximize bearing surface.
- 8. Min. 6' Ø Drilled Shaft.
- 9. Support Bracket - Formed 12 Ga. steel. Fusion bonded epoxy coated.
- 10. Overflow Pipe - Sch. 40 PVC mated to drainage pipe at base seal.
- 11. Drainage Pipe - ADS highway grade with TRI-A coupler. Suspend pipe during backfill operations to prevent buckling or breakage. Diameter as noted.
- 12. Base Seal - Geotextile, poly liner or concrete slurry.
- 13. Rock - Clean and washed, sized between 3/8" and 1-1/2" to best complement soil conditions.
- 14. FloFast™ Drainage Screen - Sch. 40 PVC 0.120" slotted well screen with 32 slots per row/ft. 96" overall length with TRI-B coupler.

- 15. Min. 4' Ø Shaft - Drilled to maintain permeability of drainage soils.
- 16. Fabric Seal - U.V. Resistant Geotextile - To be removed by customer at project completion.
- 17. Absorbent - Hydrophobic Petrochemical Sponge. Min. 128 oz. capacity.
- 18. Connector Pipe - 4" Ø Sch. 40 PVC.
- 19. Vented Anti-Siphon intake with flow regulator.
- 20. Intake Screen - Sch. 40 PVC 0.120" modified slotted well screen with 32 slots per row/ft. 48" overall length with TRI-C end cap.
- 21. Freeboard Depth Varies with inlet pipe elevation. Increase primary/secondary settling chamber depths as needed to maintain all inlet pipe elevations above connector pipe overflow.
- 22. Optional Inlet Pipe (by Others).
- 23. Moisture Membrane - 6 mil. Plastic. Place securely against eccentric cone and hole sidewall. Used in lieu of slurry in landscaped areas.

INDUSTRY SERVICES

Site Drainage Systems

- Stormwater Drywells
- French Drains
- Piping
- Drainage Appurtenances
- Pump Systems

Technical Analysis

- Design Review
- Percolation Testing
- Geologic Database
- ADEQ Drywell Registration

Recharge Systems

- Municipal/Private Recharge Wells
- Injection Wells & Galleries

Environmental Applications

- Pattern Drilling/Soil Remediation
- Drainage Rehabilitation
- Drywell Abandonments
- OSHA HAZMAT-Certified

Drainage Renovation

- Problem Assessment
- Site Redesign/Modification
- System Retrofit

Drainage Maintenance

- Preventive Maintenance
- Service Contracts
- Drywell Cleaning

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ROC047067 B-4; ADWR 363

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NV Lic. 0035350 A

NM Lic. 90504 GF04

An evolution of McGuckin Drilling

RET-4: Dry Well



Description

A dry well is a bored, drilled, or driven shaft or hole whose depth is greater than its width. A dry well may either be a small excavated pit filled with aggregate or a prefabricated storage chamber or pipe segment. Dry well design and function are similar to infiltration trenches in that they are designed to temporarily store and subsequently infiltrate stormwater runoff. In particular, dry wells can be used to reduce the volume of stormwater runoff from building roofs. While generally not a significant source of stormwater runoff

pollution, roofs are one of the most important sources of new or increased stormwater runoff volume from land development sites. Dry wells can be used to indirectly enhance water quality by reducing the volume of stormwater runoff to be treated by other downstream stormwater quality control measures.

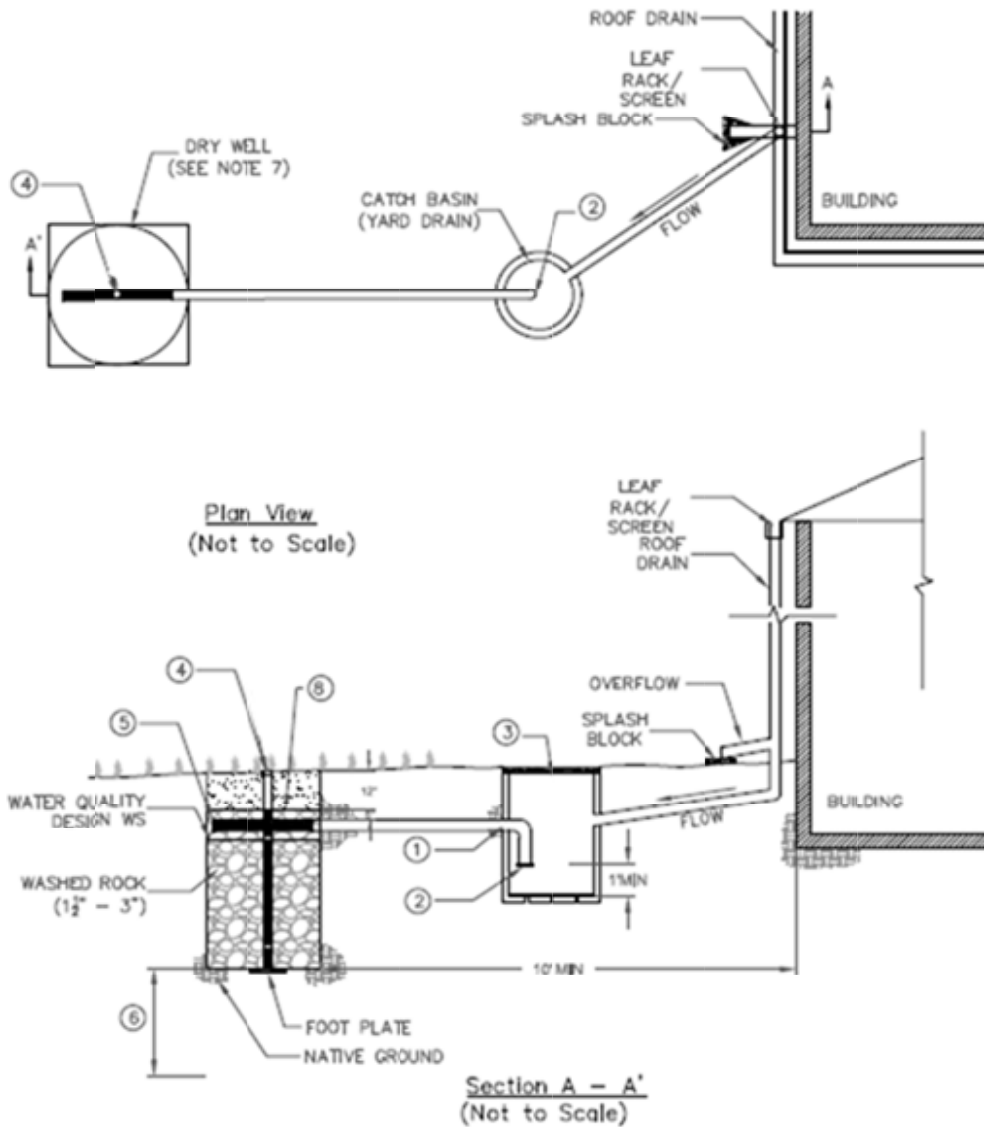
A schematic of a typical dry well is presented in Figure E-4.

LID Ordinance Requirements

Dry wells can be used to meet the on-site retention requirements of the LID Ordinance. Dry wells will prevent pollutants in the SWQDv from being discharged off-site.

Advantages

- Requires minimal space to install
- Low installation costs
- Provide groundwater recharge
- Reduces peak stormwater runoff flows during small storm events



NOTES:

- ① MINIMUM 4" - 6" DIAMETER PVC PIPE. INSTALL AT FLAT SLOPE.
- ② INSTALL FINE MESH SCREEN AT INLET TO DRY WELL. SET INLET ELEVATION AT 1' MINIMUM ABOVE CATCH BASIN BOTTOM.
- ③ CATCH BASIN (YARD DRAIN) INSTALLED WITH A SOLID LID FLUSH WITH GROUND SURFACE.
- ④ 4-6" VERTICAL PERFORATED PVC INSPECTION WELL WITH SCREW LID (NUT DOWN) FLUSH WITH GROUND SURFACE.
- ⑤ CAP END OF 4-6" HORIZONTAL PERFORATED PVC DISPERSION PIPE.
- ⑥ MINIMUM 10' ABOVE SEASONAL HIGH GROUNDWATER TABLE AND 3" ABOVE BEDROCK.
- ⑦ DRY WELL CONFIGURATION MAY VARY (E.G. PRE-FAB MAY BE CIRCULAR).
- ⑧ CHOKING STONE LAYER SHALL BE PLACED ON TOP OF THE DRY WELL TO SEPARATE IT FROM THE TOPSOIL AND PREVENT CLOGGING.

Figure E-4. Dry Well Schematic

Disadvantages

- Is not appropriate for areas with low permeability soils or high groundwater levels
- May not be appropriate for industrial sites or locations with contaminated soils or where spills may occur because of the potential threat to groundwater contamination
- Cannot receive untreated stormwater runoff except from rooftops
- Requires complete reconstruction for failed dry wells
- Is not suitable for fill sites or on steep slopes

General Constraints and Implementation Considerations

- Dry wells can be integrated into open space buffers and other landscape areas.
- The potential for groundwater contamination must be carefully considered,. Dry wells are not suitable for sites that:
 - Use or store chemicals or hazardous materials, unless they are prevented from entering the well; or
 - Un-remediated “brownfield sites” where there is known groundwater or soil contamination
- Dry wells should be sited away from tree drip lines and kept free of vegetation.
- If the corrected in-situ infiltration rate exceed 2.4 in/hr, then stormwater runoff may need to be fully-treated with an upstream stormwater quality control measure prior to infiltration to protect groundwater quality.
- Dry wells cannot be located on sites with a slope greater than 20 percent (5:1).
- Pretreatment to remove sediment is required to protect dry wells from high sediment loads.
- If a yard drain is proposed as part of the design, it must be designed so that any standing water in the catch basin will infiltrate within 96 hours.
- If possible, the entire tributary area of the dry well should be stabilized before construction begins. If this is not possible, all flows should be diverted around the dry well to protect it from sediment loads during construction or the top two inches of soil from the dry well bottom should be removed after the site has been stabilized. Excavated material should be stored such that it cannot be washed back into the dry well if a storm occurs during construction.
- The equipment used to construct the dry well should have extra wide low-pressure tires. Construction traffic should not enter the dry well because it can compact soil, which reduces infiltration capacity. If heavy equipment is used on the base of the dry well, the infiltrative capacity may be restored by tilling or aerating prior to placing the infiltrative bed.

- Clean, washed gravel should be placed in the excavated dry well in lifts and lightly compacted with a plate compactor. Use of unwashed gravel can result in clogging.
- A geomembrane liner should be installed generously with overlapping seams on sides, bottom, and one foot below the surface of the dry well.
- Once construction is complete, stabilize the entire tributary area to the dry well before allowing stormwater runoff to enter it.
- An observation well must be installed to check water levels, retention time, and evidence of clogging.
- Accessibility for maintenance during dry and wet weather conditions must be provided.

Design Specifications

The following sections provide design specifications for dry wells.

Geotechnical

Due to the potential to contaminate groundwater, cause slope instability, impact surrounding structures, and potential for insufficient infiltration capacity, an extensive geotechnical site investigation must be conducted during the site planning process to verify site suitability for a dry well. All geotechnical investigations must be performed according to the most recent GMED Policy GS 200.1. Soil infiltration rates and the groundwater table depth must be evaluated to ensure that conditions are satisfactory for proper operation of a dry well. The project applicant must demonstrate through infiltration testing, soil logs, and the written opinion of a licensed civil engineer that sufficiently permeable soils exist on-site to allow the construction of a properly functioning dry well.

Dry wells are appropriate for soils with a minimum corrected in-situ infiltration rate of 0.3 in/hr. The geotechnical report must determine if the proposed project site is suitable for a dry well and must recommend a design infiltration rate (see “Design Infiltration Rate” under the “Sizing” section). The geotechnical investigation should be such that a good understanding is gained as to how the stormwater runoff will move through the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water.

Pretreatment

Pretreatment is important for all structural stormwater quality control measures, but it is particularly important for retention facilities. Pretreatment refers to design features that provide settling of large particles before stormwater runoff enters a stormwater quality control measure in order to reduce the long-term maintenance burden. Pretreatment should be provided to reduce the sediment load entering a dry well in order to maintain the infiltration rate of the dry well. To ensure that dry wells are effective, the project applicant must incorporate pretreatment devices that provide sediment reduction (e.g.,

vegetated swales, vegetated filter strips, sedimentation manholes, and proprietary devices).

Setbacks

Dry wells must be sited following the setbacks from the most recent GMED Policy GS 200.1.

Geometry

- Dry well configurations vary, but generally have length and width top dimensions close to a square. Prefabricated dry wells are often circular.
- The filter bed media layers must have the following composition and thickness, unless they are prefabricated dry wells:
 - Top layer: 2 inches of pea gravel
 - Middle layer: 3 to 5 feet of washed 2- to 6-inch gravel; void spaces should be approximately 30 to 40 percent
 - Bottom layer: 6 inches of sand or geomembrane liner equivalent.
- Gravel media and prefabricated dry wells have porosities of 30 to 40 percent and 80 to 95 percent, respectively.
- If a dry well receives stormwater runoff from an underground pipe (i.e., stormwater runoff does not enter the top of the dry well from the ground surface), a fine mesh screen should be installed at the inlet. The inlet elevation should be 18 inches below the ground surface (i.e., below 12 inches of surface soil and 6 inches of dry well media).

Sizing

Dry wells are sized using a simple sizing method where the SWQDv must be completely infiltrated within 96 hours. Dry wells provide stormwater runoff storage in the voids of the rock fill.

Step 1: Determine the SWQDv

Dry wells must be designed to capture and retain the SWQDv (see Section 6 for SWQDv calculation procedures).

Step 2: Determine the design infiltration rate

Determine the corrected in-situ infiltration rate (f_{design}) of the native soil using the procedures described in the most recent GMED Policy GS 200.1.

Step 3: Calculate the surface area

Determine the required size of the infiltration surface by assuming the SWQDv will fill the available void spaces of the gravel storage layer. The maximum depth of stormwater runoff that can be infiltrated within the maximum retention time (96 hrs) is calculated using the following equation:

$$d_{max} = \frac{f_{design}}{12} \times t$$

Where:

d_{max} = Maximum depth of water that can be infiltrated within the required drawdown time [ft];

f_{design} = Design infiltration rate [in/hr]; and

t = Maximum retention time (max 96 hrs) [hr].

Select the dry well depth (d_t) such that:

$$d_t \leq \frac{d_{max}}{n_t}$$

Where:

d_t = Depth of dry well fill [ft];

d_{max} = Maximum depth of water that can be infiltrated within the maximum retention time [ft]; and

n_t = Dry well fill porosity.

Calculate the infiltrating surface area (bottom of the dry well) required:

$$A = \frac{SWQDv}{d_t \times n_t}$$

Where:

A = Surface area of the bottom of the dry well [ft²];

SWQDv = Stormwater quality design volume [ft³]; and

d_t = Depth of dry well fill [ft]; and

n_t = Dry well fill porosity.

Flow Entrance and Energy Dissipation

Energy dissipation controls, constructed of sound materials such as stones, concrete, or proprietary devices that are rated to withstand the energy of the influent flow, must be installed at the inlet to the dry well. Consult with LACDPW for the type and design of energy dissipation structure.

Drainage

The specifications for designing drainage systems for dry wells are presented below:

- The bottom of dry well must be native soil that is over-excavated at least one foot in depth with the soil replaced uniformly without compaction. Amending the excavated soil with two to four inches (~15 to 30 percent) of coarse sand is recommended.
- The use of vertical piping, either for distribution or infiltration enhancement, is prohibited. This application may be classified as a Class V Injection Well per 40 CFR Part 146.5(e)(4).
- The infiltration capacity of the subsurface layers should be sufficient to ensure a maximum retention time of 96 hours. An observation well must be installed to allow observation of retention time.

Hydraulic Restriction Layer

The entire infiltrative area, including the side walls must lined with a geomembrane liner to prevent soil from migrating into the top layer and reducing storage capacity. The specifications of the geomembrane liner are presented in Table E-7. The entire well area, including the sides, must be lined with a geomembrane liner prior to placing the media bed. Provide generous overlap at the seams.

Table E-7. Geomembrane Liner Specifications for Dry Wells

Parameter	Test Method	Specifications
Material		Nonwoven geomembrane liner
Unit weight		8 oz/yd ³ (minimum)
Filtration rate		0.08 in/sec (minimum)
Puncture strength	ASTM D-751 (Modified)	125 lbs (minimum)
Mullen burst strength	ASTM D-751	400 lb/in ² (minimum)
Tensile strength	AST D-1682	300 lbs (minimum)
Equiv. opening size	US Standard Sieve	No. 80 (minimum)

Observation Well

The observation well is a vertical section of perforated PVC pipe, four- to six-inch diameter, installed flush with the top of the dry well on a footplate and with a locking, removable cap. The observation well is needed to monitor the infiltration rate in dry well and is useful for marking the location of the dry well.

Vegetation

- Dry wells must be kept free of vegetation.

- Trees and other large vegetation should be planted away from dry well such that drip lines do not overhang the infiltration area.

Restricted Construction Materials

Use of pressure-treated wood or galvanized metal at or around a dry well is prohibited.

Maintenance Access

The dry well must be safely accessible during wet and dry weather conditions if it is publicly-maintained. If the dry well becomes plugged and fails, access is needed to excavate the dry well and replace the filter bed media. To prevent damage and compaction, access must be able to accommodate a backhoe working at “arm’s length” from the dry well.

Maintenance Requirements

Maintenance and regular inspections are important for proper function of dry wells. The following are general maintenance requirements:

- Conduct regular inspection and routine maintenance for pretreatment devices.
- Inspect dry well and its observation well frequently to ensure that water infiltrates into the subsurface completely within maximum retention time of 96 hours. If water is present in the observation well more than 96 hours after a major storm, the dry well may be clogged. Maintenance activities triggered by a potentially clogged facility include:
 - Check for debris/sediment accumulation and remove sediment (if any) and evaluate potential sources of sediment and vegetative or other debris (e.g., embankment erosion, channel scour, overhanging trees, etc). If suspected upstream sources are outside of the County's jurisdiction, additional pretreatment operations (e.g., trash racks, vegetated swales, etc.) may be necessary.
 - Assess the condition of the top aggregate layer for sediment buildup and crusting. Remove the top layer of pea gravel and replace. If slow draining conditions persist, the entire dry well may need to be excavated and replaced.
- Eliminate standing water to prevent vector breeding.
- Remove and dispose of trash and debris as needed, but at least prior to the beginning of the wet season.

A summary of potential problems that may need to be addressed by maintenance activities is presented in Table E-8.

The County requires execution of a maintenance agreement to be recorded by the property owner for the on-going maintenance of any privately-maintained stormwater

quality control measures. The property owner is responsible for compliance with the maintenance agreement. A sample maintenance agreement is presented in Appendix H.

Table E-8. Dry Well Troubleshooting Summary

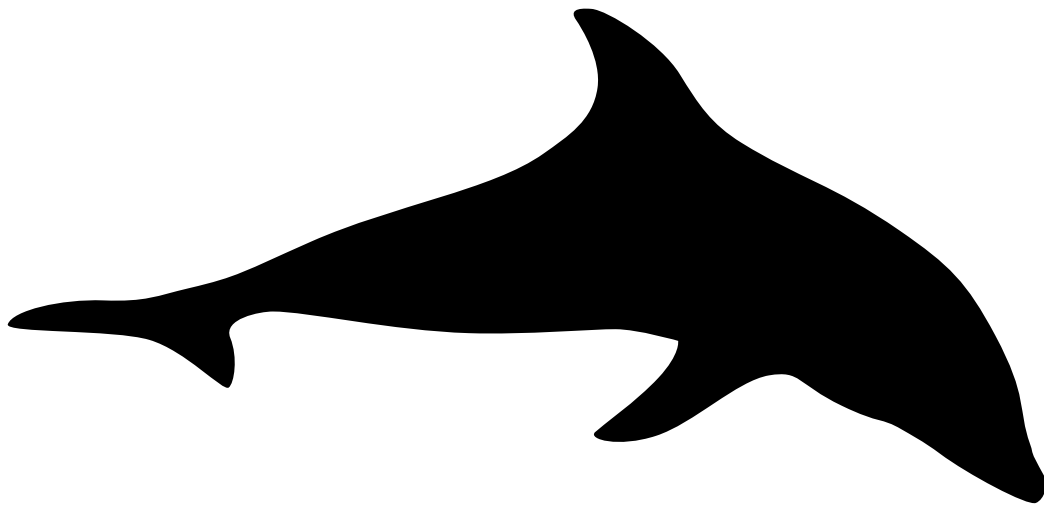
Problem	Conditions When Maintenance Is Needed	Maintenance Required
Trash and Debris	Trash and debris > 5 ft ³ /1,000 ft ²	Remove and dispose of trash and debris.
Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants	Remove any evidence of visual contamination.
Erosion/Sediment Accumulation	Undercut or eroded areas at inlet structures	Repair eroded areas and re-grade if necessary.
	Accumulation of sediment, debris, and oil/grease in pretreatment devices	Remove sediment, debris, and/or oil/grease.
	Accumulation of sediment, debris, and oil/grease on surface or inlet	Remove sediment, debris, and/or oil/grease.
Water Drainage Rate	Standing water, or by inspection of observation wells	Remove the top layer of the dry well bottom and replace if necessary.

Appendix D:
“NO DUMPING – DRAINS TO OCEAN” Stencil Examples



Sample Stencil 1

NO DUMPING



**DRAINS TO
OCEAN**

Appendix E:
Catch Basin Cleaning

OPERATION & MAINTENANCE PLAN FOR FILTER INSERT

The maintenance program will include the following key components:

1. REGULAR SWEEPING AND REMOVAL OF DEBRIS:

Vehicle parking lot will be swept on a regular basis. Sediment and debris (litter, leaves, papers and cans, etc.) within the area, especially around the drainage inlet, will be collected and removed. The frequency of sweeping will be based on the amount of sediment and debris generated.

2. REGULAR INSPECTIONS:

The catch basin, downspout, or trench drain filter insert will be inspected on a regular basis. The frequency of inspection will be based on pollutant loading, amount of debris, leaves, etc., and amount of runoff. At a minimum, there will be three inspections per year.

3. CONDUCT OF THE VISUAL INSPECTION:

- a. Broom sweep around the inlet and remove the inlet grate.
- b. Inspect the filter liner for serviceability. If called for, the filter body will be replaced.
- c. Check the condition of the adsorbent pouches and visually check the condition of the enclosed adsorbent. If the surface of the granules is more than 50% coated with a dark gray or black substance, the pouches will be replaced with new ones.
- d. Check for loose or missing nuts (on some models) and gaps between the filter and the inlet wall, which would allow bypass of the filter during low flows.
- e. The filter components will be replaced in the inlet and the grate replaced.

4. CLEANING OUT THE FILTER INSERT:

Regardless of the model of filter insert, the devices must be cleaned out on a recurring basis. The manufacturer recommends at least three cleanings per year – more in high exposure areas. For the Flo-Gard+Plus filters, the filter must be cleaned when the solids level reaches close to the full tip.

- a. The Standard Filter, in most cases, can be cleaned out by removing the device from the inlet and dumping the contents into a DOT approved drum for later disposal. If the oil-adsorbant pouches need to be changed, the time to change them is immediately after dumping and before the filter is replaced in the inlet.
- b. Because of weight, method of installation and so forth, some filter inserts will be cleaned with the aid of a vactor truck. If necessary, the oil-adsorbant pouches will be changed after the pollutants have been removed and as the filter is being returned to service.

5. MAINTENANCE LOG:

Keep a log of all inspections and maintenance performed on the catch basins, trench drains, and filter inserts. Keep this log on-site.

CATCH BASIN MAINTENANCE RECORD

SITE INFORMATION	
Contact:	Phone: ()
Project Name:	
Address:	
Filter No. & Model:	

SERVICE INFORMATION	
Date of Service:	By:
<input type="checkbox"/> Inspection	<input type="checkbox"/> Clean Debris <input type="checkbox"/> Clean Silt/Sediment
<input type="checkbox"/> Replace Pouch	<input type="checkbox"/> Replace Rock <input type="checkbox"/> Repair/Replace Parts
Comments:	
Approval Signature:	

SITE INFORMATION	
Contact:	Phone: ()
Project Name:	
Address:	
Filter No. & Model:	

SERVICE INFORMATION	
Date of Service:	By:
<input type="checkbox"/> Inspection	<input type="checkbox"/> Clean Debris <input type="checkbox"/> Clean Silt/Sediment
<input type="checkbox"/> Replace Pouch	<input type="checkbox"/> Replace Rock <input type="checkbox"/> Repair/Replace Parts
Comments:	
Approval Signature:	

Appendix F:
Operation & Maintenance Plan

To be provided during final engineering.

Appendix G:
Soils Report



CITY VENTURES

3121 Michelson Drive, Suite 150
Irvine, California 92612

June 15, 2023
Project No. 1-0485

Attention: Mr. Patrick Chien

Subject: **GEOTECHNICAL INVESTIGATION**
The Vincent Street Townhomes
122-126 North Pacific Coast Highway, Redondo Beach
Los Angeles County, California

References: See Appendix A

Dear Mr. Chien:

Alta California Geotechnical, Inc. (Alta) is pleased to present this geotechnical investigation for the Vincent Street Townhomes development, located at 122 through 126 North Pacific Coast Highway, in the City of Redondo Beach, Los Angeles County, California. This report is based on a recent subsurface investigation conducted by Alta, laboratory testing, a review of the "Site Diagram" prepared by Fournier Design Studio, and a review of the referenced reports.

Alta's review of the data indicates that the proposed development is feasible, from a geotechnical perspective, provided that the recommendations presented in this report are incorporated into the grading and improvement plans and implemented during site development.

Included in this report are:

- Discussion of the site geotechnical conditions.
- Recommendations for remedial and site grading, including unsuitable soil removals.
- Geotechnical site construction recommendations.
- Foundation design parameters.

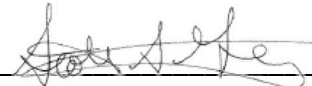
If you have any questions or should you require any additional information, please contact the undersigned at (951) 509-7090. Alta appreciates the opportunity to provide geotechnical consulting services for your project.

Sincerely,
Alta California Geotechnical, Inc.


Reviewed By:

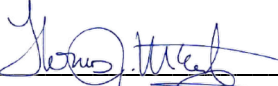


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LM: SAG:-1-0485 June 15, 2023 (Geotechnical Investigation, 122-126 N. Pacific Coast Hwy, Redondo Beach

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1.0 INTRODUCTION

This report presents Alta's findings, conclusions, and geotechnical recommendations for the proposed Vincent Street Townhomes development located at 122 through 126 North Pacific Coast Highway in the City of Redondo Beach, California.

1.1 Purpose

The purpose of this report is to examine the existing onsite geotechnical conditions and assess their impacts on the proposed development of the property as depicted on the enclosed site diagram prepared by Fournier Design Studio (Plate 1). This report is suitable for use in developing grading plans and engineer's cost estimates.

1.2 Scope of Work

Alta's *Scope of Work* for this geotechnical investigation included the following:

- Reviewing the referenced reports and air photos (Appendix A).
- Site geologic mapping.
- Excavating, logging, and sampling four (4) hollow-stem auger borings to a maximum depth of 26.0-feet below the ground surface (bgs), (Appendix B).
- Conducting laboratory testing on samples obtained during our investigation (Appendix C).
- Performing an infiltration study with two (2) additional borings to 5.0-ft. bgs to provide an assessment of the infiltration characteristics of the onsite soil and their impact on storm water disposal.
- Evaluating engineering geologic and geotechnical engineering data, including laboratory data, to develop recommendations for site remedial grading including specialized grading techniques for unsuitable soil removals along the property boundary, import soil, foundations and utilities.
- Preparing this report and accompanying exhibits.

1.3 Report Limitations

The conclusions and recommendations presented in this report are based on the field and laboratory information generated during this investigation, and a review of the referenced reports. The information contained in this report is intended to be used for development of grading plans and preliminary construction cost estimates.

2.0 PROJECT DESCRIPTION

2.1 Site Location and Background

The rectangular-shaped approximately ± 1.25 -acre site is currently the location of St. James Preschool and Parish Center. The site is bounded by to the north by Vincent Street, to the west by Pacific Coast Highway, to the east by Central Court, and to the south by a private property. Currently, the property contains three structures, a parking lot, concrete flatwork, and an approximately 6-ft. to 10-ft. high slope that descends to Pacific Coast Highway along the western property boundary. A smaller parcel located southeast of the project will be developed into a community garden and guests parking.

Historic aerial photographs are available as far back as 1952 and indicate that in 1952, a multi-story structure existed at the northwest corner of the property and several smaller structures existed along the southern property boundary. By 1963, the three currently existing structures were built and the southern portion of the site was redeveloped into a parking lot. By 1985, the multi-story structure in the northwest corner of the property was demolished. The site has remained largely unchanged since (Historic Aerials, 2023).

2.2 Proposed Development

Alta anticipates that the site will be developed to support a multi-story residential project consisting of 35 units and associated improvements. Alta anticipates that conventional cut-and-fill grading techniques will be used to develop the site. This grading will support residential structures consisting of wood frame construction with shallow foundations and reinforced concrete slabs-on-grade, and associated improvements.

3.0 SITE INVESTIGATION

3.1 Investigation and Laboratory Testing

Alta conducted a subsurface investigation on May 22, 2023, consisting of the excavation, logging and select sampling of four (4) hollow-stem auger borings up to a maximum depth of 26.0 feet, and the installation of two (2) 5.0-ft. deep well for infiltration testing. The locations of the exploratory excavations are shown on enclosed Plate 1 and the boring logs are presented in Appendix B.

Laboratory testing was performed on bulk and ring samples obtained during the field investigation. A brief description of the laboratory test procedures and the test results are presented in Appendix C.

3.2 Infiltration Testing

It is Alta's understanding that the project may utilize infiltration systems for storm water disposal. Details of the system are not known at this time.

Infiltration testing was undertaken using two (2) borings to 5.0-ft. bgs (P-1 and P-2). The testing was performed in general accordance with the Los Angeles County Technical Guidance Document. The test wells were presoaked at least 24 hours prior to testing. During testing, the water level readings were recorded every 10 minutes until the readings stabilized.

The data was then adjusted to provide infiltration rates utilizing the Porchet Method. The resulting infiltration rates are presented in Table 3-1. The results do not include a factor of safety. Recommendations for infiltration BMP design are presented in Section 6.3.

Table 3-1 Summary of Infiltration Testing (No Factor of Safety)		
Test Designation	P-1	P-2
Approximate Depth of Test	5.0 ft	5.0 ft
Final Time Interval	10 minutes	10 minutes
Radius of Test Hole	4 inches	4 inches
Tested Infiltration Rate	5.1 inches/hr	7.7 inches/hr

4.0 GEOLOGIC CONDITIONS

4.1 Geologic and Geomorphic Setting

Regionally, the subject site is located in the Peninsular Ranges geomorphic province, which characterizes the southwest portion of southern California where major right lateral active fault zones predominately trend northwest-southeast. The Peninsular Ranges province is composed of plutonic and metamorphic rock, with lesser amounts of Tertiary volcanic and sedimentary rock, Quaternary drainage in-fills and sedimentary veneers.

4.2 Stratigraphy

Based on our literature review and subsurface investigation, the site is underlain by undocumented artificial fill and older eolian deposits. These geologic units are briefly described below.

4.2.1 Artificial Fill - Undocumented (map symbol afu)

The undocumented artificial fill observed at the site consists mainly of dark brown sand and silty sand in a dry to moist and medium dense condition. The unit was logged to a maximum depth of four (4) feet.

4.2.2 Older Eolian Deposits (map symbol Qoe)

The older eolian deposits observed at the site consists mainly of brownish tan to tan and orange tan sand in a dry to slightly moist and loose to very dense condition. The unit was logged to a depth of 26.0 feet below the ground surface.

4.3 Geologic Structure

4.3.1 Tectonic Framework

Jennings (1985) defined eight structural provinces within California that have been classified by predominant regional fault trends and similar fold structure. These provinces are in turn divided into blocks and sub-blocks that are defined by “major Quaternary faults.” These blocks and sub-blocks exhibit similar structural features. Within this framework, the subject site is located within Structural Province I, which is controlled by the dominant northwest trend of the San Andreas Fault and is divided into two blocks, the Coast Range Block and the Peninsular Range Block. The Peninsular Range Block, on which this site is located, is characterized by a series of parallel, northwest trending faults that exhibit right lateral dip-slip movement. These faults are terminated by the Transverse Range block to the north and extend southward into the Baja Peninsula. These northwest trending faults divide the Peninsular Range block into eight sub-blocks. The site is located on the northwest portion of the Inglewood-San Diego Sub-block, one of the eight sub-blocks, which is bound on the west by the Palo Verde-Coronado Bank fault zone and on the east by the Newport-Inglewood/Rose Canyon fault zone.

4.3.2 Regionally Mapped Active Faults

Several large, active fault systems including the Palos Verde-Coronado Bank, Newport-Inglewood/Rose Canyon, and the San Andreas occur in the region surrounding the site. These fault systems have been studied extensively and in a large part control the geologic structure of southern California.

4.3.3 Geologic Structure

Based upon our site investigation and literature review, the surficial sediments are of Quaternary age, and are not folded or faulted.

4.4 Groundwater

Groundwater was not encountered to a depth of 26.0-feet below the ground surface during our subsurface investigation. Groundwater data from the California Department of Water Resources retrieved from the nearest groundwater well located 1.4 miles east of the site dates back to 1995. The data indicates that in 1995, groundwater recorded from Well #04S14W09D001S was 114-feet below the ground surface (CDWR, 2023).

4.5 Earthquake Hazards

The subject site is located in southern California, which is a tectonically active area. The type and magnitude of seismic hazards affecting a site are dependent on the distance to the causative fault and the intensity and magnitude of the seismic event. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction and/or ground lurching.

4.5.1 Local and Regional Faulting

The site is located on the northwest portion of the Inglewood-San Diego sub-block, where the Palos Verdes, Newport-Inglewood, Puente Hills, Santa Monica, and Malibu Coast fault surround the site approximately 1.5, 6.5, 12.6, 15.8, and 17.4 miles away, respectively.

4.5.2 Surface Rupture

Active faults are not known to exist within the project and a review of Special Publication 42 indicates the site is not within a California State designated earthquake fault zone. Accordingly, the potential for fault surface rupture on the subject site is very low.

4.5.3 Seismicity

Ground shaking hazards caused by earthquakes along other active regional faults do exist. The 2022 California Building Code requires use-modified spectral accelerations and velocities for most structural designs. Seismic design parameters using soil profile types identified in the 2022 California Building Code are presented in Section 7.3.

4.5.4 Liquefaction

Seismic agitation of relatively loose saturated sands, silty sands, and some silts can result in a buildup of pore pressure. If the pore pressure exceeds the overburden stresses, a temporary quick condition known as liquefaction can occur. Liquefaction effects can manifest in several ways including: 1) loss of bearing; 2) lateral spread; 3) dynamic settlement; and 4) flow failure. Lateral spreading has typically been the most damaging mode of failure.

In general, the more recent that a sediment has been deposited, the more likely it will be susceptible to liquefaction. Other factors that must

be considered are groundwater, confining stresses, relative density, and the intensity and duration of seismically induced ground shaking.

The site is not within a State-identified zone of required investigation for liquefaction (CDMG, 1999). No groundwater was encountered during Alta's investigation. Public groundwater data indicates that in 1995, groundwater recorded from the nearest well (Well #04S14W09D001S) located 1.4 miles east of the site, was 114 feet below the ground surface (CDWR, 2023).

Based on the depth of groundwater and the underlying soil type, it is our opinion that the potential for liquefaction is minimal at the site.

4.5.5 Dry Sand Settlement

Dry sand settlement is the process of non-uniform settlement of the ground surface during a seismic event. Based on our subsurface investigation and our removal/recompaction recommendations, the potential for dry sand settlement is anticipated to be low and within foundation design tolerances. Design dynamic settlement parameters are presented in Table 7-1.

5.0 ENGINEERING PROPERTIES AND ANALYSIS

5.1 Materials Properties

Presented herein is a general discussion of the engineering properties of the onsite materials that will be encountered during construction of the proposed project. Descriptions of the soil (Unified Soil Classification System) are presented on the boring logs in Appendix B.

5.1.1 Excavation Characteristics

Based on the data provided from the subsurface investigations, it is our opinion that the onsite materials possess favorable excavation characteristics such that conventional earth moving equipment can be utilized.

5.1.2 Compressibility

The artificial fill and upper portions of older eolian deposits onsite are considered compressible and unsuitable to support the proposed improvements. Recommended removal depths are presented in Section 6.1.2.

5.1.3 Moisture

The artificial fill and older eolian deposits that will require removal and recompaction as discussed in Section 6.1.2 are typically under-optimum and will require moisture conditioning prior to placement as compacted fill.

5.1.4 Hydro-Consolidation

Hydro-consolidation is the effect of introducing water into soil that is prone to collapse. Upon loading and initial wetting, the soil structure and apparent strength are altered resulting in almost immediate settlement. That settlement can have adverse impacts on engineered structures, particularly in areas where it is manifested differentially. Differential settlements are typically associated with differential wetting, irregularities in the subsurface soil conditions, or irregular loading patterns.

Based on our laboratory testing (Appendix C), the potential for hydro-collapse in the underlying alluvium is minimal and should be within

foundation tolerances upon the completion of the recommended unsuitable soil removals.

5.1.5 Expansion Potential

Expansion index testing was performed on samples taken during our subsurface investigation. Based on the results, it is anticipated that the majority of materials onsite are “very low” to “low” in expansion potential ($0 \leq EI \leq 50$, Appendix C) when tested per ASTM D: 4829.

5.1.6 Earthwork Adjustments

The values presented in Table 5-1 are deemed appropriate for estimating purposes and may be used in an effort to balance earthwork quantities. As is the case with every project, contingencies should be made to adjust the earthwork balance when grading is in-progress and actual conditions are better defined.

TABLE 5-1 Earthwork Adjustment Factors		
Geologic Unit	Adjustment Factor Range	Average
Artificial Fill Undocumented (afu)/ Older Eolian Deposits (Qoe)	Shrink 11% to 15%	13%

5.1.7 Chemical Analyses

Chemical testing was performed on samples of material underlying the proposed site. Soluble sulfate test results indicate that the soluble sulfate concentrations of the soils tested are classified as negligible (Category S0) per ACI 318-14.

Negligible chloride levels were detected in the onsite soils. Resistivity testing conducted as part of this investigation, indicates that the soils are “corrosive” to buried metals (per Romanoff, 1989). Additional

discussions on corrosion are presented in Section 7.9. Corrosion test results are presented in Appendix C.

5.2 Engineering Analysis

Presented below is a general discussion of the engineering analysis methods that were utilized to develop the conclusions and recommendations presented in this report.

5.2.1 Bearing Capacity and Lateral Earth Pressures

Ultimate bearing capacity values were obtained using the graphs and formula presented in NAVFAC DM-7.1. Allowable bearing was determined by applying a factor of safety of at least 3 to the ultimate bearing capacity. Static lateral earth pressures were calculated using Rankine methods for active and passive cases. If it is desired to use Coulomb forces, a separate analysis specific to the application can be conducted.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on Alta's findings during our subsurface investigation, the laboratory test results, and our staff's previous experience in the area, it is Alta's opinion that the development of the site is feasible from a geotechnical perspective. Presented below are recommendations that should be incorporated into site development and construction plans.

6.1 Remedial Grading Recommendations

All grading shall be accomplished under the observation and testing of the project geotechnical consultant in accordance with the recommendations contained herein and the City of Redondo Beach's criteria.

6.1.1 Site Preparation

Significant amounts of vegetation, construction debris, and other deleterious materials are unsuitable as structural fill material and should be disposed of off-site prior to commencing grading/construction. Any septic tanks, seepage pits or wells should be abandoned as per the Los Angeles County Department of Health Services.

Existing concrete should be removed prior to the placement of engineered fill. The demolished concrete may be incorporated into compacted, engineered fills after it is crushed to a maximum size of six (6) inches. Prior to placement as engineered fill any protruding steel rebar should be cut from the concrete pieces and disposed of offsite.

Existing asphaltic concrete should be removed prior to the placement of engineered fill. From a geotechnical perspective, this material may be incorporated into compacted, engineered fills after it is crushed to a maximum size of six (6) inches. The crushed asphalt should not be placed under residential structures, but rather, it can be placed in approved non-residential areas, such as streets, parking areas or open space. These recommendations should be verified by the environmental consultant.

6.1.2 Unsuitable Soil Removals

The artificial fill and upper portions of older eolian deposits are compressible and as such, are not suitable to support the proposed structures. As such, it is anticipated that, on average, the upper three (3) to five (5) feet of existing soils will require removal and recompaction, extending a minimum of 5 feet horizontally outside of the structures. Material removed as part of the unsuitable soil removals can be used as artificial fill, provided it is free of deleterious materials.

Footings for structures should be underlain by a minimum of two (2) feet of compacted fill. As such, for building pads where unsuitable soil removals do not provide the minimum depth of compacted fill, or where design grades and/or remedial grading activities create cut/fill transitions, the cut and shallow fill portions of the building pads should be over-excavated during grading and replaced with the minimum depth of compacted fill.

For fill areas in streets, in general, a minimum removal and recompaction of the upper two (2) feet is recommended, however all undocumented artificial fill shall be removed and recompacted. For cuts greater than two (2) feet in street areas, removals are not required so long as competent older eolian deposits are exposed. For cuts less than two (2) feet, the two (2) foot removal and recompaction applies.

The Project Geotechnical Consultant should observe the removal bottom prior to placing fill. If unsuitable soils are exposed upon the completion of the removals recommended above, additional removals may be required.

6.2 General Earthwork Recommendations

6.2.1 Compaction Standards

All fill and processed natural ground shall be compacted to a minimum relative compaction of 90 percent, as determined by ASTM Test Method: D-1557. Fill material should be moisture conditioned to optimum moisture or above, and as generally discussed in Alta's Earthwork Specification Section presented in Appendix E. Compaction shall be achieved with the use of sheepfoot rollers or similar kneading type

equipment. Mixing and moisture conditioning will be required in order to achieve the recommended moisture conditions.

6.2.2 Groundwater/Seepage

It is anticipated that groundwater will not be encountered during construction. It is possible that perched water conditions could be encountered depending on the time of year construction occurs.

6.2.3 Documentation of Removals

All removal/over-excavation bottoms should be observed and approved by the project Geotechnical Consultant prior to fill placement. Consideration should be given to surveying the removal bottoms and undercuts after approval by the geotechnical consultant and prior to the placement of fill. Staking should be provided in order to verify undercut locations and depths.

6.2.4 Treatment of Removal Bottoms

At the completion of removals/over-excavation, the exposed removal bottom should be ripped to a minimum depth of eight (8) inches, moisture-conditioned to above optimum moisture content and compacted in-place to the project standards.

6.2.5 Fill Placement

After removals, scarification, and compaction of in-place materials are completed, additional fill may be placed. Fill should be placed in eight-inch bulk maximum lifts, moisture conditioned to optimum moisture content or above, compacted and tested as grading/construction progresses until final grades are attained.

6.2.6 Mixing

Mixing of materials may be necessary to prevent layering of different soil types and/or different moisture contents. The mixing should be accomplished prior to and as part of compaction of each fill lift.

6.2.7 Import Soils

Import soils, if necessary, should consist of clean, structural quality, low expansive, compactable materials similar to the on-site soils and should be free of trash, debris, or other objectionable materials. The project Geotechnical Consultant should be notified not less than 72 hours in advance of the locations of any soils proposed for import. Import sources should be sampled, tested, and approved by the project Geotechnical Consultant at the source prior to the importation of the soils to the site. The project Civil Engineer should include these requirements on plans and specifications for the project.

6.2.8 Utility Trenches

6.2.8.1 Excavation

Utility trenches should be supported, either by laying back excavations or shoring, in accordance with applicable OSHA standards. In general, existing site soils are classified as Soil Type "B" and "C" per OSHA standards. Upon completion of the recommended removals and recompaction, the artificial fill will be classified as Soil Type "B". The Project Geotechnical Consulting should be consulted if geologic conditions vary from what is presented in this report.

6.2.8.2 Backfill

Trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D-1557.

Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill provided oversized materials are removed. No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks, or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils. Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

Under-slab trenches should also be compacted to project specifications. If select granular backfill (SE > 30) is used, compaction by flooding will be acceptable.

6.2.9 Backcut Stability

Temporary backcuts, if required during unsuitable soil removals, should be made no steeper than 1:1 without review and approval of the geotechnical consultant. Flatter backcuts may be necessary where geologic conditions dictate and where minimum width dimensions are to be maintained.

Care should be taken during remedial grading operations in order to minimize risk of failure. Should failure occur, complete removal of the disturbed material will be required.

In consideration of the inherent instability created by temporary construction backcuts for removals, it is imperative that grading schedules are coordinated to minimize the unsupported exposure time of these excavations. Once started, these excavations and subsequent fill operations should be maintained to completion without intervening delays imposed by avoidable circumstances. In cases where five-day workweeks comprise a normal schedule, grading should be planned to avoid exposing at-grade or near-grade excavations through a non-work weekend. Where improvements may be affected by temporary instability, either on or offsite, further restrictions such as slot cutting, extending workdays, implementing weekend schedules, and/or other requirements considered critical to serving specific circumstances may be imposed.

6.3 Storm Water Infiltration Systems

From a geotechnical perspective, allowing storm water to infiltrate the onsite soil in concentrated areas increases the potential for settlement, liquefaction, and water-related damage to structures/improvements, such as wet slabs or pumping subgrade, and should be avoided where possible. If infiltration systems are required on this site, care should be taken in designing systems that control the storm water as much as possible.

Preliminary infiltration testing was conducted at the site as part of this investigation, and the methodology is discussed in 3.2. The resulting infiltration rates for P-1 and P-2 was calculated to be 5.1- and 7.7-inches per hour. The results do not include a factor of safety.

Groundwater was not encountered to a depth of 26.0-feet below the ground surface during our subsurface investigation. Groundwater data from the

California Department of Water Resources retrieved from the nearest groundwater well located 1.4 miles east of the site dates back to 1995. The data indicates that in 1995, groundwater recorded from Well #04S14W09D001S was 114-feet below the ground surface (CDWR, 2023).

The WQMP designer should review the tests results and determine if the proposed BMP system is appropriate for the site. A factor of safety should be applied to the results that is in accordance with City of Redondo Beach requirements.

From a geotechnical perspective, allowing storm water to infiltrate the onsite soil in concentrated areas increases the potential for settlement, liquefaction, and water-related damage to structures/improvements, such as wet slabs or pumping subgrade. Care should be taken in designing systems that control the storm water as much as possible. A methodology for dealing with overflow should the infiltration systems become clogged or full should be developed and maintained.

It is recommended that the Project Geotechnical Consultant observe the BMP excavations during construction to verify that the infiltration rates presented herein are appropriate. If it is determined that rates may be variable, additional infiltration testing should be undertaken.

6.4 Boundary Conditions

The site is bounded by to the north by Vincent Street, to the west by North Pacific Coast Highway, to the east by Central Court, and to the south by a private property. Construction of retaining/screen walls along these boundaries may require additional geotechnical recommendations concerning unsuitable soil removals and foundation design parameters. Boundary conditions for the

project should be reviewed by the Project Geotechnical Consultant as the design progresses.

7.0 DESIGN CONSIDERATIONS

7.1 Structural Design

It is anticipated that multi-story wood-framed residential structures, with slab on-grade and shallow foundations will be constructed. Upon the completion of rough grading, finish grade samples should be collected and tested in order to provide specific recommendations as they relate to the individual building pads. These test results and corresponding design recommendations should be presented in a final rough grading report. Final slab and foundation design recommendations should be made based upon specific structure sitings, loading conditions, and as-graded soil conditions. It is anticipated that the majority of onsite soils will possess “very low” to “low” expansion potential when tested in general accordance with ASTM Test Method D: 4829.

General foundation design recommendations are presented in Table 7-1.

Presented below in Sections 7.1.2 are foundation/slab design recommendations for the proposed residential structures. For budgeting purposes, the following foundation design requirements for a range of potential expansion characteristics are presented.

7.1.1 Foundation Design

Foundations may be preliminary designed based on the values presented in Table 7-1 below.

Table 1 Foundation Design Parameters*	
Allowable Bearing	2000 lbs/ft ² (assuming a minimum embedment depth and width of 12 inches).
Lateral Bearing	250 lbs/ft ² at a depth of 12 inches plus 250 lbs/ft ² for each additional 12 inches of embedment to a maximum of 2000 lbs/ft ² .
Sliding Coefficient	0.35
Settlement	Static Settlement - 0.5 inches in 40 feet Dynamic Settlement - 0.5 inches in 40 feet

*These values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern depth and reinforcement requirements and should be evaluated.

7.1.2 Conventional Slab/Foundation Systems

Based on the onsite soils conditions and information supplied by the 2022 CBC, conventional slab/foundation systems may be designed in accordance with Tables 7-1 and 7-2.

TABLE 7-2 CONVENTIONAL FOUNDATION DESIGN PARAMETERS	
Expansion Potential	<i>Very Low to Low</i>
Soil Category	I
Design Plasticity Index	10
Minimum Footing Embedment	12 inches*
*The minimum footing embedments presented herein are based on expansion indexes. The structural engineer should determine minimum embedments based on the number of floors supported by the footings, the structural loading, and the requirements of the latest California Building Code.	
Minimum Footing Width	12-inches-The structural engineer should determine the minimum footing width based on loading and the latest California Building Code.
Footing Reinforcement	No. 4 rebar, one (1) on top, one (1) on bottom
Slab Thickness	4 inches (actual)
Slab Reinforcement*	No. 3 rebar spaced 18 inches on center, each way
Under-Slab Requirement	See Section 7.2
Slab Subgrade Moisture	Minimum of 110 percent of optimum moisture to a depth of 12 inches prior to placing concrete.
Footing Embedment Adjacent to Swales and Slopes	If exterior footings adjacent to drainage swales are to exist within five (5) feet horizontally of the swale, the footing should be embedded sufficiently to assure embedment below the swale bottom is maintained. Footings adjacent to slopes should be embedded such that at least five- (5) feet is provided horizontally from edge of the footing to the face of the slope.

7.1.3 Post-Tensioned Slabs/Foundation Design Recommendations

Post-tensioned slabs for the project may be preliminarily designed utilizing the parameters presented in Tables 7-1 and 7-3. The parameters presented herein are based on methodology provided in the Design of Post-Tensioned Slabs-On-Ground, Third Edition, by the Post-Tensioning Institute, in accordance with the 2022 CBC.

TABLE 7-3 POST-TENSION SLAB DESIGN PARAMETERS						
Category	Expansion Potential	Minimum Embedment	Edge Lift		Center Lift	
			Em (ft)	Ym (inch)	Em (ft)	Ym (inch)
I	Very Low to Low	12 inches*	5.4	0.61	9.0	0.26
Slab Subgrade Moisture						
Category I	Minimum 110% of optimum moisture to a depth of 12 inches prior to pouring concrete					
Embedment*						
The minimum outer footing embedment presented herein are based on expansion indexes. The structural engineer should verify the minimum embedment based on the number of floors supported by the footings, the structural loading, and the requirements of the latest California Building Code. If mat slabs are utilized, alternate embedment depths can be provided.						
Moisture Barrier						
A moisture barrier should be provided in accordance with the recommendations presented in Section 7.2						
<i>The parameters presented herein are based on procedures presented in the <u>Design of Post-Tensioned Slabs-On-Ground, Third Edition</u>. No corrections for vertical barriers at the edge of the slab, or for adjacent vegetation have been assumed. The design parameters are based on a Constant Suction Value of 3.9 pF.</i>						

7.2 Moisture Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive and should be capable of effectively preventing the migration of water and reducing the transmission of water vapor to acceptable levels. Historically, a 10-mil plastic membrane, such as Visqueen, placed between two to four inches of clean sand, has been used for this purpose. The use of this system or other systems can be considered, at the discretion of the designer, provided the system reduces the vapor transmission rates to acceptable levels.

7.3 Seismic Design

The site classes were determined based on the referenced reports and published geologic maps in the area in general conformance with Chapter 20 of ASCE 7-16. Based on the density of the underlying soils, a Site Class of D (shear wave velocity of 259 m/s) was selected. The seismic design parameters were calculated using a program based on the USGS website and ASCE 7-16 procedures. It is our understanding that based on the proposed structures, code allows or the use of an alternate method to calculate S_{D1} , assuming the structure has a fundamental period that does not exceed 0.5s. The resulting values are presented in Table 7-4. If the structures have fundamental periods exceeding 0.5s, then a site-specific strong motion analysis shall be performed.

TABLE 7-4 Seismic Ground Motion Values 2022 CBC and ASCE 7-16	
<i>Parameter</i>	<i>Value</i>
Site Class	D
Site Latitude	33.8432
Site Longitude	-118.3858
Spectral Response Acceleration Parameter, S_s	1.895
Spectral Response Acceleration Parameter, S_1	0.683
Site Coefficient, F_a	1.0
Site Coefficient, F_v	1.7
MCE Spectral Response Acceleration Parameter, S_{MS}	1.895
MCE Spectral Response Acceleration Parameter, S_{M1}	1.161
Design Spectral Response Acceleration Parameter, S_{DS}	1.263
Design Spectral Response Acceleration Parameter, S_{D1}	0.774
Peak Ground Acceleration, PGA_M	0.918

7.4 Block Walls

Block walls, if used, should be embedded a minimum of 2 feet below the lowest adjacent grade. Construction joints (not more than 20 feet apart) should be included in the block wall construction. Side yard walls should be structurally separated from the rear yard wall.

7.5 Footing Excavations

Soils from the footing excavations should not be placed in slab-on-grade areas unless properly compacted and tested. The excavations should be cleaned of all loose/sloughed materials and be neatly trimmed at the time of concrete placement. The Project Geotechnical Consultant should observe the footing excavations prior to the placement of concrete to determine that the excavations are founded in suitably compacted material.

7.6 Retaining Walls

Retaining walls should be founded on engineered fill and should be backfilled with granular soils that allow for drainage behind the wall. Foundations may be designed in accordance with the recommendations presented in Table 7-1, above. Unrestrained walls, free to horizontally move $0.0005H$ (for dense cohesionless backfill), may be designed to resist lateral pressures imposed by a fluid with a unit weight determined in accordance with the values presented in Table 7-5 below. The table also presents design parameters for restrained (at-rest) retaining walls. These parameters may be used to design retaining walls that may be considered as restrained due to the method of construction or location (corner sections of unrestrained retaining walls).

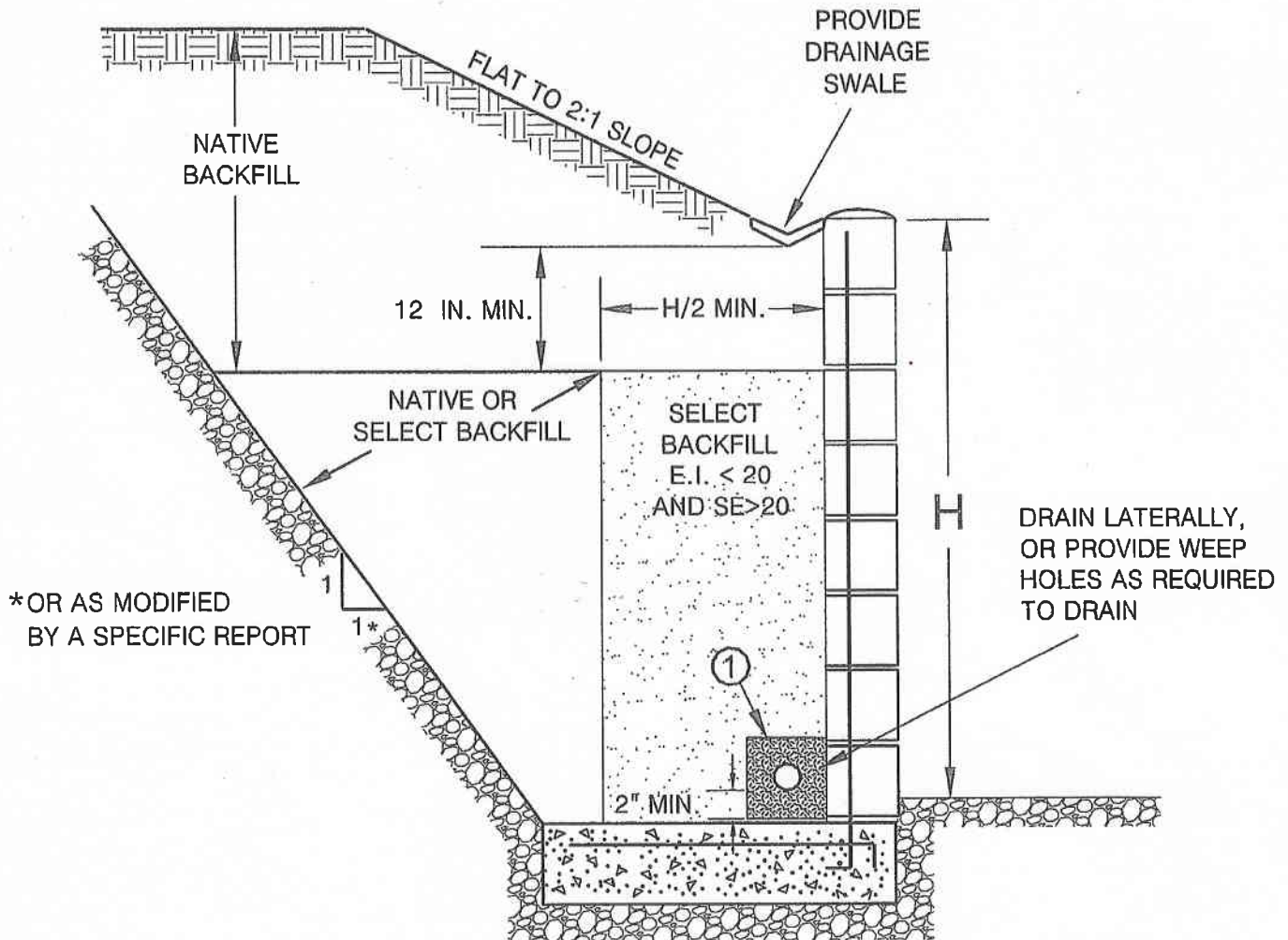
TABLE 7-5		
Equivalent Fluid Pressures for 90% Compacted Fill (Select Material)		
Backfill	Active Pressure (psf/ft)	At-Rest Pressure (psf/ft)
Level	35	55

Per the requirements of the 2022 CBC, the seismic force acting on the retaining walls with backfill exceeding 6-feet in height may be resolved utilizing the formula $18.5H^2$ lb/lineal ft (H=height of the wall). This force acts at approximately 0.6H above the base of the wall. The seismic value can be converted as required by the retaining wall engineer. Retaining walls should be designed in general accordance with Section 1807A.2 of the 2022 CBC.

- Restrained retaining walls should be designed for “at-rest” conditions.
- The design loads presented in the above table are to be applied on the retaining wall in a horizontal fashion and as such friction between wall and retained soils should not be allowed in the retaining wall analyses.
- Additional allowances should be made in the retaining wall design to account for the influence of construction loads, temporary loads, and possible nearby structural footing loads.
- Select backfill should be granular, structural quality backfill with a Sand Equivalent of 20 or better and an ASCE Expansion Index of 20 or less. The backfill must encompass the full active wedge area. The upper one foot of backfill should be comprised of native on-site soils (see Plate A).
- The wall design should include waterproofing (where appropriate) and backdrains or weep holes for relieving possible hydrostatic pressures. The backdrain should be comprised of a 4-inch perforated PVC pipe in a 1 ft. by 1 ft., $\frac{3}{4}$ -inch gravel matrix, wrapped with a geofabric. The backdrain should be installed with a minimum gradient of 2 percent and should be outletted to an appropriate location. For subterranean walls this may include drainage by sump pumps.
- No backfill should be placed against concrete until minimum design strengths are achieved.

It should be noted that the allowable bearing and lateral bearing values presented in Table 7-1 are based on level conditions at the toe. Modified design parameters can be presented for retaining walls with sloping condition at the toe. Other conditions should be evaluated on a case-by-case basis.

RETAINING WALL BACKFILL DETAIL



①

PIPE: 4-INCH PERFORATED PVC, SCHEDULE 40, SDR35 OR APPROVED ALTERNATE
 MINIMUM 8 PERFORATIONS (1/4-IN. DIA.) PER LINEAL FT. IN BOTTOM HALF OF PIPE

ROCK: MINIMUM VOLUME OF 1 CU. FT. OF 3/4-IN. MAX. ROCK PER. LINEAL FOOT OF PIPE, OR APPROVED ALTERNATE

FILTER FABRIC: MIRAFL 140 FILTER FABRIC OR APPROVED EQUIVALENT



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PLATE A

7.7 Exterior Slabs and Walkways

Exterior concrete slabs and walkways should be designed and constructed in consideration of the following recommendations.

7.7.1 Subgrade Compaction

The subgrade below exterior concrete slabs should be compacted to a minimum of 90 percent relative compaction as determined by ASTM Test Method: D 1557.

7.7.2 Subgrade Moisture

The subgrade below concrete slabs should be moisture conditioned to a minimum of 110 percent of optimum moisture prior to concrete placement.

7.7.3 Concrete Slab Thickness

Concrete flatwork and driveways should be designed utilizing four-inch minimum thickness.

7.7.4 Concrete Slab Reinforcement

Utilization of reinforcement for flatwork and driveways is subject to a cost/benefit analysis. Reinforcement will decrease the amount of cracking that may occur in flatwork, however, planning for occasional repairs may be more cost effective. Utilizing closely spaced control joints is likely more cost-effective than utilizing reinforcement. The majority of the soils onsite are classified as very low in expansion potential. Consideration should be given to reinforcing flatwork with irregular (non-square/rectangular) shapes.

7.7.5 Control Joints

Weakened plane joints should be installed on walkways at intervals of approximately eight feet (maximum) or less. Exterior slabs should be designed to withstand shrinkage of the concrete.

7.8 Concrete Design

As stated in Section 5.1.7, negligible concentrations of sulfates were detected in the onsite soils (Class S0). Therefore, the use of sulfate resistant concrete is not required per ACI 318-14 at this time. Post-grading conditions should be evaluated, and final recommendations made at that time.

7.9 Corrosion

Based on preliminary testing, the onsite soils are corrosive to buried metal objects. Buried ferrous metals should be protected against the effects of corrosive soils in accordance with the manufacturer's recommendations. Typical measures may include using non-corrosive backfill, protective coatings, wrapping, plastic pipes, or a combination of these methods. A corrosion engineer should be consulted if specific design recommendations are required by the improvement designer.

Per ACI 318-14, an exposure class of C1 would be applicable to metals encased in concrete (rebar in footings) due to being exposed to moisture from surrounding soils. Per Table 19.3.2.1 of ACI 318-14, the requirements for concrete with an exposure class of C1 are a minimum compressive strength of 2500 psi and a maximum water-soluble chloride ion content in concrete of 0.30 (percent by weight of cement).

7.10 Pavement Design

Pavement sections for the proposed streets shall be designed based on laboratory testing conducted on samples taken from the soil subgrade. Preliminarily, based on an assumed R-Value of 30, the pavement may be designed utilizing the sections presented in Table 7-6. These sections should be verified upon the completion of grading, based on R-Value testing. The ultimate pavement section design for public streets is under the City of Redondo Beach's purview.

Table 7-6 Preliminary Pavement Sections		
Traffic Index	Pavement Section Options OR	
5.0	3-inch AC on 6-inch AB	4-inch AC on 4-inch AB
5.5	3-inch AC on 7-inch AB	4-inch AC on 5-inch AB
6.0	3.5-inch AC on 7.5-inch AB	4-inch AC on 6.5-inch AB
AC-Asphalt Concrete		
AB-Caltrans Class II Base		

Construction of the streets should be accomplished in accordance with the current criteria of the City of Redondo Beach. Prior to the placement of base material, the subgrade should be suitably moisture conditioned, processed and compacted to a minimum 95 percent of the laboratory maximum density (ASTM: D 1557) to at least twelve (12) inches below subgrade. After subgrade compaction, the exposed grade should then be "proof"-rolled with heavy equipment to ensure the grade does not "pump" and is verified as non-yielding. Aggregate base material should be placed on the compacted subgrade and compacted in-place to a minimum 95 percent of the laboratory standard obtained per ASTM: D 1557.

7.11 Site Drainage

Positive drainage away from the proposed structures should be provided and maintained. Roof, pad, and lot drainage should be collected and directed away from the structures toward approved disposal areas through drainage terraces, gutters, down drains, and other devices. Design fine grade elevations should be maintained through the life of the structure or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water, away from structures.

8.0 LOT MAINTENANCE

Ongoing maintenance of the improvements is essential to the long-term performance of structures. As such, the owners must implement certain maintenance procedures. The attached "Maintenance and Improvement Considerations" presented in the Appendix E may be included as part of the sales packet to educate the owners in issues related to drainage, maintenance, improvements, etc. The following recommendations should also be implemented.

8.1 Lot Drainage

Roof, pad, and lot drainage should be collected and directed away from structures and slopes and toward approved disposal areas. Design fine grade elevations should be maintained through the life of the structure or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water, away from structures and slopes. Residents should be made aware that they are responsible for maintenance and cleaning of all drainage terraces, down drains, and other devices that have been installed to promote structure and slope stability.

8.2 Burrowing Animals

Owners should undertake a program for the elimination of burrowing animals.

9.0 FUTURE PLAN REVIEWS

This report represents a geotechnical review of the site. As the project design for the project progresses, site specific geologic and geotechnical issues should be considered in the design and construction of the project. Consequently, future plan reviews may be necessary. These reviews may include reviews of:

- Grading Plans
- Foundation Plans
- Utility Plans

These plans should be forwarded to the project Geotechnical Consultant for review.

10.0 CLOSURE

10.1 Geotechnical Review

For the purposes of this report, multiple working hypotheses were established for the project, utilizing the available data and the most probable model is used for the analysis. Future information collected during the proposed grading operations is intended to evaluate the hypothesis and as such, some of the assumptions summarized in this report may need to be changed. Some modifications of the grading recommendations may become necessary, should the conditions encountered in the field differ from the conditions hypothesized in this report.

Plans and sections of the project specifications should be reviewed by Alta to evaluate conformance with the intent of the recommendations contained in this report. If the project description or final design varies from that described in herein, Alta must be consulted regarding the applicability of the recommendations contained herein and whether any changes are required. Alta accepts no liability for any use of its recommendations if the project description or final design varies and Alta is not consulted regarding the alterations.

10.2 Limitations

This report is based on the following: 1) the project as presented on the attached plan; 2) the information obtained from Alta's laboratory testing included herein; and 3) from the information presented in the referenced reports. The findings and recommendations are based on the results of the subsurface investigation, laboratory testing, and office analysis combined with an interpolation and extrapolation of conditions between and beyond the subsurface excavation locations. However, the materials adjacent to or beneath those observed may have different characteristics than those observed, and no precise representations are made as to the quality or extent of the materials not

observed. The results reflect an interpretation of the direct evidence obtained. Work performed by Alta has been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in the same locality under similar conditions. The methods used to develop the recommendations do not comprise an exact science and are not a guarantee that the interaction between the soils and proposed structures shall perform as planned. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by a geotechnical consultant who is familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report.

The conclusions and recommendations included in this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of Alta.

Alta has no responsibility for construction means, methods, techniques, sequences, procedures, safety precautions, programs in connection with the construction, acts or omissions of the CONTRACTOR or any other person performing any of the construction, or for the failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

APPENDIX A

Selected References

1. California Code of Regulations, 2022, California Building Code, Title 24, Part 2, Volume 2, Based on the 2021 International Building Code, Effective Date January 1, 2023.
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APPENDIX B

Subsurface Investigation

APPENDIX B
Subsurface Investigation

Alta's subsurface investigation consisted of excavating, logging, and sampling four (4) hollow-stem auger borings. Details of the subsurface investigation are presented in Table B. The approximate location of the exploratory excavation is shown on the accompanying Figure 1 and the Geotechnical Logs are attached.

TABLE B <i>SURFACE INVESTIGATION DETAILS</i>			
Equipment	Range of Depths	Sampling Methods	Sample Locations
Hollow-stem auger	Up to 51.5 feet	1. Bulk 2. Ring Samples	1. Bulk-Select Depths 2. Rings-Every 2.5 feet or 5 Feet

UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		grf	ltr	Description	Major Divisions	grf	ltr	Description	
Coarse Grained Soils	Gravel and Gravelly Soils	More than 50% of coarse fraction retained on No. 4 sieve	GW	Well-graded gravels or gravel sand mixtures, little or no fines	Fine Grained Soils	Silts And Clays LL, <50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	
			GP	Poorly-graded gravels or gravel sand mixture, little or no fines			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			GM	Silty gravels, gravel-sand-silt mixtures			OL	Organic silts and organic silt-clays of low plasticity	
			GC	Clayey gravels, gravel-sand-clay mixtures			MH	Inorganic silts, micaceous or diatomaceous fine or silty soils, elastic silts	
	Sand and Sandy Soils	More than 50% retained on No. 200 sieve	More than 50% of coarse fraction passes on No. 4 sieve	SW		Well-graded sands or gravelly sands, little or no fines	VH	Inorganic clays of high plasticity, fat clays	
				SP		Poorly-graded sands or gravelly sands, little or no fines	OH	Organic clays of medium to high plasticity	
				SM		Silty sands, sand-silt mixtures	Highly Organic Soils	PT	Peat and other highly organic soils
				SC		Clayey sands, and-clay mixtures			

BOUNDARY CLASSIFICATION: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENINGS			
200	40	10	4	3/4"	3"	12"	
Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

RELATIVE DENSITY

Sands and Gravels	Blows/Foot (SPT)
Very Loose	<4
Loose	4-10
Medium Dense	11-30
Dense	31-50
Very Dense	>50

CONSISTENCY CLASSIFICATION

Silts and Clays	Criteria
Very Soft	Thumb penetrates soil >1 in.
Soft	Thumb penetrates soil 1 in.
Firm	Thumb penetrates soil 1/4 in.
Stiff	Readily indented with thumbnail
Very Stiff	Thumbnail will not indent soil

HARDNESS

Bedrock
Soft
Moderately Hard
Hard
Very Hard

LABORATORY TESTS

Symbol	Test
DS	Direct Shear
DSR	Direct Shear (Remolded)
CON	Sieve Analysis
SA	Maximum Density
MAX	Resistance (R) Value
RV	Expansion Index
EI	Sand Equivalent
SE	Atterberg Limits
AL	Chemical Analysis
CHEM	Hydrometer Analysis
HY	

SOIL MOISTURE

Increasing Visual Moisture Content
↓
Dry - Dry to touch
Moist - Damp, but no visible free water
wet - Visible free water

SIZE PROPORTIONS

Trace - <5%
Few - 5 to 10%
Some - 15 to 25%



GEOTECHNICAL BORING LOG

PROJECT NO. 1-0485
 DATE STARTED 5/22/23
 DATE FINISHED 5/22/23
 DRILLER 2R Drilling Inc.
 TYPE OF DRILL RIG 8" Hollow Stem Auger

PROJECT NAME 122-126 North Pacific Coast Highway
 GROUND ELEV. 95
 GW DEPTH (FT) _____
 DRIVE WT. 140lbs
 DROP 30 in.

BORING DESIG. B-1
 LOGGED BY JC
 NOTE _____

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOWS	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
95					SM	@0.0ft. 3" Asphaltic Concrete, No Base.				
		R	22		SP	ARTIFICIAL FILL-UNDOCUMENTED (afu): SILTY SAND, very fine to medium grained, dark brown, dry, medium dense, trace fine gravel <1/2". @2.0ft. olive brown.	2.5	116	16	
5	90	R	10			OLDER EOLIAN DEPOSITS (Qoe): SAND, fine to coarse grained, tannish brown, moist, medium dense, some clay. @5.0ft. loose, some silt.	4.8	99	19	
10	85	R	28			@10.0ft. brownish tan, medium dense.	3.5	102	15	
15	80	R	68			@15.0ft. orange tan, very dense.	6.0	108	30	
20	75	R	76 for 10"			@20.0ft. tan.	3.6	100	15	
25	70	R	75			@25.0ft. orange tan.	3.9	102	17	
TOTAL DEPTH 26.0 FEET NO GROUNDWATER ENCOUNTERED CAVING OBSERVED BELOW 15.0 FEET										

SAMPLE TYPES:
 R RING (DRIVE) SAMPLE
 S SPT (SPLIT SPOON) SAMPLE
 B BULK SAMPLE T TUBE SAMPLE

▼ GROUNDWATER
 ► SEEPAGE
 J: JOINTING C: CONTACT
 B: BEDDING F: FAULT
 S: SHEAR RS: RUPTURE SURFACE

Alta California Geotechnical, Inc.

P.N. 1-0485 PLATE B-1

APPENDIX C

Laboratory Testing

LABORATORY TESTING

The following laboratory tests were performed on a representative sample in accordance with the applicable latest standards or methods from the ASTM, California Building Code (CBC) and California Department of Transportation.

Classification

Soils were classified with respect to the Unified Soil Classification System (USCS) in accordance with ASTM D-2487 and D-2488.

Particle Size Analysis

Modified hydrometer testing was conducted to aid in classification of the soil. The results of the particle size analysis are presented in Table C.

Maximum Density/Optimum Moisture

The maximum dry density and optimum moisture content of one representative bulk samples were evaluated in accordance with ASTM D-1557. The results are summarized in Table C.

Expansion Index Tests

One (1) expansion index test was performed to evaluate the expansion potential of typical on-site soil. Testing was carried out in general conformance with ASTM Test Method D-4829. The results are presented in Table C.

Consolidation Tests

Consolidation testing was performed on two (2) relatively “undisturbed” soil samples at their natural moisture content in accordance with procedures outlined in ASTM D-2435. The samples were placed in a consolidometer and loads were applied incrementally in geometric progression. The samples (2.42-inches in diameter and 1-inch in height) were permitted to consolidate under each load increment until the slope of the characteristic linear secondary compression portion of the thickness versus log of time plot was apparent. The percent consolidation for each load cycle was recorded as the ratio of the amount of vertical

compression to the original 1-inch height. The consolidation test results are shown on Plates C-1 and C-2.

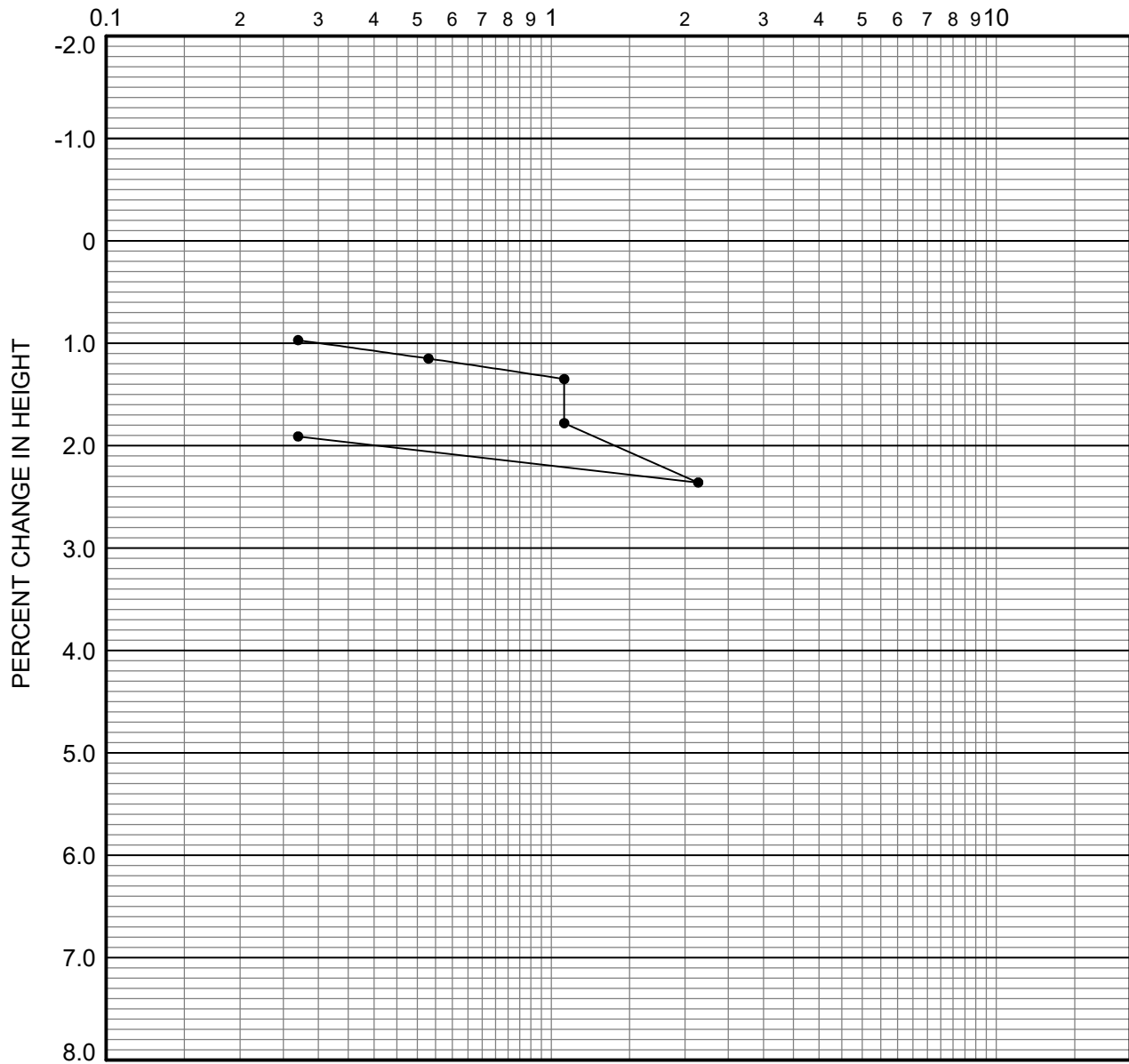
Chemical Analyses

Chemical testing was performed on one select samples by Alta. The results of these tests (sulfate content, resistivity, chloride content and pH) are presented on Table C.

**TABLE C
SUMMARY OF LABORATORY TEST DATA
P.N. 1-0485**

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	DIRECT SHEAR	PLUS NO.4 SEIVE (plus 4.76mm) (%)	SAND (4.76mm-0.075mm) (%)	SILT (0.075mm-0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	CONSOL	OTHER TESTS REMARKS
B-1	10	Sand (Qoe)	SP				0	95	3	2		SEE PLATE C-1	
B-2	5	Sand (Qoe)	SP				0	91	3	6		SEE PLATE C-2	
B-3	2.5	Silty Sand (afu)	SM	129.0	8.0		9	73	9	9	0		MinResist: 1163-OHMCM pH:7.1,Chl:115ppm,So4:0.05%

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-1	10.0	102	3.5	15	5	SP	Sand (Qoe)

REMARKS: WATER ADDED AT 1.07 TSF

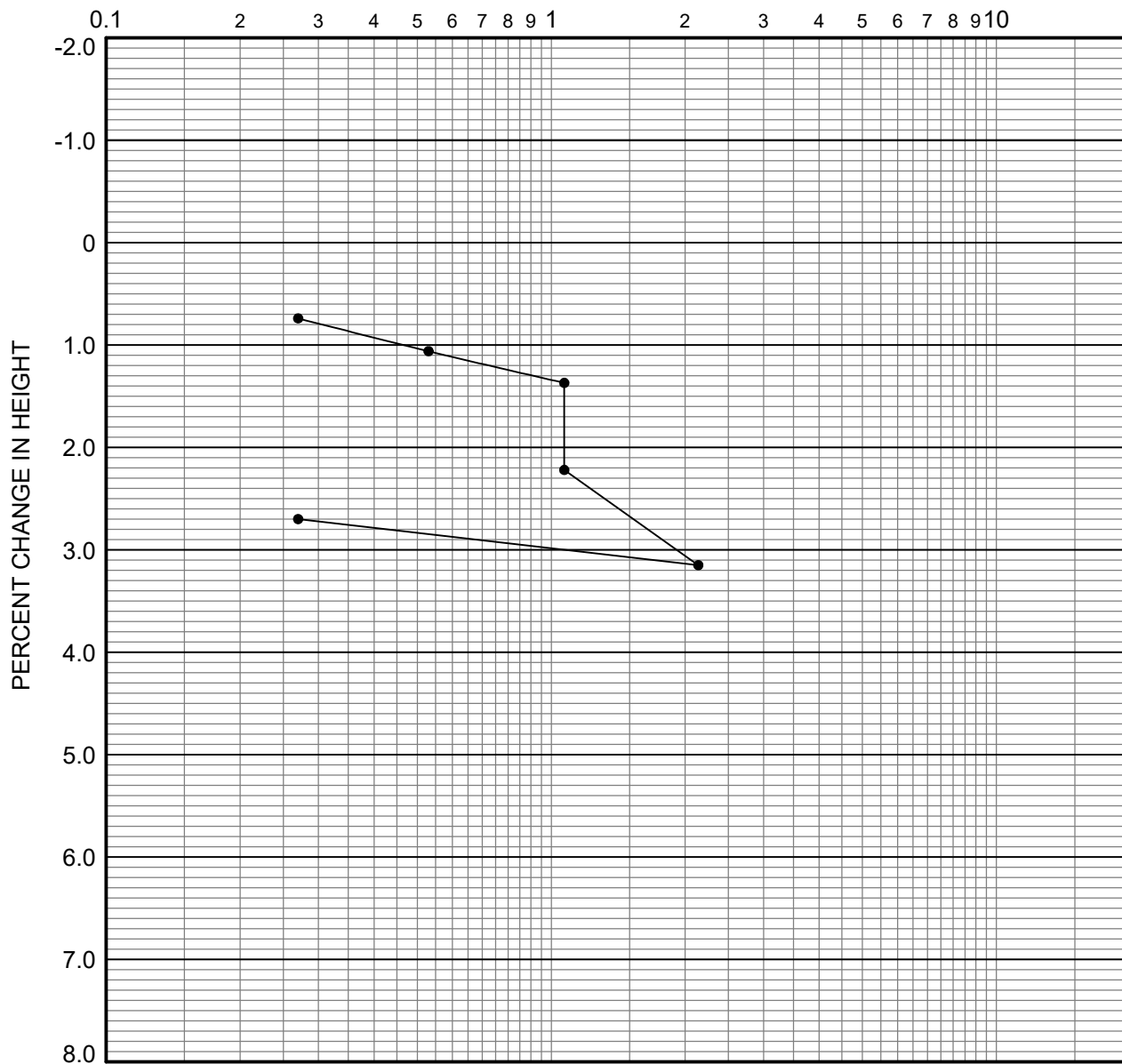
CONSOLIDATION CURVE

Alta California Geotechnical, Inc.

P.N. 1-0485

PLATE C-1

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density (pcf)	in situ moist. (%)	in situ satur. (%)	-200 sieve (%)	group symbol	typical names
B-2	5.0	99	3.5	14	9	SP	Sand (Qoe)

REMARKS: WATER ADDED AT 1.07 TSF

CONSOLIDATION CURVE

Alta California Geotechnical, Inc.

P.N. 1-0485

PLATE C-2

APPENDIX D

Maintenance and Improvement Considerations

MAINTENANCE AND IMPROVEMENT CONSIDERATIONS

General

Owners purchasing property must assume a certain degree of responsibility for improvements and for maintaining conditions around their home. Of primary importance from a geotechnical standpoint are maintaining drainage patterns and minimizing the soil moisture variation below all improvements. Such design, construction and owner maintenance provisions may include:

- Employing contractors for improvements who design and build in recognition of local building codes and specific site soils conditions.
- Establishing and maintaining positive drainage away from all foundations, walkways, driveways, patios, and other improvements.
- Avoiding the construction of planters adjacent to structural improvements. Alternatively, planter sides/bottoms can be sealed with an impermeable membrane and drained away from the improvements via subdrains into approved disposal areas.
- Sealing and maintaining construction/control joints within concrete slabs and walkways to reduce the potential for moisture infiltration into the subgrade soils.
- Utilizing landscaping schemes with vegetation that requires minimal watering. Watering should be done in a uniform manner, as equally as possible on all sides of the foundation, keeping the soil "moist" but not allowing the soil to become saturated.
- Maintaining positive drainage away from structures and providing roof gutters on all structures with downspouts that are designed to carry roof runoff directly into area drains or discharged well away from the foundation areas.
- Avoiding the placement of trees closer to the proposed structures than a distance of one-half the mature height of the tree.
- Observation of the soil conditions around the perimeter of the structure during extremely hot/dry or unusually wet weather conditions so that modifications can be made in irrigation programs to maintain relatively uniform moisture conditions.

Sulfates

Owners should be cautioned against the import and use of certain inorganic fertilizers, soil amendments, and/or other soils from offsite sources in the absence of specific information relating to their chemical composition. Some fertilizers have been known to leach sulfate compounds into soils and increase the sulfate concentrations to potentially detrimental levels.

Site Drainage

- The owners should be made aware of the potential problems that may develop when drainage is altered through construction of hardscape improvements. Pondered water, drainage over the slope face, leaking irrigation systems, overwatering, or other conditions which could lead to ground saturation must be avoided.
- No water should be allowed to flow over the slopes. No alteration of pad gradients should be allowed that would prevent pad and roof runoff from being directed to approved disposal areas.
- Drainage patterns have been established at the time of the fine grading should be maintained throughout the life of the structure. No alterations to these drainage patterns should be made unless designed by qualified professionals in compliance with local code requirements and site-specific soils conditions.

Slope Drainage

- Residents should be made aware of the importance of maintaining and cleaning all interceptor ditches, drainage terraces, down drains, and any other drainage devices, which have been installed to promote slope stability.
- Subsurface drainage pipe outlets may protrude through slope surfaces and/or wall faces. These pipes, in conjunction with the graded features, are essential to slope and wall stability and must be protected in-place. They should not be altered or damaged in any way.

Planting and Irrigation of Slopes

- Seeding and planting of the slopes should be planned to achieve, as rapidly as possible, a well-established and deep-rooted vegetal cover requiring minimal watering.
- It is the responsibility of the landscape architect to provide such plants initially and of the residents to maintain such planting. Alteration of such a planting scheme is at the resident's risk.
- The resident is responsible for proper irrigation and for maintenance and repair of properly installed irrigation systems. Leaks should be fixed immediately.

- Sprinklers should be adjusted to provide maximum uniform coverage with a minimum of water usage and overlap. Overwatering with consequent wasteful runoff and serious ground saturation must be avoided.
- If automatic sprinkler systems are installed, their use must be adjusted to account for seasonal and natural rainfall conditions.

Burrowing Animals

- Residents must undertake a program to eliminate burrowing animals. This must be an ongoing program in order to promote slope stability.

Owner Improvement

Owner improvements (pools, spas, patio slabs, retaining walls, planters, etc.) should be designed to account for the terrain of the project, as well as expansive soil conditions and chemical characteristics. Design considerations on any given lot may need to include provisions for differential bearing materials, ascending/descending slope conditions, bedrock structure, perched (irrigation) water, special geologic surcharge loading conditions, expansive soil stresses, and long-term creep/settlement.

All owner improvements should be designed and constructed by qualified professionals utilizing appropriate design methodologies, which account for the on-site soils and geologic conditions. Each lot and proposed improvement should be evaluated on an individual basis.

Setback Zones

Manufactured slopes maybe subject to long-term settlement and creep that can manifest itself in the form of both horizontal and vertical movement. These movements typically are produced as a result of weathering, erosion, gravity forces, and other natural phenomenon. A setback adjacent to slopes is required by most building codes, including the California Building Code. This zone is intended to locate and support the residential structures away from these slopes and onto soils that are not subject to the potential adverse effects of these natural phenomena.

The owner may wish to construct patios, walls, walkways, planters, swimming pools, spas, etc. within this zone. Such facilities may be sensitive to settlement and creep and should not be

constructed within the setback zone unless properly engineered. It is suggested that plans for such improvements be designed by a professional engineer who is familiar with grading ordinances and design and construction requirements. In addition, we recommend that the designer and contractor familiarize themselves with the site specific geologic and geotechnical conditions on the specific lot.

APPENDIX E

Earthwork Specifications

**ALTA CALIFORNIA GEOTECHNICAL, INC.
EARTHWORK SPECIFICATIONS**

These specifications present the generally accepted standards and minimum earthwork requirements for the development of the project. These specifications shall be the project guidelines for earthwork except where specifically superseded in preliminary geology and soils reports, grading plan review reports or by the prevailing grading codes or ordinances of the controlling agency.

A. GENERAL

1. The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications.
2. The project Geotechnical Engineer and Engineering Geologist, or their representatives, shall provide observation and testing services, and Geotechnical consultation for the duration of the project.
3. All clearing, grubbing, stripping and site preparation for the project shall be accomplished by the Contractor to the satisfaction of the Geotechnical Engineer/Engineering Geologist.
4. It is the Contractor's responsibility to prepare the ground surface to receive fill to the satisfaction of the Geotechnical Engineer and to place, spread, mix, moisture condition, and compact the fill in accordance with the job specifications and as required by the Geotechnical Engineer. The Contractor shall also remove all material considered by the Geotechnical Engineer to be unsuitable for use in the construction of engineered fills.
5. The Contractor shall have suitable and sufficient equipment in operation to handle the amount of fill being placed. When necessary, equipment will be shut down temporarily in order to permit the proper preparation of fills.

B. PREPARATION OF FILL AREAS

1. Excessive vegetation and all deleterious material should be disposed of offsite as required by the Geotechnical Engineer.

Existing fill, soil, alluvium or rock materials determined by the Geotechnical Engineer as being unsuitable for placement in compacted fills shall be removed and hauled from the site. Where applicable, the Contractor may obtain the

approval of the Soils Engineer and the controlling authorities for the project to dispose of the above described materials, or a portion thereof, in designated areas onsite.

After removal of the deleterious materials have been accomplished, earth materials deemed unsuitable in their natural, in-place condition, shall be removed as recommended by the Geotechnical Engineer/Engineering Geologist.

2. Upon achieving a suitable bottom for fill placement, the exposed removal bottom shall be disced or bladed by the Contractor to the satisfaction of the Geotechnical Engineer. The prepared ground surfaces shall then be brought to the specified moisture content mixed as required, and compacted and tested as specified. In localities where it is necessary to obtain the approval of the controlling agency prior to placing fill, it will be the Contractor's responsibility to contact the proper authorities to visit the site.
3. Any underground structure such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines or other structures not located prior to grading are to be removed or treated in a manner prescribed by the Geotechnical Engineer and/or the controlling agency for the project.

C. ENGINEERED FILLS

1. Any material imported or excavated on the property may be utilized as fill, provided the material has been determined to be suitable by the Geotechnical Engineer. Deleterious materials shall be removed from the fill as directed by the Geotechnical Engineer.
2. Rock or rock fragments less than twelve inches in the largest dimension may be utilized in the fill, provided they are not placed in concentrated pockets and the distribution of the rocks is approved by the Geotechnical Engineer.
3. Rocks greater than twelve inches in the largest dimension shall be taken offsite, or placed in accordance with the recommendations of the Geotechnical Engineer in areas designated as suitable for rock disposal.
4. All materials to be used as fill, shall be tested in the laboratory by the Geotechnical Engineer. Proposed import materials shall be approved by the Geotechnical Engineer 48 hours prior to importation.
5. The fill materials shall be placed by the Contractor in lifts, that when compacted, shall not exceed six inches. Each lift shall be spread evenly and shall be

thoroughly mixed to achieve a near uniform moisture condition and a uniform blend of materials.

All compaction shall be achieved at or above the optimum moisture content, as determined by the applicable laboratory standard. The Contractor will be notified if the fill materials are too wet or too dry to achieve the required compaction standard.

6. When the moisture content of the fill material is below the limit specified by the Geotechnical Engineer, water shall be added and the materials shall be blended until a uniform moisture content, within specified limits, is achieved. When the moisture content of the fill material is above the limits specified by the Geotechnical Engineer, the fill materials shall be aerated by discing, blading, mixed with dryer fill materials, or other satisfactory methods until the moisture content is within the specified limits.
7. Each fill lift shall be compacted to the minimum project standards, in compliance with the testing methods specified by the controlling governmental agency, and in accordance with recommendations of the Geotechnical Engineer.

In the absence of specific recommendations by the Geotechnical Engineer to the contrary, the compaction standard shall be the most recent version of ASTM:D 1557.

8. Where a slope receiving fill exceeds a ratio of five-horizontal to one-vertical, the fill shall be keyed and benched through all unsuitable materials into sound bedrock or firm material, in accordance with the recommendations and approval of the Geotechnical Engineer.
9. Side hill fills shall have a minimum key width of 15 feet into bedrock or firm materials, unless otherwise specified in the soil report and approved by the Geotechnical Engineer in the field.
10. Drainage terraces and subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency and/or with the recommendations of the Geotechnical Engineer and Engineering Geologist.
11. The Contractor shall be required to maintain the specified minimum relative compaction out to the finish slope face of fill slopes, buttresses, and stabilization fills as directed by the Geotechnical Engineer and/or the governing agency for the project. This may be achieved by either overbuilding the slope and cutting

back to the compacted core; by direct compaction of the slope face with suitable equipment; or by any other procedure which produces the required result.

12. The fill portion of fill-over-cut slopes shall be properly keyed into rock or firm material; and the fill area shall be stripped of all soil or unsuitable materials prior to placing fill.

The design cut portion of the slope should be made first and evaluated for suitability by the Engineering Geologist prior to placement of fill in the keyway above the cut slope.

13. Pad areas in cut or natural ground shall be approved by the Geotechnical Engineer. Finished surfaces of these pads may require scarification and recompaction, or over excavation as determined by the Geotechnical Engineer.

D. CUT SLOPES

1. The Engineering Geologist shall observe all cut slopes and shall be notified by the Contractor when cut slopes are to be started.
2. If, during the course of grading, unforeseen adverse or potentially adverse geologic conditions are encountered, the Engineering Geologist and Soil Engineer shall investigate, analyze and make recommendations to remediate these problems.
3. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the superjacent, prevailing drainage.
4. Unless otherwise specified in specific geotechnical reports, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.
5. Drainage terraces shall be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the Geotechnical Engineer or Engineering Geologist.

E. GRADING CONTROL

1. Fill placement shall be observed and tested by the Geotechnical Engineer and/or his representative during grading.

Field density tests shall be made by the Geotechnical Engineer and/or his representative to evaluate the compaction and moisture compliance of each fill lift. Density tests shall be conducted at intervals not to exceed two feet of fill

height. Where sheepsfoot rollers are used, the fill may be disturbed to a depth of several inches. Density determinations shall be taken in the compacted material below the disturbed surface at a depth determined by the Geotechnical Engineer or his representative.

2. Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction, or improper moisture content is in evidence, that particular layer or portion thereof shall be reworked until the required density and/or moisture content has been attained. Additional fills shall not be placed over an area until the previous lift of fill has been tested and found to meet the density and moisture requirements for the project and the previous lift is approved by the Geotechnical Engineer.
3. When grading activities are interrupted by heavy rains, fill operations shall not be resumed until field observations and tests by the Geotechnical Engineer indicate the moisture content and density of the fill are within the specified limits.
4. During construction, the Contractor shall properly grade all surfaces to maintain good drainage and prevent the ponding of water. The Contractor shall take remedial action to control surface water and to prevent erosion of graded areas until such time as a permanent drainage and erosion devices have been installed.
5. Observation and testing by the Geotechnical Engineer and/or his representative shall be conducted during filling and compacting operations in order that he will be able to state in his opinion that all cut and filled areas are graded in accordance with the approved specifications.
6. Upon the completion of grading activities and after the Geotechnical Engineer and Engineering Geologist have finished their observations of the work, final reports shall be submitted. No further excavation or fill placement shall be undertaken without prior notification of the Geotechnical Engineer and/or Engineering Geologist.

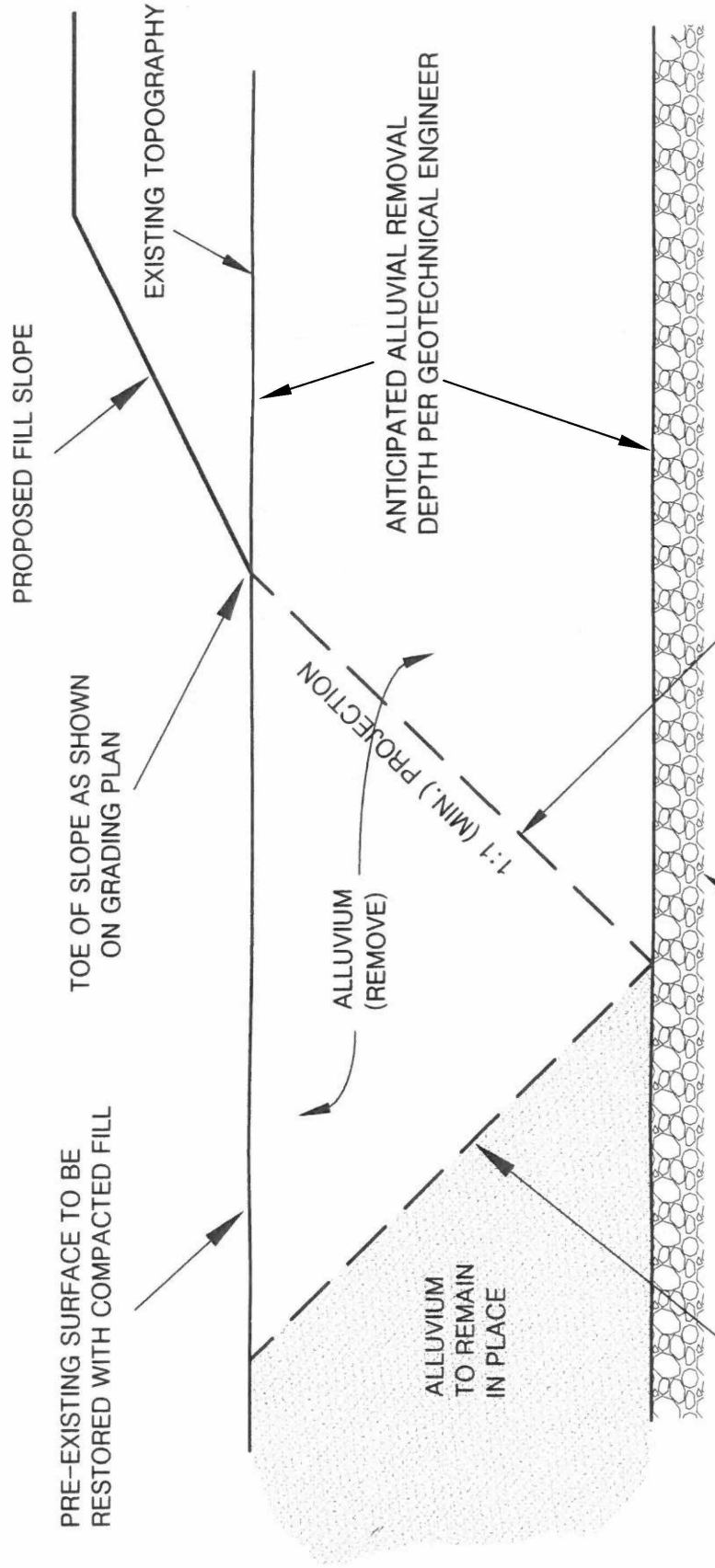
F. FINISHED SLOPES

All finished cut and fill slopes shall be planted and irrigated and/or protected from erosion in accordance with the project specifications, governing agencies, and/or as recommended by a landscape architect.

APPENDIX F

Grading Details

DETAIL FOR FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON



FORECUT VARIES: FOR DEEP REMOVALS, FORECUT SHOULD BE MADE NO STEEPER THAN 1:1, OR AS REQUIRED FOR SAFETY CONSIDERATIONS

APPROVED COMPETENT MATERIAL

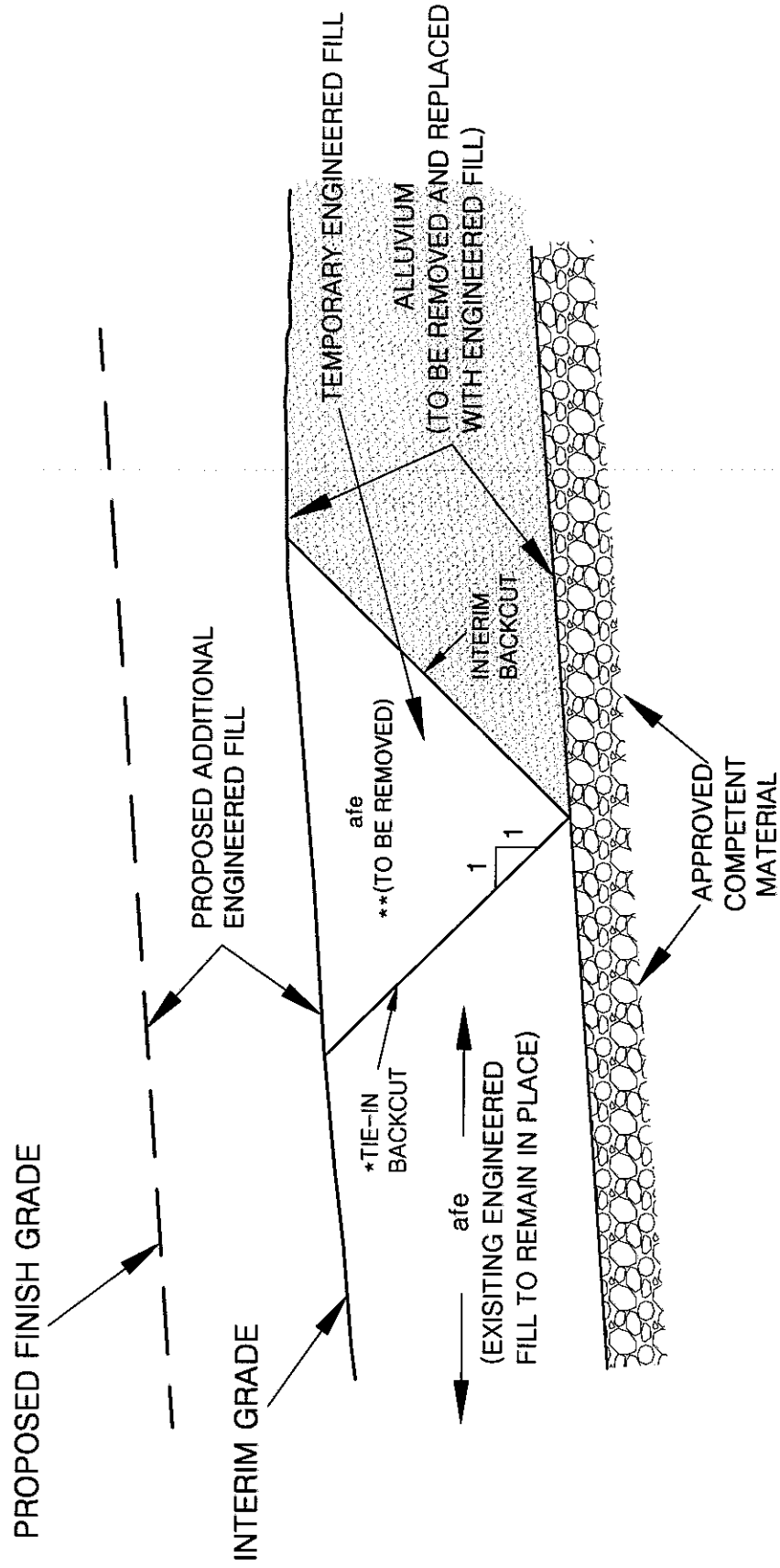
PROVIDE A 1:1 MIN. PROJECTION FROM TOE OF SLOPE AS SHOWN ON GRADING PLAN TO THE RECOMMENDED REMOVAL BOTTOM. SLOPE HEIGHT, SITE CONDITIONS, AND/OR LOCAL CONDITIONS COULD DICTATE FLATTER PROJECTIONS



ALTA CALIFORNIA GEOTECHNICAL, INC.
VER. 3/12

PLATE G-1

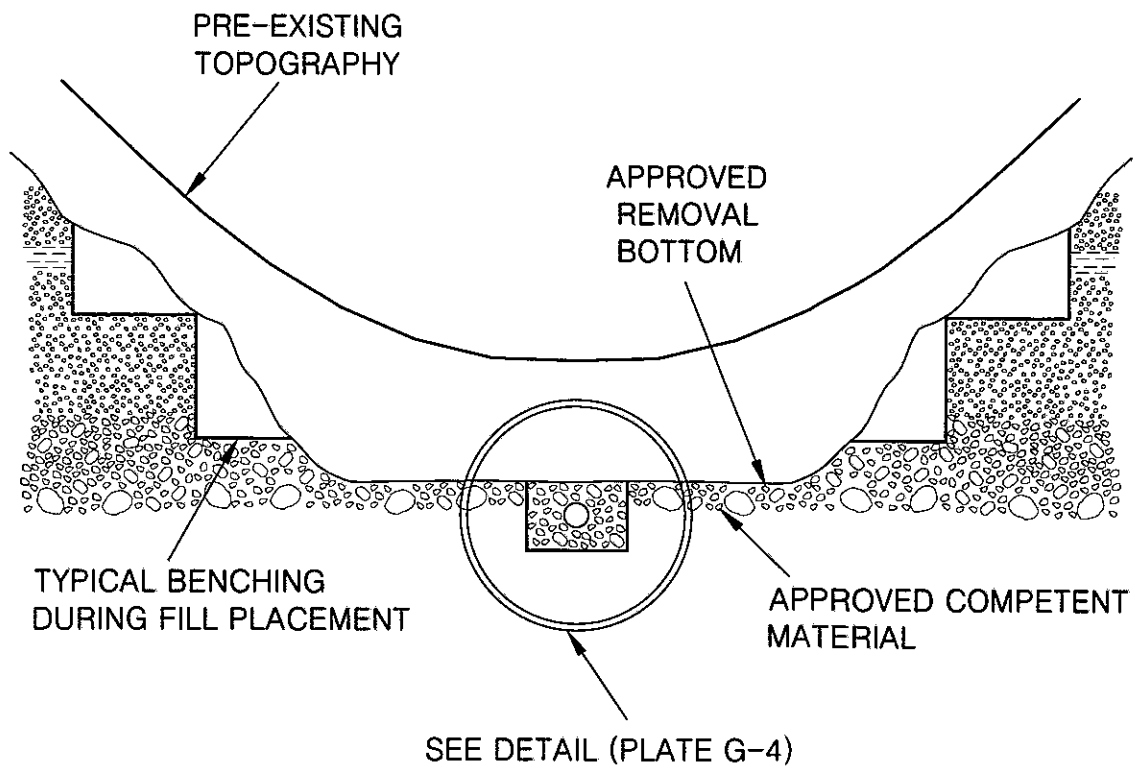
REMOVAL ADJACENT TO EXISTING FILL



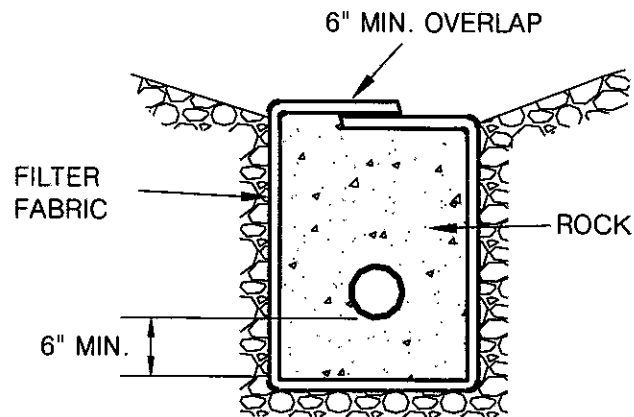
*INITIATE 1:1 TIE-IN BACKCUT TO INTERCEPT TOE OF INTERIM BACKCUT

** AS PART OF TIE-IN FOR ADDITIONAL ENGINEERED FILL

CANYON SUBDRAIN



CANYON SUBDRAIN DETAIL



PERFORATED PIPE SURROUNDED WITH ROCK AND FILTER FABRIC

ROCK: MIN. VOLUME OF 9 CU.FT. PER LINEAL FT. OF 3/4 IN. MAX. ROCK

PIPE: 6 IN. ABS OR PVC PIPE WITH A MINIMUM OF 8 PERFORATIONS

(1/4-IN. DIA.) PER LINEAL FT. IN BOTTOM HALF OF PIPE

ASTM D2751, SDR 35, OR ASTM D3034 OR ASTM D1527,

SCHD. 40 ASTM D1785, SCHD. 40

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT

NOTES:

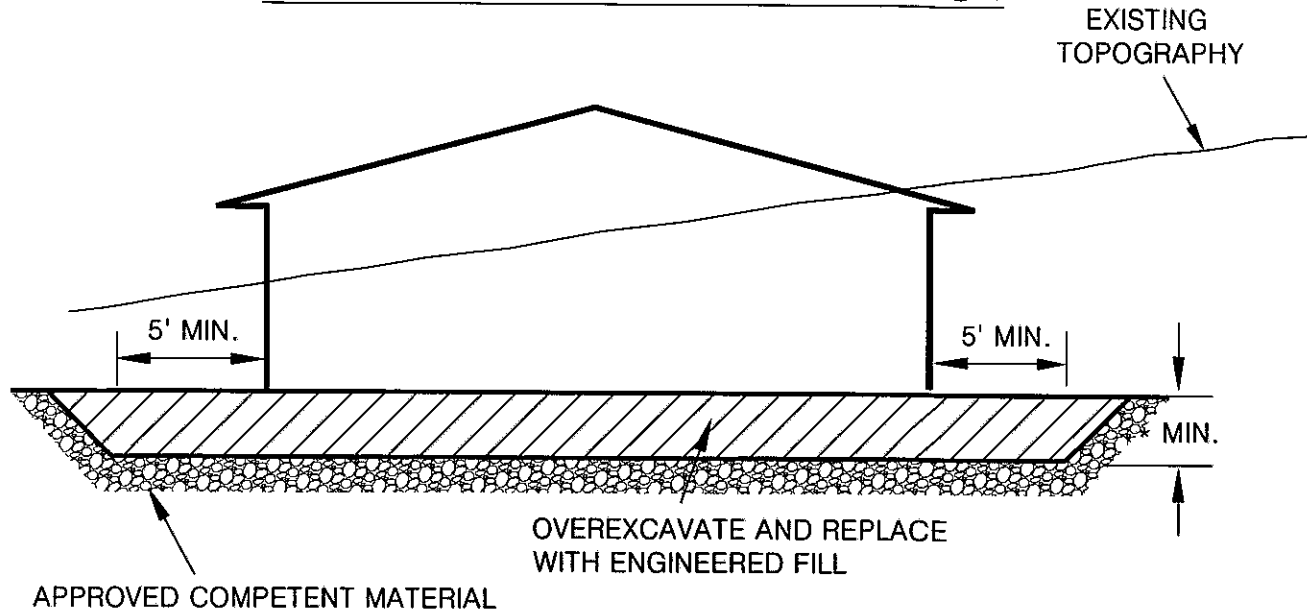
1. FOR CONTINUOUS RUN IN EXCESS OF 500. FT USE 8 IN. DIA. PIPE
2. ENGINEERED FILL PLACED BELOW DRAINS SHALL BE COMPACTED TO 93% OF THE LABORATORY MAXIMUM DRY DENSITY (ASTM:D1557)



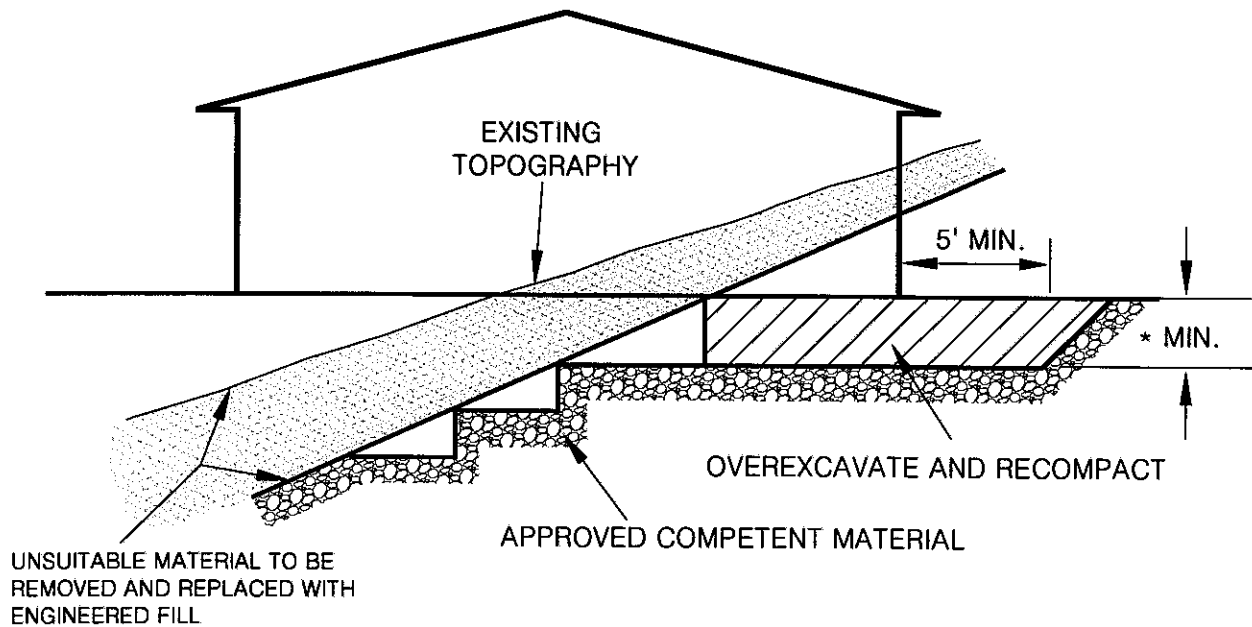
ALTA CALIFORNIA GEOTECHNICAL, INC.
VER. 3/12

PLATE G-4

OVEREXCAVATION CUT LOT



CUT-FILL LOT (TRANSITION)



*NOTE ALL BUILDING PADS SHALL BE OVER EXCAVATED TO A MINIMUM OF $\frac{1}{3}$ OF THE MAXIMUM DEPTH OF FILL BELOW THE BUILDING PAD TO A MAXIMUM OF 17 FEET (SEE PLATE G-16)

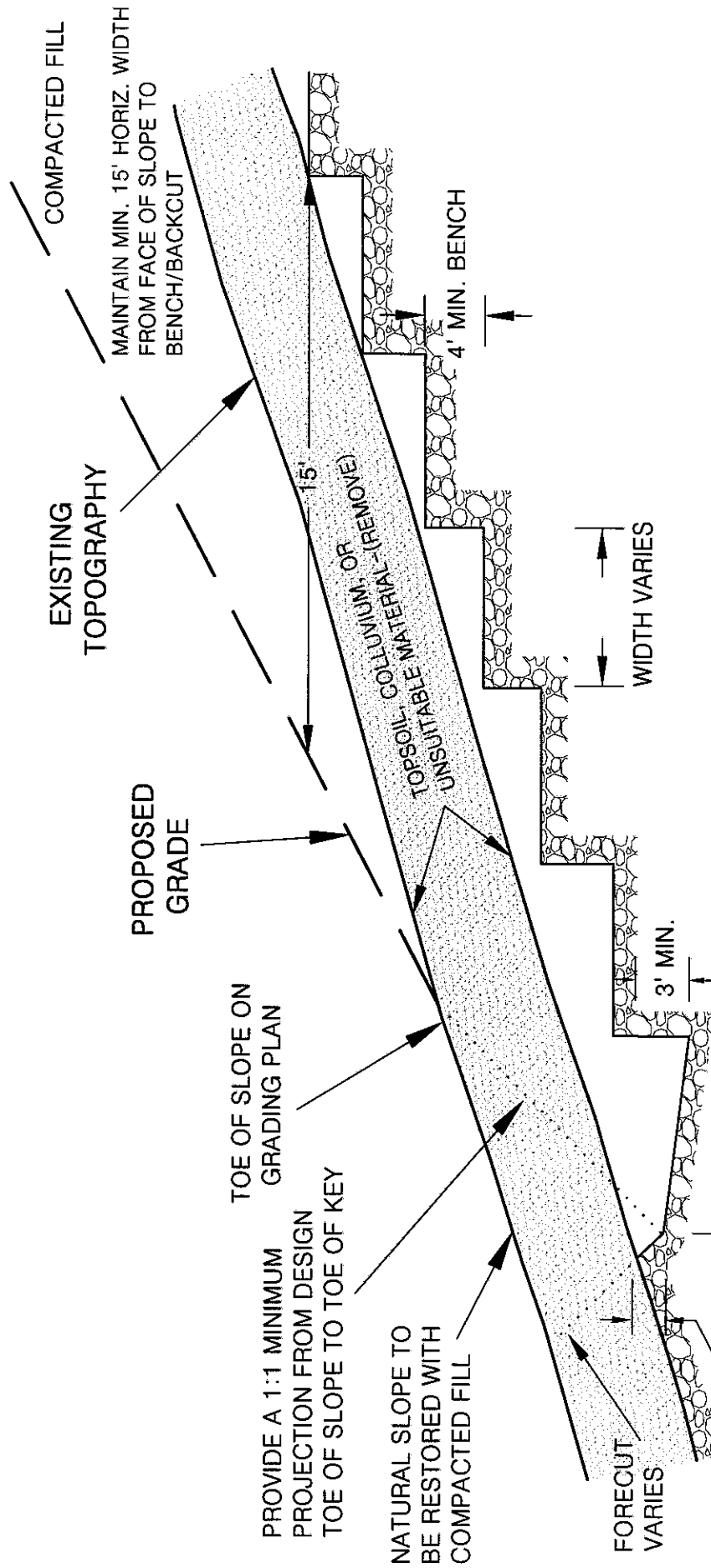


ALTA CALIFORNIA GEOTECHNICAL, INC.
VER. 3/12

PLATE G-5

SIDE HILL SLOPE FILL DETAIL

(NATURAL SLOPES 5:1 OR STEEPER)



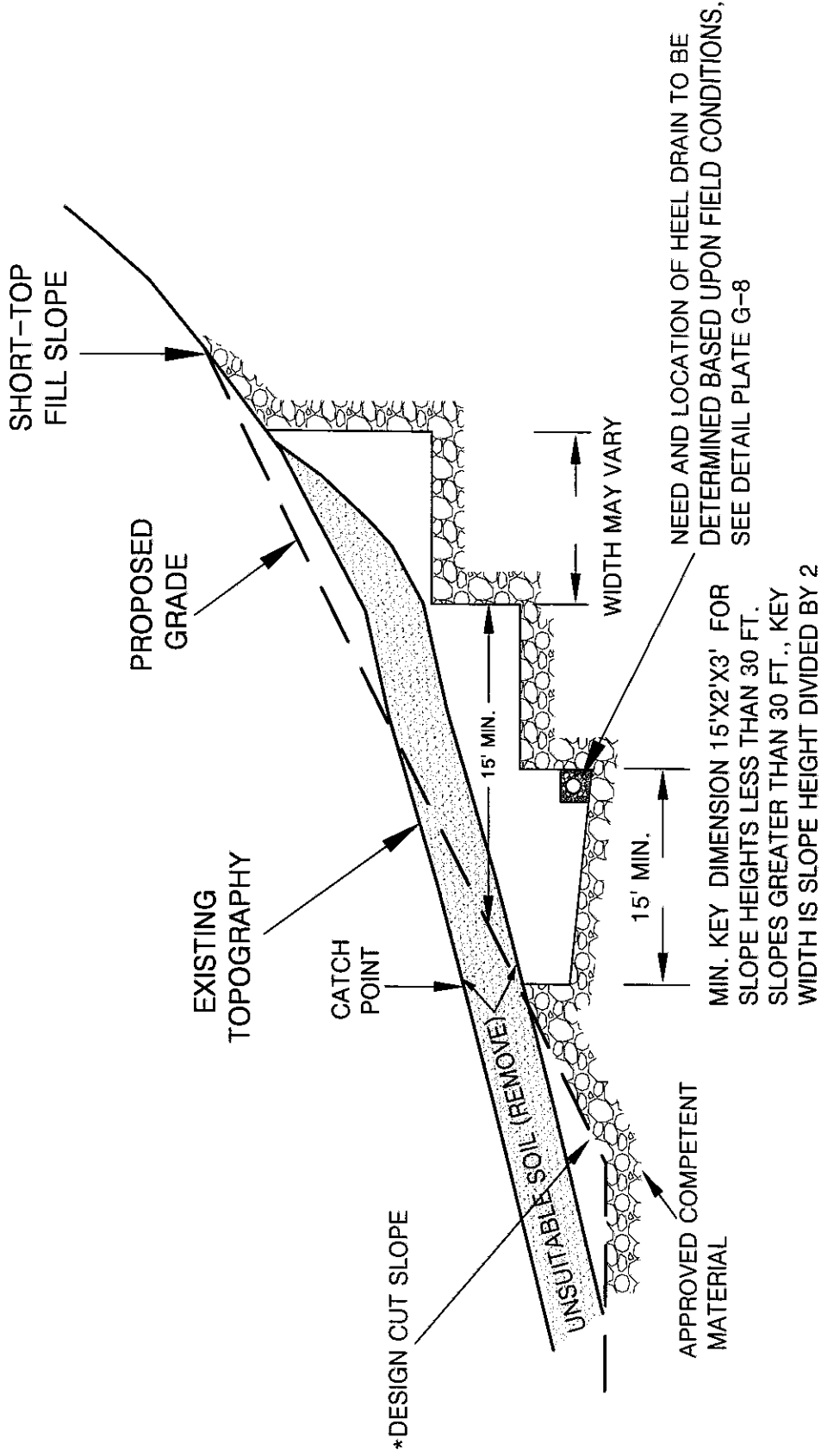
- PROVIDE A 1:1 MINIMUM PROJECTION FROM DESIGN TOE OF SLOPE TO TOE OF KEY
- EXISTING TOPOGRAPHY
- PROPOSED GRADE
- TOE OF SLOPE ON GRADING PLAN
- TOE OF SLOPE TO TOE OF KEY
- NATURAL SLOPE TO BE RESTORED WITH COMPACTED FILL
- FORECUT VARIES
- 2' MIN. INTO APPROVED COMPETENT MATERIAL
- 15' MIN.
- 3' MIN.
- 4' MIN. BENCH
- TOPSOIL, COLLUVIUM, OR UNSUITABLE MATERIAL - (REMOVE)
- WIDTH VARIES
- MAINTAIN MIN. 15' HORIZ. WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT
- COMPACTED FILL
- NOTES:
1. WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, SEE PLATE G-1. WHERE THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN SLOPE RATIO, SPECIAL RECOMMENDATIONS WILL BE PROVIDED BY THE GEOTECHNICAL ENGINEER.
 2. THE NEED FOR AND PLACEMENT OF DRAINS WILL BE DETERMINED BY THE GEOTECHNICAL ENGINEER OR GEOLOGIST BASED UPON EXPOSED FIELD CONDITIONS.



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PLATE G-6

FILL OVER CUT SLOPE DETAIL



*THE CUT PORTION OF THE SLOPE SHOULD BE EXCAVATED AND EVALUATED BY THE ENGINEERING GEOLOGIST/GEO TECHNICAL ENGINEER PRIOR TO CONSTRUCTING THE FILL SLOPE

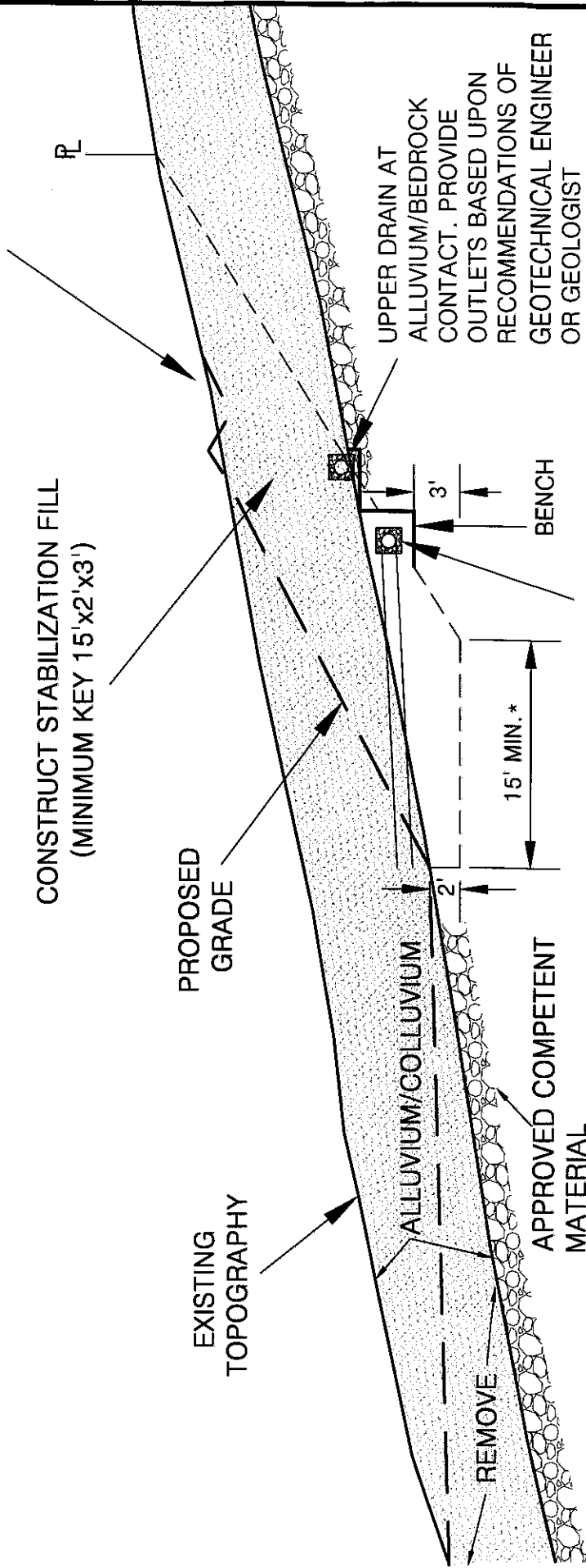


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VER. 1/18

PLATE G-7

STABILIZATION FILL (UPSLOPE ALLUVIATED AREA)

PROVIDE BERM, PAVED SWALE,
AND/OR STORM DRAIN PER
CIVIL ENGINEER

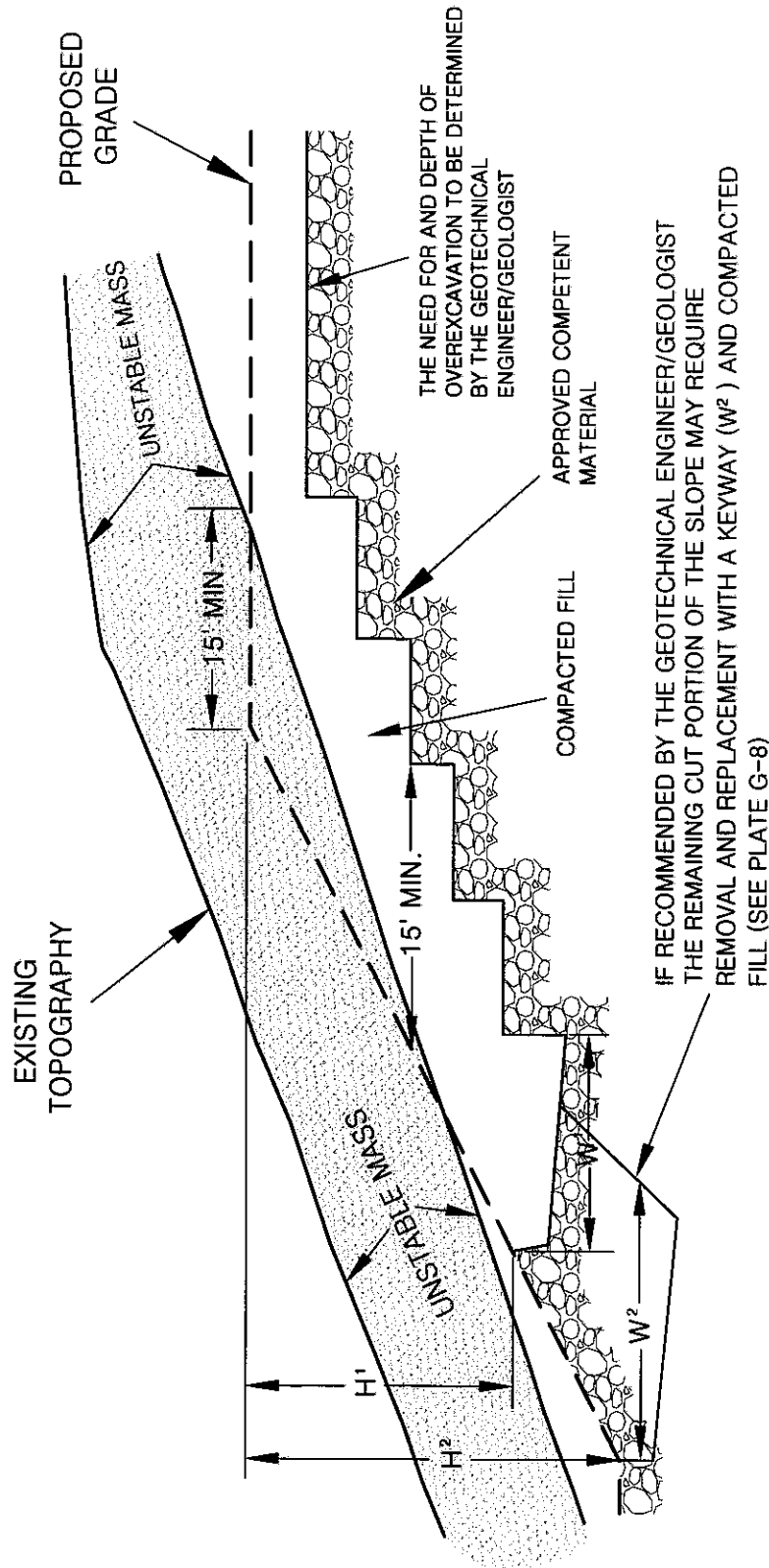


UPPER DRAIN AT
ALLUVIUM/BEDROCK
CONTACT. PROVIDE
OUTLETS BASED UPON
RECOMMENDATIONS OF
GEOTECHNICAL ENGINEER
OR GEOLOGIST

BACK DRAIN
PER DETAIL G-8

* FOR SLOPE HEIGHTS LESS THAN 30 FT.
SLOPES GREATER THAN 30 FT., KEY
WIDTH IS SLOPE HEIGHT DIVIDED BY 2

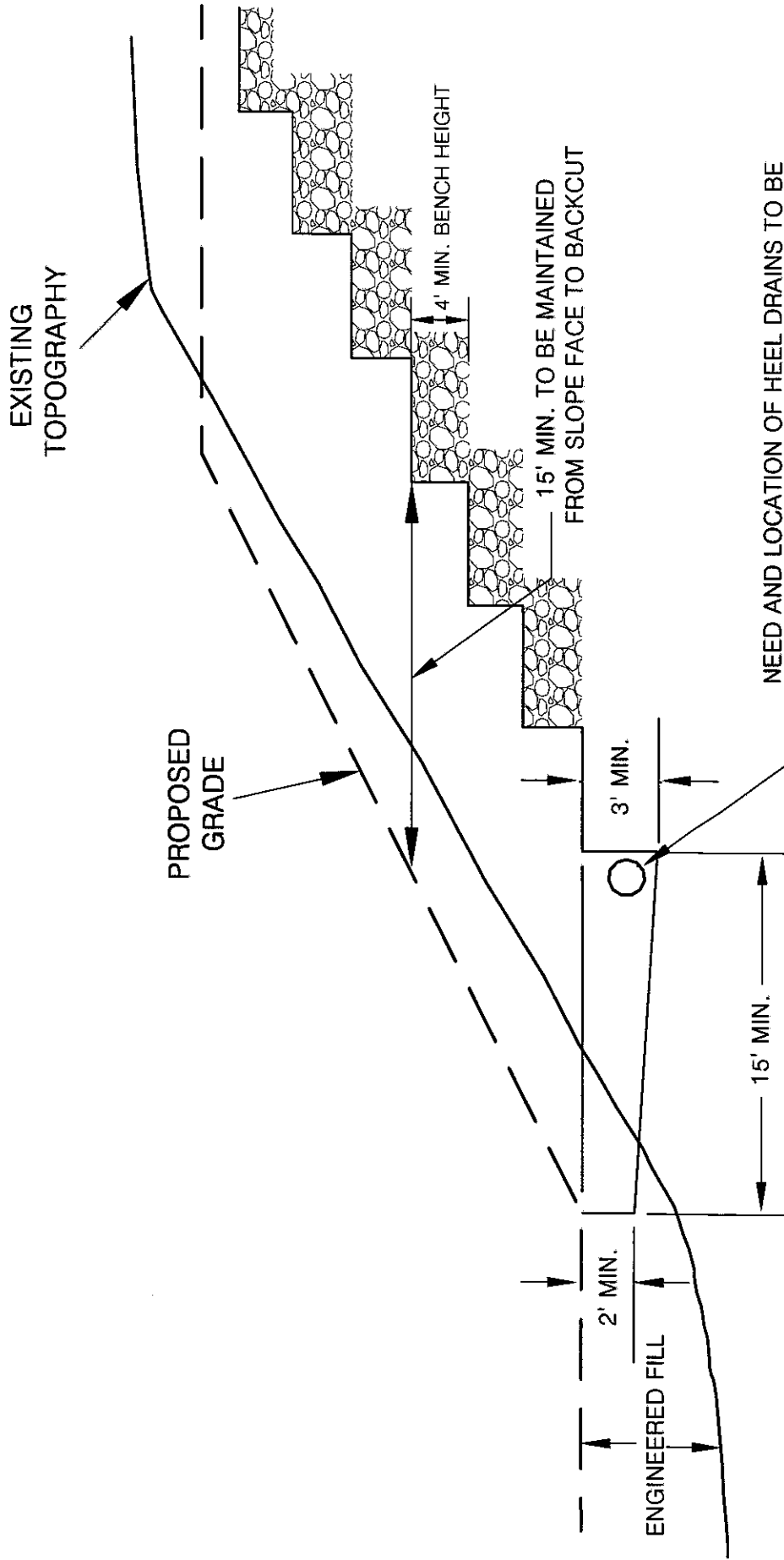
SELECTIVE GRADING DETAIL FOR STABILIZATION FILL UNSTABLE MATERIAL EXPOSED IN PORTION OF CUT SLOPE



NOTES: 1. BACKDRAINS ARE NOT REQUIRED UNLESS SPECIFIED.

2. "W" SHALL BE EQUIPMENT WIDTH (15') FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE PROJECT GEOTECHNICAL ENGINEER/GEOLOGIST. AT NO TIME SHALL "W" BE LESS THAN H/2.

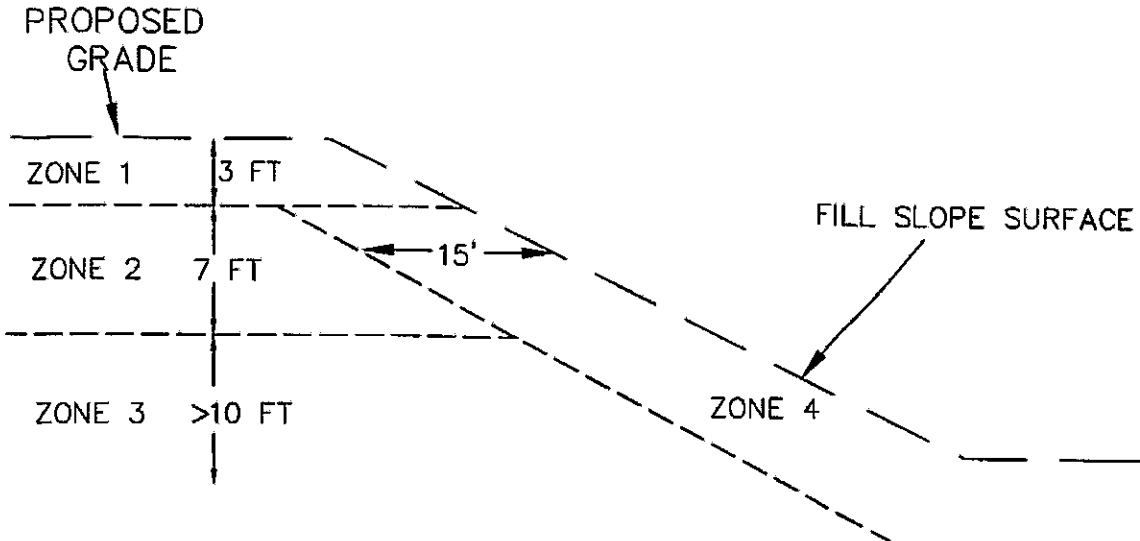
SKIN FILL SLOPE OVER NATURAL GROUND



MIN. KEY DIMENSIONS 15'X2'X3' FOR SLOPE HEIGHTS LESS THAN 30 FT. SLOPES GREATER THAN 30 FT., KEY WIDTH IS SLOPE HEIGHT DIVIDED BY 2

NEED AND LOCATION OF HEEL DRAINS TO BE DETERMINED BASED UPON FIELD CONDITIONS IF REQUIRED, SEE DETAIL PLATE G-8

DETAIL FOR MAXIMUM PARTICLE DIMENSION



ZONE	DEPTH	PARTICLE MAX. DIMENSION	PLACEMENT METHOD
1	0-3 ft.	≤ 1.0 ft.	STANDARD OR CONVENTIONAL COMPACTION METHODS (SEE EARTHWORK SPECIFICATIONS)
2	3-10 ft.	≤ 2.0 ft.	ROCK BLANKETS (SEE PLATE G-13)
3	>10 ft.	≤ 8.0 ft.	ROCK BLANKETS (PLATE G-13) ROCK WINDROW (PLATE G-14) INDIVIDUAL ROCK BURIED (PLATE G-15)
4	15 HORIZONTAL FEET FROM FILL SLOPE FACE	≤ 1.0 ft.	STANDARD OR CONVENTIONAL COMPACTION METHODS (SEE EARTHWORK SPECIFICATIONS)

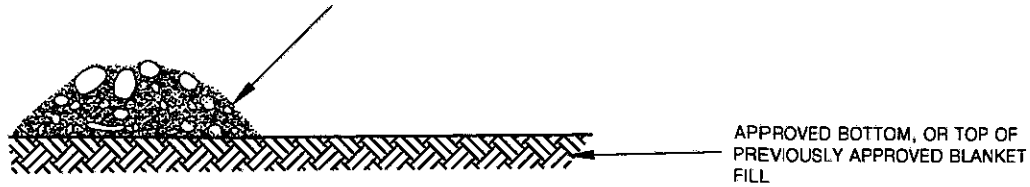


ALTA CALIFORNIA GEOTECHNICAL, INC.
VER. 2/15

PLATE G-12

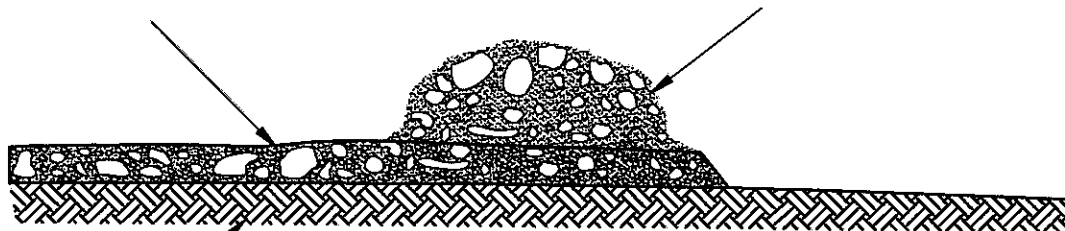
ROCK BLANKET DETAILS

LOOSE PILE 1
 LOOSE, DUMPED ROCK, GRAVEL AND SAND MIXTURE REMOVE
 FRAGMENTS LARGER THAT 2 FEET FOR ISOLATED BURIAL
 (PLATE G-15) OR WINDROW (PLATE G-10)



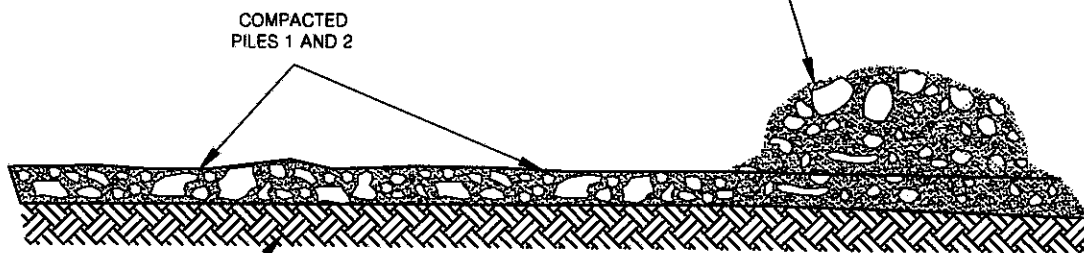
COMPACT PILE 1
 SPREAD LOOSE PILE FORWARD WITH HEAVY TRACKED DOZER (D-8
 OR LARGER). HEAVILY WATER, TRACK, AND APPLY ADDITIONAL SAND
 AND GRAVEL AS NECESSARY TO FILL VOIDS AND CREATE A DENSE
 MATRIX OF ROCK, COBBLES, GRAVEL AND SAND (2 FOOT MAXIMUM
 THICKNESS)

LOOSE PILE 2
 DUMP SUCCESSIVE PILES OF LOOSE ROCK, GRAVEL AND SAND
 MIXTURE ON FORWARD EDGE OF PREVIOUSLY COMPACTED LIFT
 WITH TRUCKS AND/OR SCRAPERS. USE PREVIOUS LIFT TO ACCESS
 AND FURTHER COMPACT PILE 1.



APPROVED BOTTOM, OR TOP OF
 PREVIOUSLY APPROVED BLANKET
 FILL

LOOSE PILE 3
 DUMP SUCCESSIVE PILES OF LOOSE ROCK, GRAVEL AND SAND
 MIXTURE ON FORWARD EDGE OF PREVIOUSLY COMPACTED LIFT
 WITH TRUCKS AND/OR SCRAPERS. USE PREVIOUS LIFT TO ACCESS
 AND FURTHER COMPACT EXISTING BLANKET.

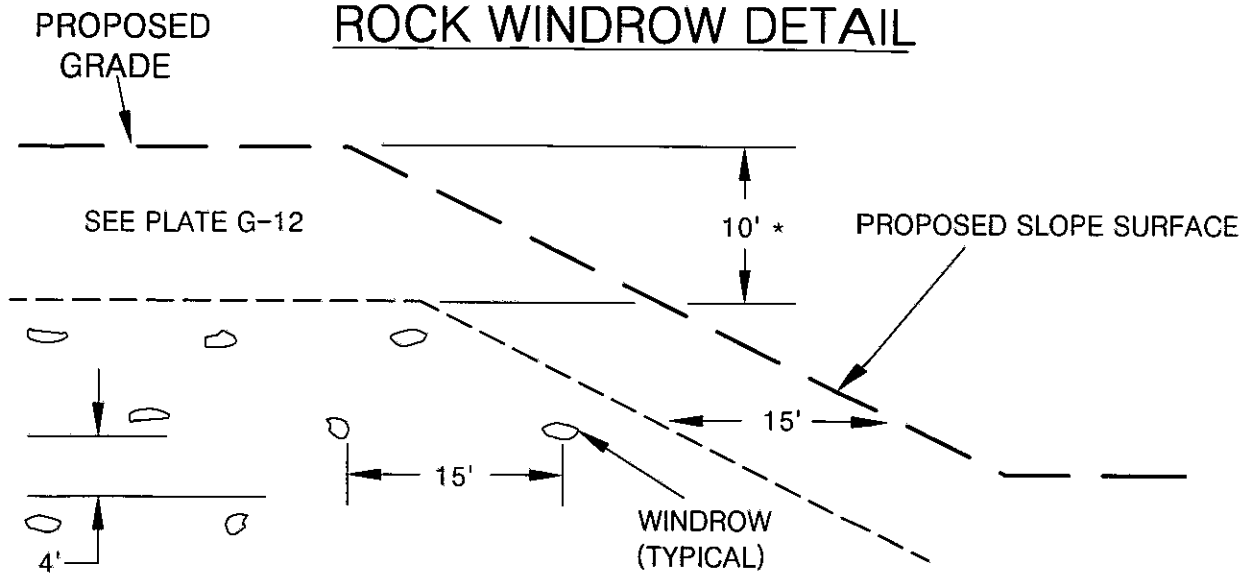


APPROVED BOTTOM, OR TOP OF
 PREVIOUSLY APPROVED BLANKET
 FILL

OBSERVATION TESTING AND APPROVAL PROCEDURES
 OBSERVE EQUIPMENT. SCRAPERS AND TRUCKS SHOULD BE FULLY SUPPORTED ON BLANKET WITHOUT SIGNIFICANT YIELDING.
 EXCAVATE TEST/OBSERVATION PITS TO CONFIRM EXISTENCE OF MIXTURE OF VARIOUS PARTICLE SIZES, WITHOUT SIGNIFICANT
 VOIDS, AND FORMING A DENSE, COMPACTED FILL MATRIX. TEST BY ASTM D1556, D2922 AND/OR D3017 WHEN APPROPRIATE.
 RECORD LIMITS AND ELEVATION OF BLANKET. ALL FILL AND COMPACTION OPERATIONS TO BE CONDUCTED UNDER THE
 OBSERVATION OF THE GEOTECHNICAL ENGINEER. SUBSEQUENT LIFTS TO BE APPLIED ONLY AFTER OBSERVATION AND
 CONFIRMATION OF SUITABILITY OF FILL AND RELEASE BY THE GEOTECHNICAL ENGINEER. BLANKETS TO BE CONSTRUCTED IN
 ACCORDANCE WITH PLATE G-12.

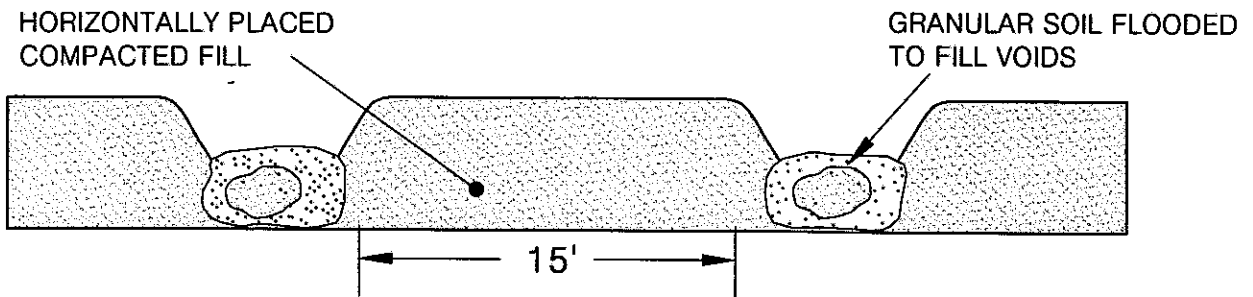


ROCK WINDROW DETAIL



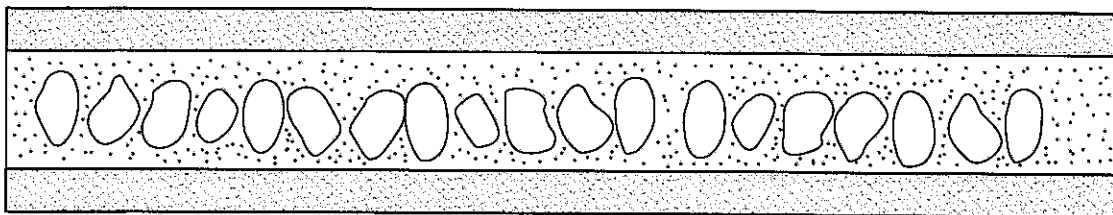
NOTE: OVERSIZED MATERIAL SHOULD BE REMOVED FROM THE 15' CLEAR ZONES WITH SPECIAL EQUIPMENT, SUCH AS A ROCK RAKE, PRIOR TO PLACING THE NEXT FILL LIFT.
*VARIANCES TO THE ABOVE ROCK HOLD DOWN MAY BE GRANTED SUBJECT TO APPROVAL BY THE OWNER, GEOTECHNICAL ENGINEER, AND GOVERNING AGENCY

TYPICAL WINDROW DETAIL (END VIEW)

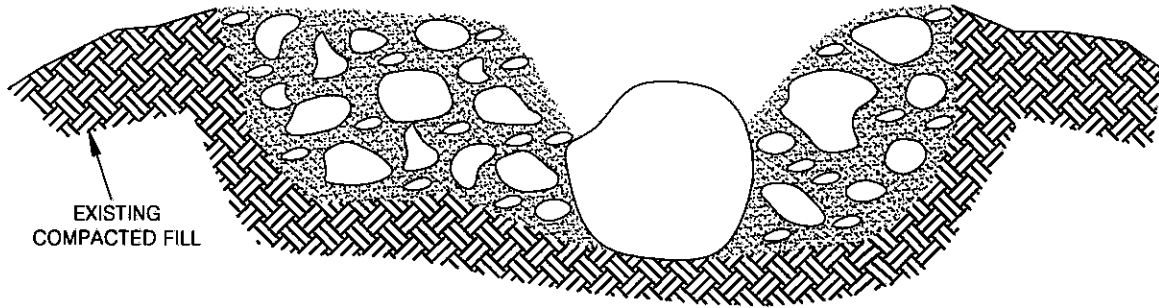


NOTE: COMPACTED FILL SHALL BE BROUGHT UP TO A HIGHER ELEVATION ALONG EACH WINDROW SO GRANULAR SOIL CAN BE FLOODED IN A "TRENCH CONDITION".

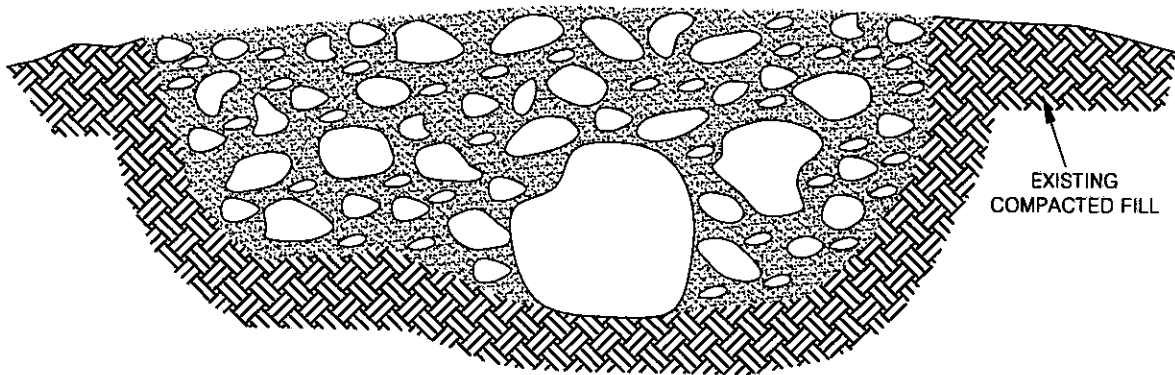
PROFILE VIEW



ISOLATED ROCK BURIAL DETAILS

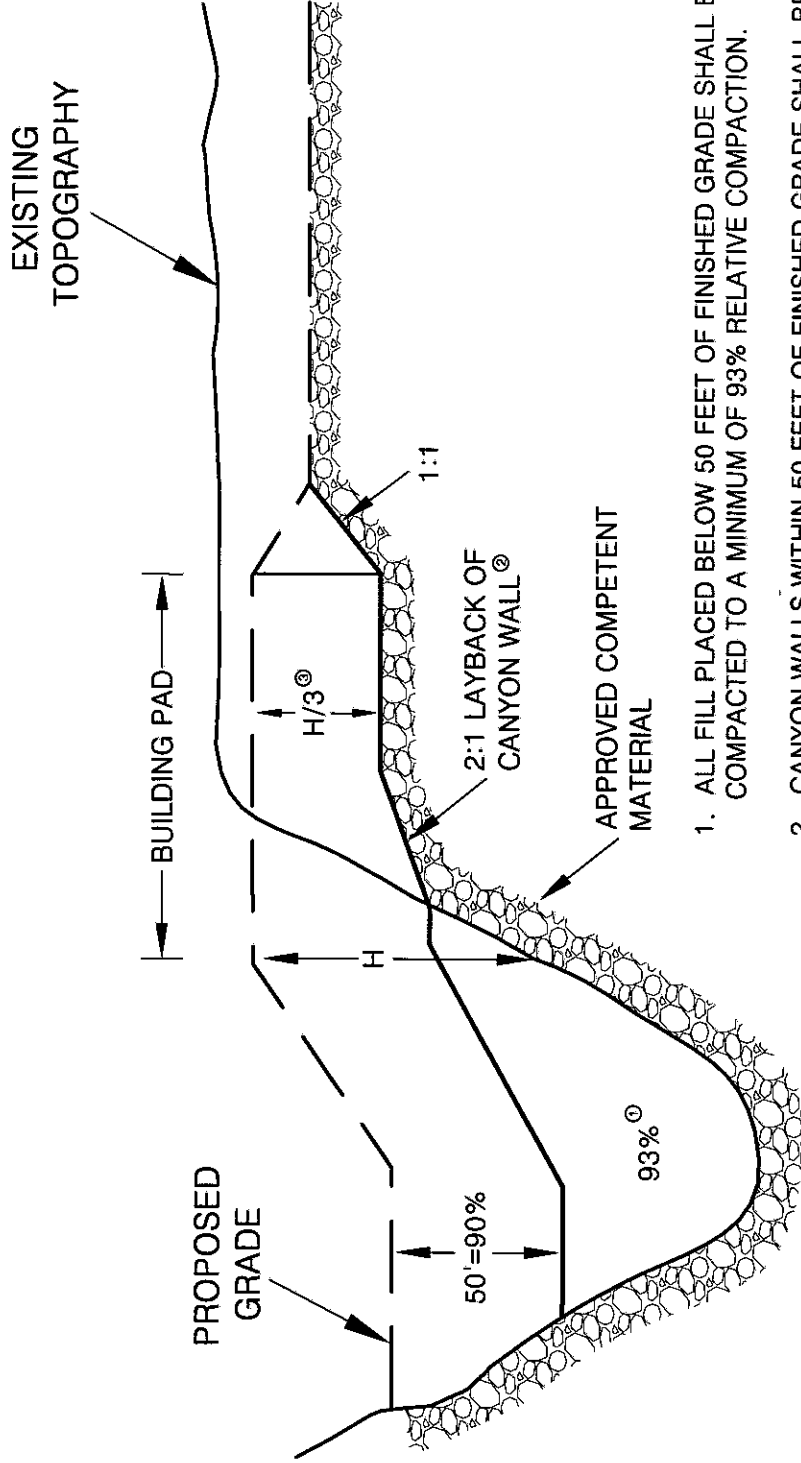


EXCAVATE HOLE INTO EXISTING FILL PRISM, PLACE BOULDER (< 8 feet in maximum dimension) INTO EXISTING COMPACTED FILL. SURROUND WITH SAND, GRAVEL, COBBLES AND WATER HEAVILY. TRACK WITH D8 OR LARGER EQUIPMENT UNTIL RESULTING FILL FULLY SUPPORTS EQUIPMENT. OBSERVE AND/OR TEST IN ACCORDANCE WITH ASTM D1556, D2922 OR D3017. ROCKS LARGER THAN 8 FEET SHALL BE FURTHER REDUCED IN SIZE BY SECONDARY BREAKING.



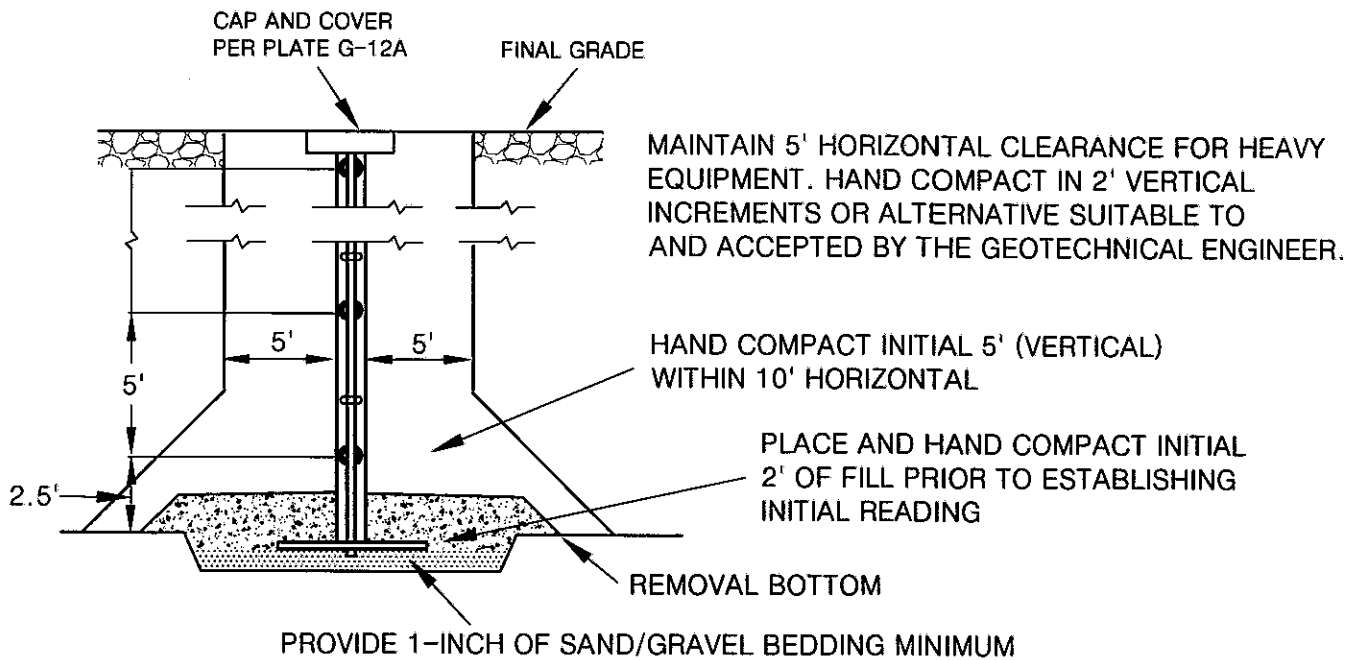
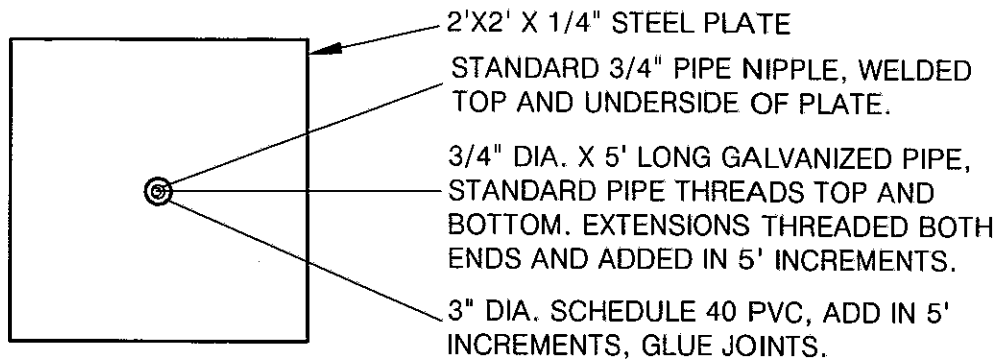
RELATIVE COMPACTION VS. DEPTH

CANYON WALL LAY BACK DIFFERENTIAL FILL OVEREXCAVATION DETAILS



1. ALL FILL PLACED BELOW 50 FEET OF FINISHED GRADE SHALL BE COMPACTED TO A MINIMUM OF 93% RELATIVE COMPACTION.
2. CANYON WALLS WITHIN 50 FEET OF FINISHED GRADE SHALL BE LAID BACK TO A SLOPE RATIO OF 2:1 OR FLATTER.
3. ALL BUILDING PADS SHALL BE OVER EXCAVATED TO A MINIMUM OF 1/3 OF THE MAXIMUM DEPTH OF FILL BELOW THE BUILDING PAD TO A MAXIMUM OF 17 FEET.
4. IF THE 2:1 LAY BACK OF THE CANYON WALL IS IMPRACTICAL, THEN AS AN ALTERNATIVE THE INCREASED COMPACTION STANDARDS IN NOTE 1 SHOULD BE EXTENDED UP TO H/3 AND THE LAY BACK WILL NOT BE REQUIRED.

SETTLEMENT PLATE DETAIL



NOTES:

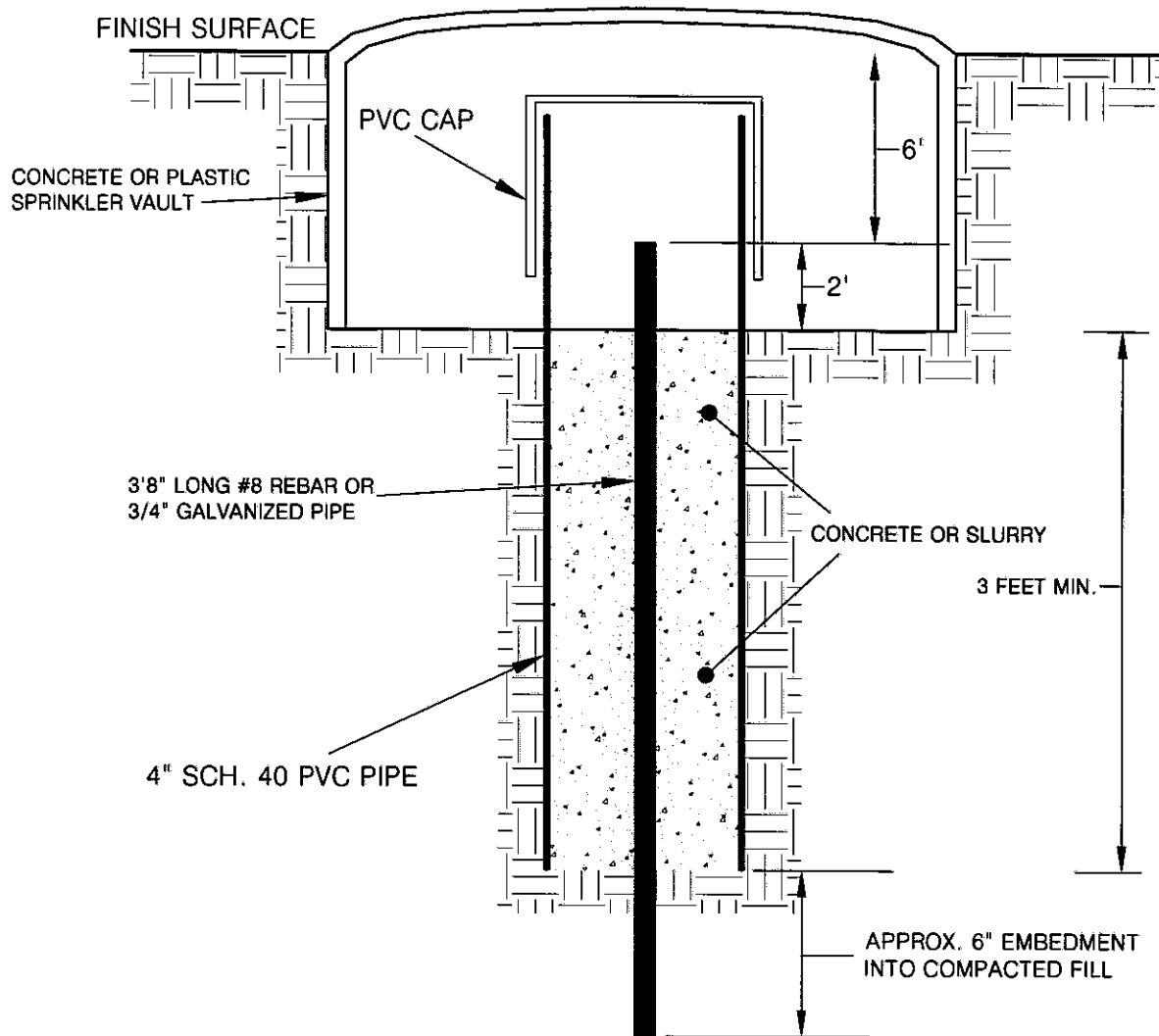
- 1) LOCATIONS OF SETTLEMENT PLATES SHALL BE CLEARLY MARKED AND READILY VISIBLE (RED FLAGGED) TO EQUIPMENT OPERATORS.
- 2) CONTRACTOR SHALL MAINTAIN 10' HORIZONTAL CLEARANCE FOR HEAVY EQUIPMENT WITHIN 5' (VERTICAL) OF PLATE BASE. FILL WITHIN CLEARANCE AREA SHALL BE HAND COMPACTED TO PROJECT SPECIFICATIONS OR COMPACTED BY ALTERNATIVE APPROVED BY THE GEOTECHNICAL ENGINEER.
- 3) AFTER 5' (VERTICAL) OF FILL IS IN PLACE, CONTRACTOR SHALL MAINTAIN 5' HORIZONTAL EQUIPMENT CLEARANCE. FILL IN CLEARANCE AREA SHALL BE HAND COMPACTED (OR APPROVED ALTERNATIVE) IN VERTICAL INCREMENTS NOT TO EXCEED 2 FEET.
- 4) IN THE EVENT OF DAMAGE TO SETTLEMENT PLATE OR EXTENSION RESULTING FROM EQUIPMENT OPERATING WITHIN PRESCRIBED CLEARANCE AREA, CONTRACTOR SHALL IMMEDIATELY NOTIFY GEOTECHNICAL ENGINEER AND SHALL BE RESPONSIBLE FOR RESTORING THE SETTLEMENT PLATE AND EXTENSION RODS TO WORKING ORDER.

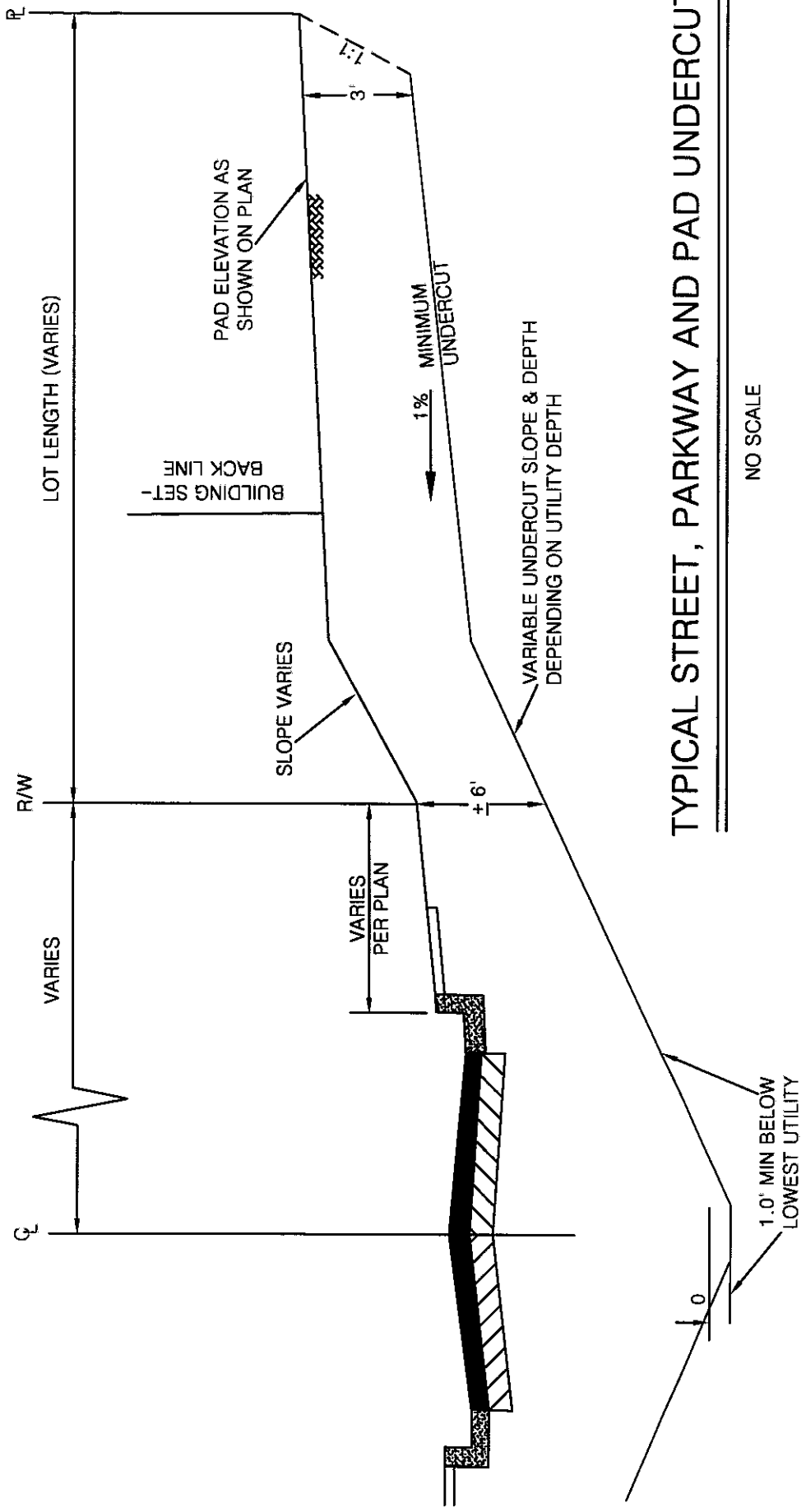


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 VER. 3/12

PLATE G-17

SURFACE SETTLEMENT MONUMENT DETAIL





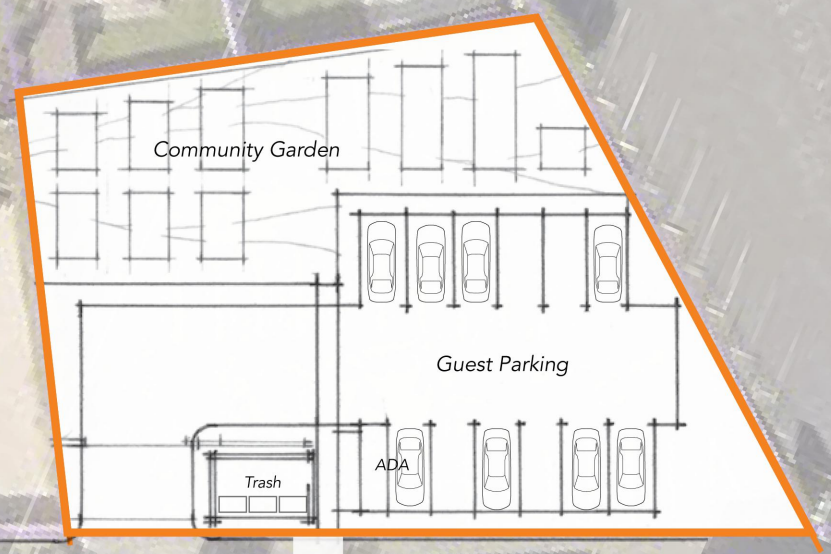
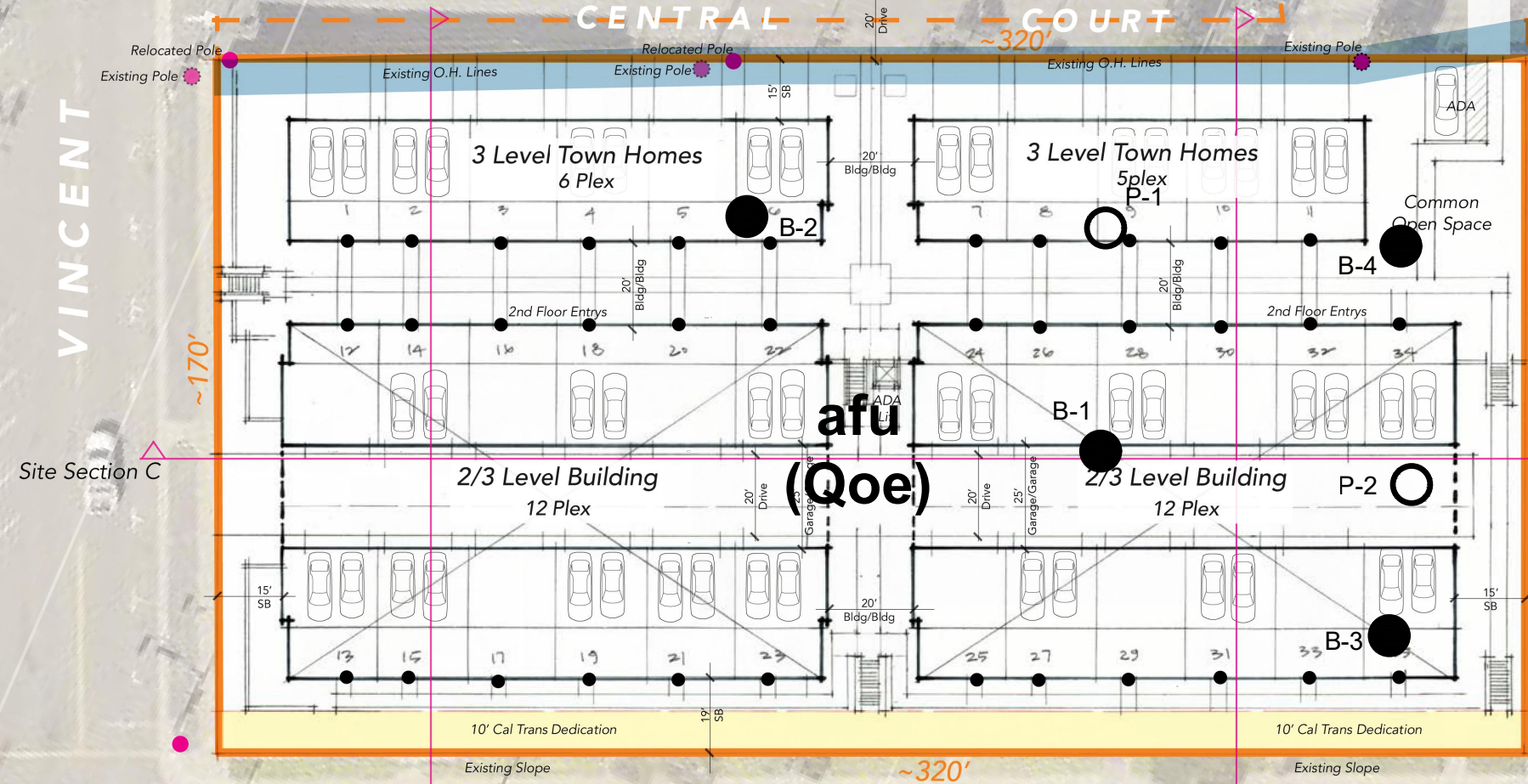
TYPICAL STREET, PARKWAY AND PAD UNDERCUT

NO SCALE

LEGEND

- afu** ARTIFICIAL FILL - UNDOCUMENTED
- Qoe** OLDER EOLIAN DEPOSITS (BRACKETED WHERE BURIED)
- B-4 APPROXIMATE LOCATION OF BORING
- P-2 APPROXIMATE LOCATION OF INFILTRATION TEST

VINCENT STREET



PARCEL TABULATION						
SITE AREA						1.25 ac
RESIDENTIAL	SF	Garage	Patio	Deck	Roof	Total
1	2B/2C	1300	400	150	90	240
2	3B/2C	1575	400	0	130	130
3	3B/2C/C	1650	400	0	130	280
						35 units
PARKING						83 cars
Garage						70
Guest Onsite						1
Guest_East Site						12
OPEN SPACE						8,760 sf
Private						7,540 sf
Common						1,200 sf
Community Garden_East Site (Not included in Common Open Space calculations)						4,500 sf
DENSITY RATIOS						
Homes						28.0 du/ac
Parking						2.37 car/du
Parking_Onsite						2.03 car/du
Parking_Overall						2.37 car/du
Open Space per Unit						250 sf/du
OVERALL						
ACREAGE		RH-2 Requirements		Provided		
1.25 ac		28 du/ac max		1.25 Nec		
DENSITY				28.0 du/ac		
COVERAGES				56%		
FAR				0.97 FAR		
RESIDENTIAL				35 Units		
RESIDENTIAL SF				53,000 SF		
OPEN SPACE				358 sf/du		
Common				34 sf/du		
Private				324 sf/du		
PARKING				83 cars		
Per du (1 covered)		20/du		70 cars		
Guest		33/du		11.67 cars		
				13 cars		
SITE DESIGN ASSUMPTIONS						
Streets						
Central Court (Existing)		20' + 15' at garage door/building		56%		
Resident Drive		20' + 2.5' at garage door - 25' Garage to Garage				
Setbacks						
Front		15'				
Rear		15'				
Sides		15'				
Building Separation		20'				
Height Limit		35' from Existing Grade				
Eastern portion of site is currently zoned R-3 and parking is allowed with a conditional use permit. Site plan is for conceptual purposes only.						

PLATE 1

ALTA CALIFORNIA GEOTECHNICAL, INC.
 170 N. MAPLE STREET, STE 108, CORONA, CA 92880
 TELEPHONE: (951) 509-7090
 PROJECT NUMBER: 1-0485 DATE: 6-15-2023

PACIFIC COAST HWY

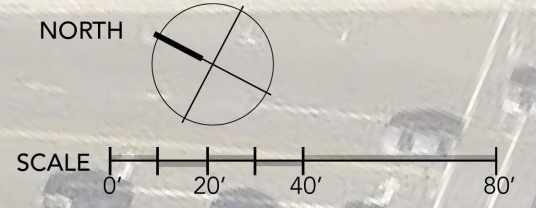
Site Diagram B.3 w/10' CalTrans

Vincent Street Townhomes
 122-126 N. Pacific Coast Hwy
 Redondo Beach, CA

PROGRESS ~ June 10, 2023

CITY VENTURES
 Building It Forward

2023 **FDS**
 Fournier Design Studio
 Planning | Design | Collaboration
 23005 Roland@FournierDesignStudio (562) 711-6650



Appendix H:
Educational Materials

To be provided during final engineering.

**PRELIMINARY HYDROLOGY STUDY
CITY OF REDONDO BEACH
TENTATIVE TRACT NO. 84401**

**Project Address:
122-126 N. Pacific Coast Highway
Redondo Beach, Ca 90278**

Prepared For:
City Ventures Homebuilding, LLC
3121 Michelson Drive, Suite 150
Irvine, CA 92612
Patrick Chien
(949) 258-7542

Prepared by:
C&V Consulting, Inc.
9830 Irvine Center Drive
Irvine, CA 92618
Ryan Bittner, P.E.

January 2024

**Preliminary Hydrology Study
For
Tentative Tract No. 84401**

ACKNOWLEDGEMENT AND SIGNATURE

This Preliminary Hydrology Study was prepared by C&V Consulting, Inc. under the supervision of Ryan Bittner, P.E.

Ryan Bittner, PE 68167
C&V Consulting, Inc.

Date

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IV.	Design Considerations	2
V.	Pipe Sizing Calculations	3
VI.	Conclusions	4
VII.	References.....	5

Appendices

A.	Vicinity Map
B.	Redondo Beach Isohyet Map
C.	HydroCalc Outputs
	Existing Calculations – 10-, 25-, 50- & 100-Yr Storm Events
	Proposed Calculations – 10-, 25-, 50- & 100-Yr Storm Events
D.	Hydrology Maps
	Existing Conditions Hydrology Map
	Proposed Conditions Hydrology Map
E.	Hydraulic Calculations
	Catch Basin Sizing
	Parkway Drain Sizing
	100-Year Water Surface Elevations
F.	References

I. Purpose:

The purpose of this report is to provide quantitative information to verify the design of the storm drain infrastructure and hydrologic methodology of the proposed project site. The values and statements within the confirm the subject site is designed and planned in accordance with the Los Angeles County Hydrology Manual and the City of Redondo Beach drainage requirements.

II. Introduction:

The proposed project is located at 122-126 N. Pacific Coast Highway in the city of Redondo Beach. The site is bounded by N. Pacific Coast Highway to the west, Vincent Street and single family residential to the north, Central Court and single family residential to the East, and single family residential and a church to the south.

The proposed development includes six (6) buildings consisting of 35 attached 3 story condominium units. The proposed 1.56-acre site will included private drive aisles, private garages, sidewalks, guest parking, and associated landscaping and open space areas. The proposed site will be accessible via one (1) driveway entrance along Vincent Street and Central Court.

The site is currently occupied by three (3) existing buildings and associated parking lot with a driveway entrance/ exit from Central Court. The entirety of the project site is relatively flat but the elevations of the surrounding streets are significantly lower. There is an open space area in the northwest corner that is on a lower elevation compared to the rest of the site. The grade gets steeper along the hillside located along the western property line adjacent to North Pacific Coast Highway. The site elevations range from approximately 80 feet above mean sea level (msl) in the northwest corner to approximately 100 feet above mean sea level (msl) near the northernmost driveway entrance in Central Court.

The site appears to sheet flow in the northwest direction towards Vincent Street and North Pacific Coast Highway. There is a high point within Central Court near the existing entrance of the site. North of the entrance, runoff surface flows in the northwest direction towards Vincent Street. South of the driveway entrance, runoff flows in the southeast direction towards Emerald Street. The existing elevations are higher northeast of Central Court compared to the elevations of the project site. Vincent Street appears to sheet flow in the southwesterly direction and North Pacific Coast Highway appears to sheet flow in the northwesterly direction towards the intersection. The existing grades of Vincent Street is significantly steeper than the grades of North Pacific Coast Highway.

According to the Los Angeles County Storm Drain GIS System, the nearest downstream catch basin is located south of Vincent Street near the Vincent Street and Broadway Avenue Intersection approximately 540' away from the project site. This catch basin connects to another catch basin east of Broadway Avenue before connecting to a 48" Los Angeles County Flood Control District (LACFCD) maintained reinforced concrete pipe (RCP) that confluences with the 69" RCP Vincent Street Drain into a 78" RCP storm drain pipe. The runoff continues to flow in the northwest direction and then wraps into Beryl Street and continues in the southwest direction until ultimately discharging into the Pacific Ocean. The site is in the South Santa Monica Bay Watershed.

The proposed site has been divided into five (5) subareas based on the proposed grading/ drainage design. The proposed development will include private drive aisles and parking spaces throughout. Proposed site drainage will direct flows to the private drive aisles, where runoff will be conveyed via proposed curb/ gutter towards five (5) proposed catch basins. The site will utilize an area drain system and underground storm drain piping to collect and convey the stormwater runoff to a proposed Dual Chamber Drywell

Infiltration system to promote subsurface infiltration. The Infiltration System has been designed to detain and infiltrate the required Storm Water Quality Design Volume (SWQDv) for water quality treatment. During larger storm events producing a greater volume than the SWQDv, including the 25-, 50-, and 100-year storm events, stormwater will overflow out of the Detention/ Infiltration system and out of the proposed catch basin and be conveyed to the public right-of-way via a proposed parkway drain on Vincent Street. In the event the stormwater conveyance system becomes clogged, stormwater will pond near the proposed catch basin #3 and #4 eventually overflow to Vincent Street via the proposed driveway entrance. Upon entering the public right-of-way, site runoff will follow the historic drainage pattern.

III. Methodology

The post-developed drainage was analyzed by utilizing the Los Angeles County Hydrology Manual. Each subarea was based on historical drainage patterns. Each area was analyzed for acreage, impervious cover, and time of concentration per the LACDPW HydroCalc software.

IV. Design Considerations:

1. The LACDPW HydroCalc Calculator Program was used to determine Tc, peak run-off flow rate, and run-off volumes for each subarea.
2. The property is located in the “Redondo Beach” rainfall region, per Figure 1-H1.3 of the Hydrology Manual. 5.2 inches of rainfall was used for the 50-year storm.
3. The site is in the soil classification “010” per Figure 1-H1.20 of the Hydrology Manual.
4. The site was analyzed for a 10-, 25-, 50-, and 100-year storm events. Copies of the HydroCalc output data can be found in Appendix C of this report. The peak runoff values have also been incorporated into the included hydrology exhibits, which are made a part of this study.
5. The proposed onsite Drywell Infiltration System was designed for the total Storm Water Quality Design Volume (SWQDv) per the 0.75 inch storm per Los Angeles LID Manual.
6. The proposed development site is approximately 85% impervious.
7. The existing development site is approximately 87% impervious based on the existing site conditions.

V. Pipe Size Calculations

Onsite storm drainage pipes will be sized for 25-year frequency storm. The Qs are developed from pro-rating the flow generated in the hydrology analysis. Pipes are sized to flow in an open flow condition. A 4" pipe is the minimum size and used for single yard drains. A 6" pipe size will collect multiple yard drains. Pipe sizes 18" and larger are considered the mainline drainage pipes that are used to convey run-off to the proposed infiltration system.

Since all pipes are sized for open flow WSPG hydraulic pressure analysis is not warranted. Instead,

$$Q_{max} = \frac{k'}{n} d^{8/3} s^{1/2} \text{ per King's Handbook}$$

$k'=0.463$; d =pipe diameter (ft)

$n=0.013^*$

$S=0.005$

Pipe Diameter	Max. Q (cfs)
8"	0.854
12"	2.518
15"	4.566
18"	7.425
24"	15.990
36"	47.146

$n=0.013^*$

$S=0.010$

Pipe Diameter	Max. Q (cfs)
8"	1.208
12"	3.562
15"	6.457
18"	10.500
24"	22.614
36"	66.675

*A Manning's Roughness Coefficient of 0.013 has been utilized to represent the roughness coefficient of PVC and/or HDPE piping.

VI. Conclusions:

The results from this preliminary hydrology study demonstrate the following:

- The drainage design for the Project has been designed to meet the County of Los Angeles Flood Control Standards.
- Building pads will be protected and will be above the theoretical 100-year flood elevation as determined in this analysis.
- The post-development site of 1.56 acres will generate approximately 3,294 ft³ of water quality volume. The proposed Drywell Infiltration/ Detention System has the detention capacity of approximately 4,009 ft³. Based on the available system surface area, the Drywell Infiltration System will infiltrate approximately 7,017 ft³ over 72 hours. Refer to the separately prepared Preliminary Low Impact Development (LID) Plan for additional information.
- Per the following summary table of total flow rates, the proposed condition produces a similar stormwater runoff peak flow rate than the existing condition for the 10-, 25-, 50-, and 100-year storm events and will therefore have no hydrologic impact on downstream drainage systems. In addition, the proposed Drywell Infiltration/ Detention System will infiltrate a portion of site runoff, therefore further reducing the proposed developed condition stormwater runoff. No detention mitigation will be required for the proposed development.

	Subarea	Q10 (cfs)	Q25 (cfs)	Q50 (cfs)	Q100 (cfs)	Tc (min)
Existing Conditions	X1	2.22	2.72	3.10	3.48	5.0
	X2	2.22	2.72	3.10	3.48	5.0
	Total	4.44	5.44	6.20	6.96	
Proposed Conditions	P1	2.22	2.72	3.10	3.48	5.0
	P2	2.22	2.72	3.10	3.48	5.0
	Total	4.44	5.44	6.2	6.96	
% Difference		0	0	0	0	

Refer to Appendix C of this report for additional information and LACDPW HydroCalc output data.

VII. References:

1. Los Angeles County Department of Public Works (LACDPW) Hydrology Manual, January 2006.
2. LACDPW HydroCalc Program was utilized to determine flow rates and time of concentrations.
3. Existing and Proposed Hydrology Maps for Vesting Tentative Tract No. 84401, prepared by C&V Consulting, Inc., January 2024.
4. Existing reference plans and as-built plans from Los Angeles County Department of Public Works (LACDPW) and the City of Redondo Beach.
5. KING, HORACE WILLIAMS. HANDBOOK OF HYDRAULICS: for the Solution of Hydraulic Problems (Classic Reprint). FORGOTTEN Books, 2015.
6. HydraFlow Express Extension for Autodesk Civil 3D, 2022.

APPENDIX A

VICINITY MAP



VICINITY MAP
NTS

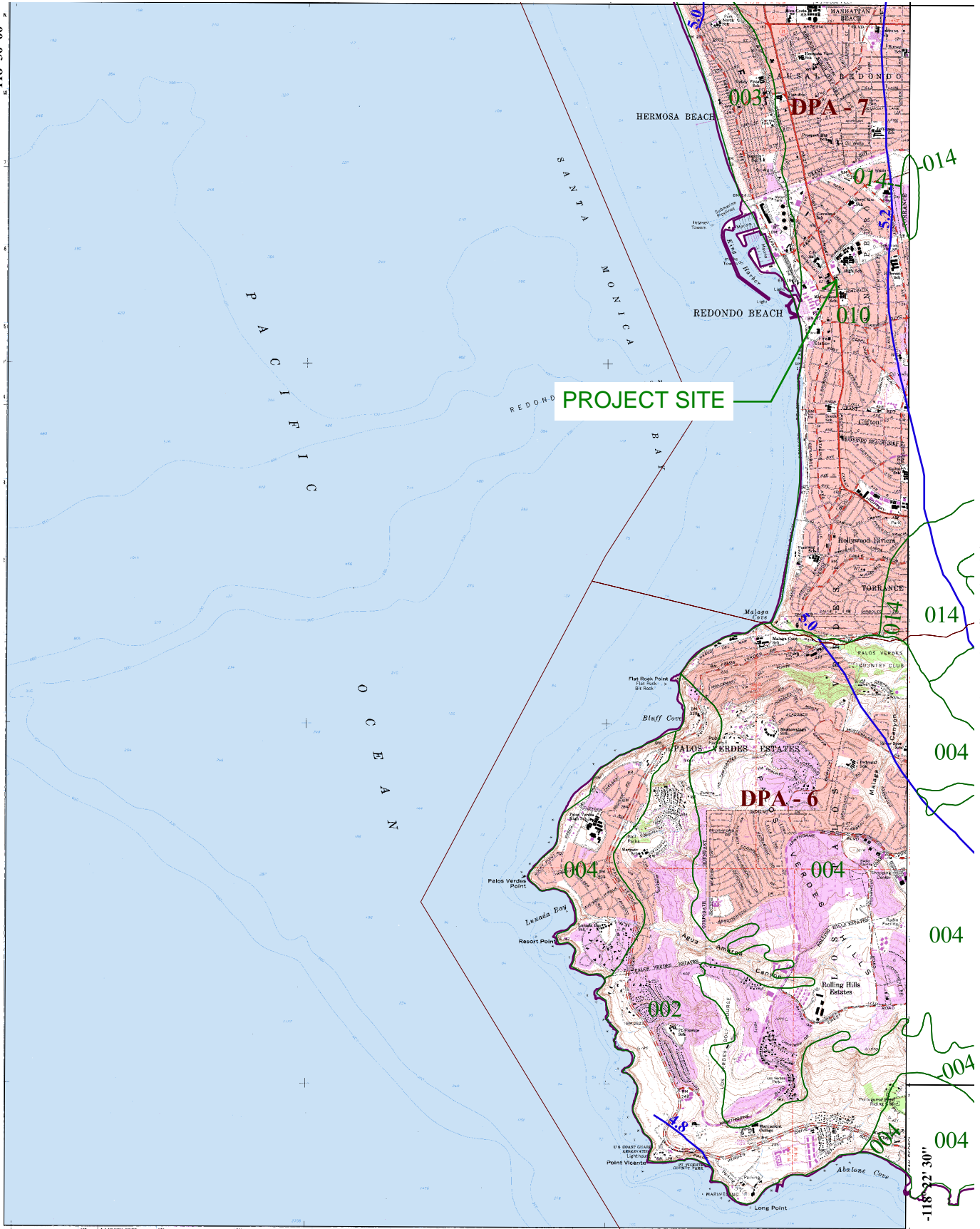
APPENDIX B

REDONDO BEACH ISOHYETAL MAP

33° 52' 30"

VENICE 1-HI.7

-118° 30' 00"



33° 44' 00"



016

SOIL CLASSIFICATION AREA

7.2

INCHES OF RAINFALL

DPA - 6

DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

REDONDO BEACH 50-YEAR 24-HOUR ISOHYET

1-HI.3



APPENDIX C

HYDROCALC OUTPUT

HYDROCALC OUTPUT

EXISTING CONDITIONS

Peak Flow Hydrologic Analysis

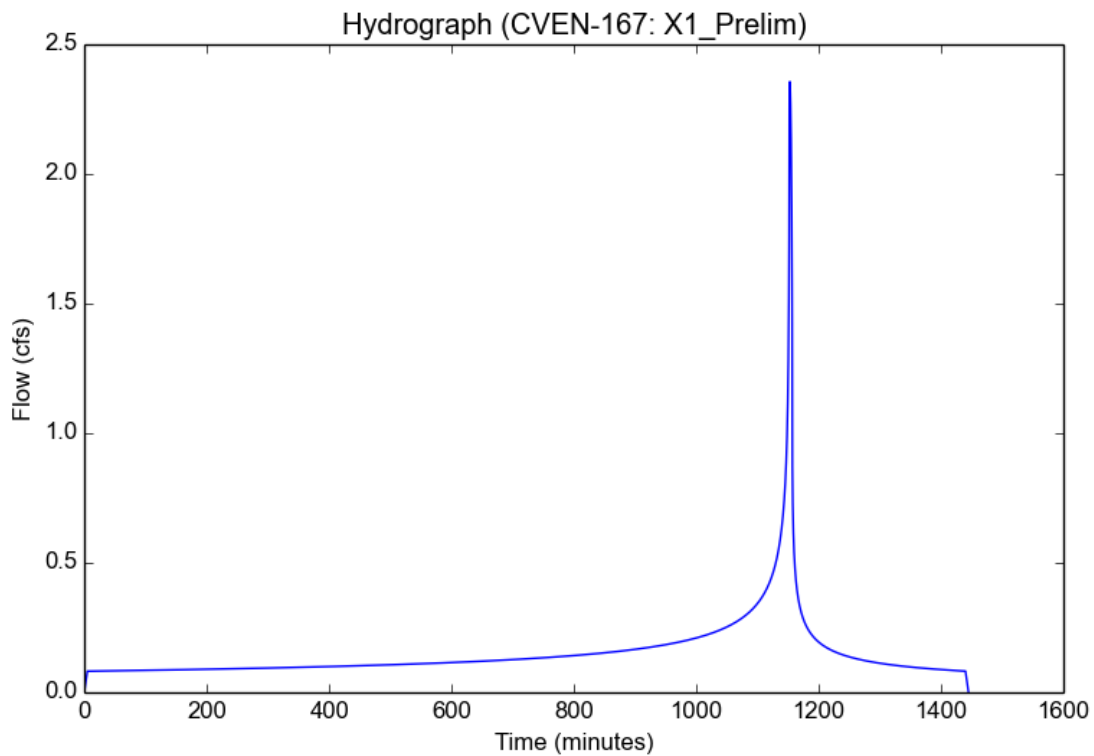
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	CVEN-167
Subarea ID	X1_Prelim
Area (ac)	1.29
Flow Path Length (ft)	127.0
Flow Path Slope (vft/hft)	0.051
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.84
Soil Type	10
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	3.7128
Peak Intensity (in/hr)	2.2152
Undeveloped Runoff Coefficient (Cu)	0.4287
Developed Runoff Coefficient (Cd)	0.8246
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.3563
Burned Peak Flow Rate (cfs)	2.3563
24-Hr Clear Runoff Volume (ac-ft)	0.3066
24-Hr Clear Runoff Volume (cu-ft)	13354.5477



Peak Flow Hydrologic Analysis

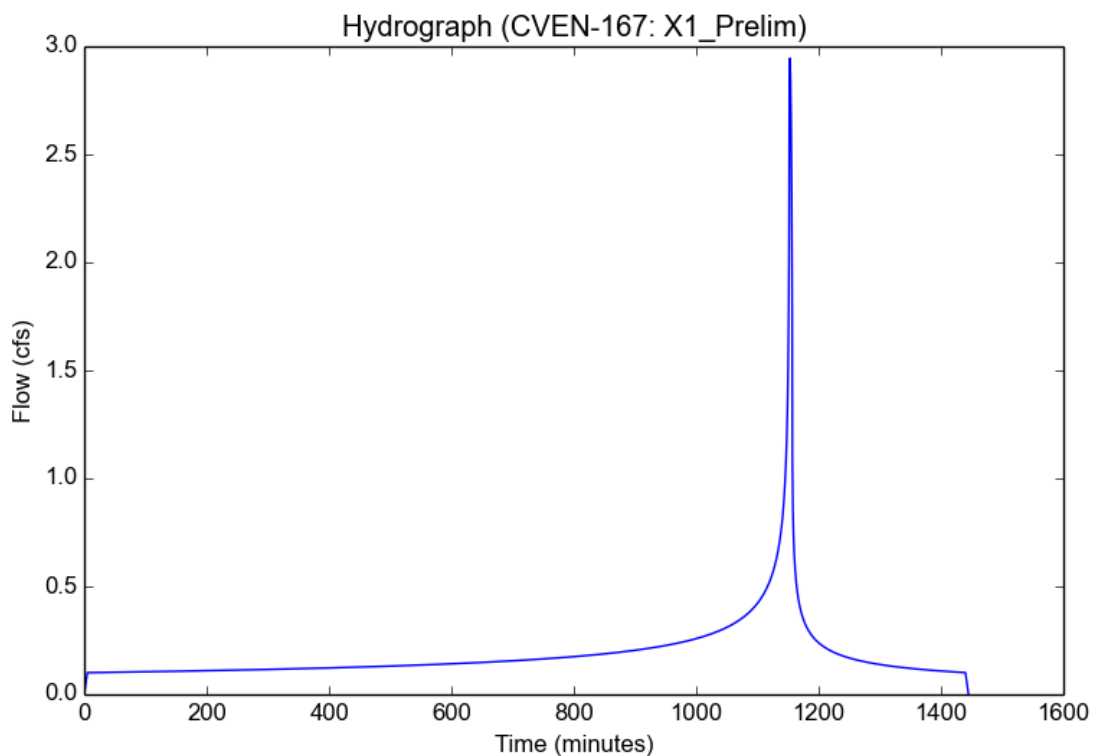
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	CVEN-167
Subarea ID	X1_Prelim
Area (ac)	1.29
Flow Path Length (ft)	127.0
Flow Path Slope (vft/hft)	0.051
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.84
Soil Type	10
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	4.5656
Peak Intensity (in/hr)	2.724
Undeveloped Runoff Coefficient (Cu)	0.5131
Developed Runoff Coefficient (Cd)	0.8381
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.945
Burned Peak Flow Rate (cfs)	2.945
24-Hr Clear Runoff Volume (ac-ft)	0.3775
24-Hr Clear Runoff Volume (cu-ft)	16443.4013



Peak Flow Hydrologic Analysis

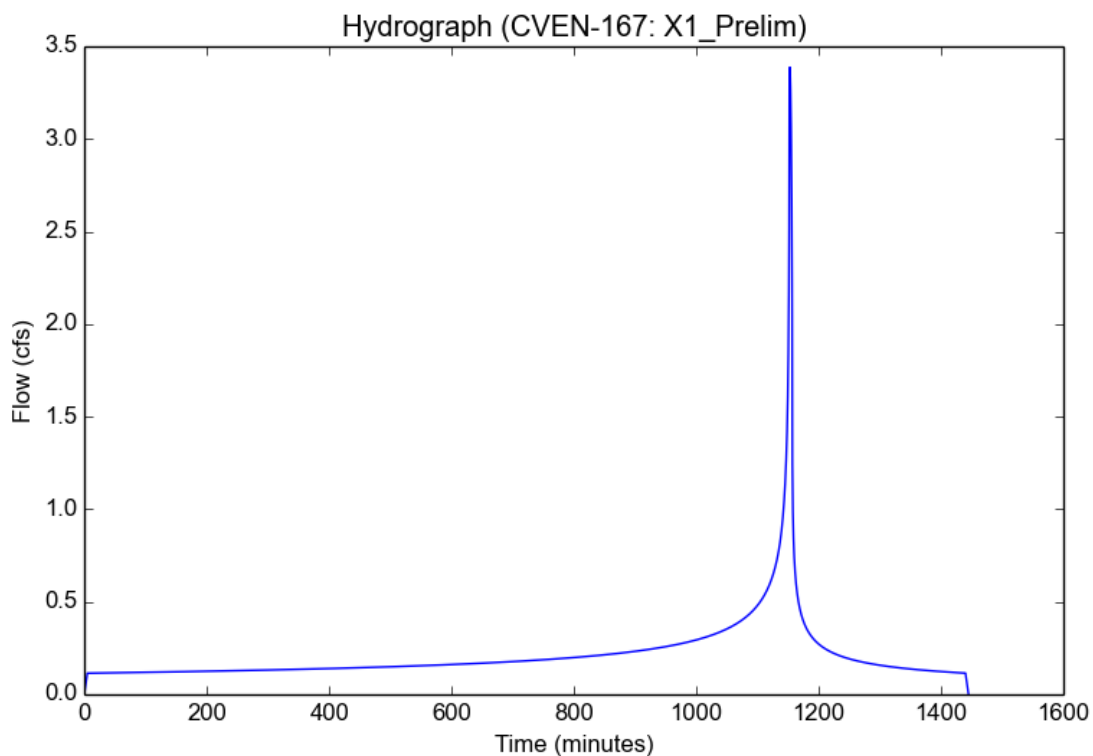
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Input Parameters

Project Name	CVEN-167
Subarea ID	X1_Prelim
Area (ac)	1.29
Flow Path Length (ft)	127.0
Flow Path Slope (vft/hft)	0.051
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.84
Soil Type	10
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.2
Peak Intensity (in/hr)	3.1025
Undeveloped Runoff Coefficient (Cu)	0.5643
Developed Runoff Coefficient (Cd)	0.8463
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.387
Burned Peak Flow Rate (cfs)	3.387
24-Hr Clear Runoff Volume (ac-ft)	0.4304
24-Hr Clear Runoff Volume (cu-ft)	18746.0643



Peak Flow Hydrologic Analysis

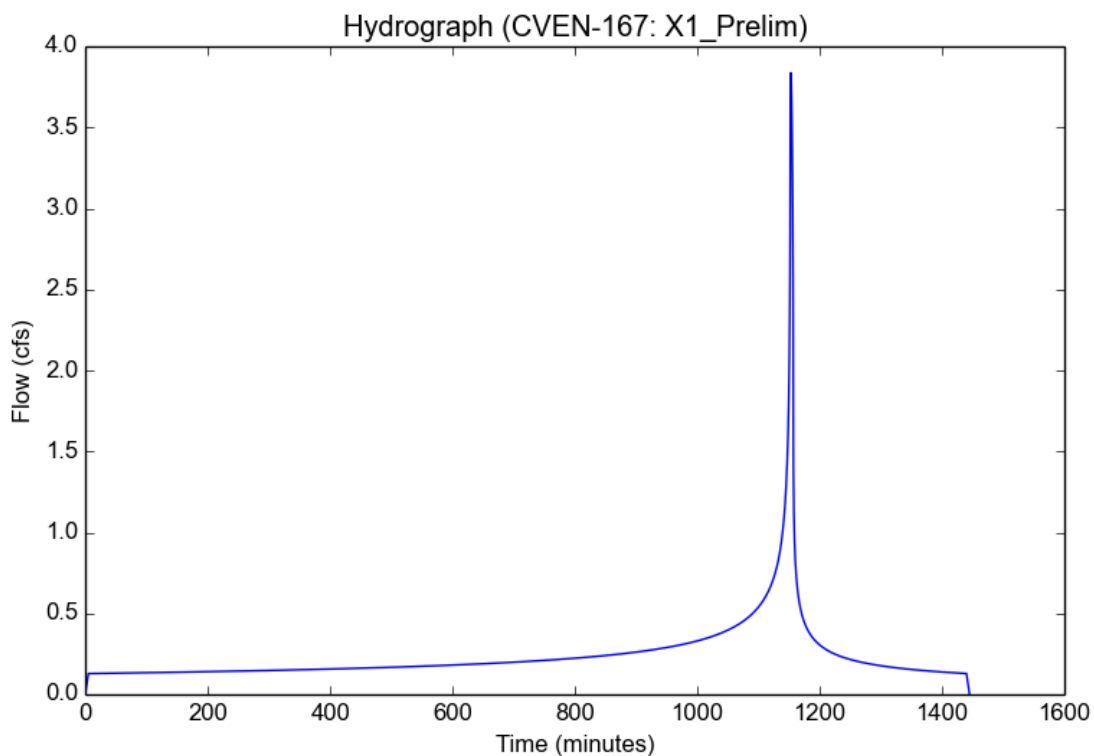
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	CVEN-167
Subarea ID	X1_Prelim
Area (ac)	1.29
Flow Path Length (ft)	127.0
Flow Path Slope (vft/hft)	0.051
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.84
Soil Type	10
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	5.8344
Peak Intensity (in/hr)	3.481
Undeveloped Runoff Coefficient (Cu)	0.6154
Developed Runoff Coefficient (Cd)	0.8545
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.8369
Burned Peak Flow Rate (cfs)	3.8369
24-Hr Clear Runoff Volume (ac-ft)	0.4833
24-Hr Clear Runoff Volume (cu-ft)	21053.9113



Peak Flow Hydrologic Analysis

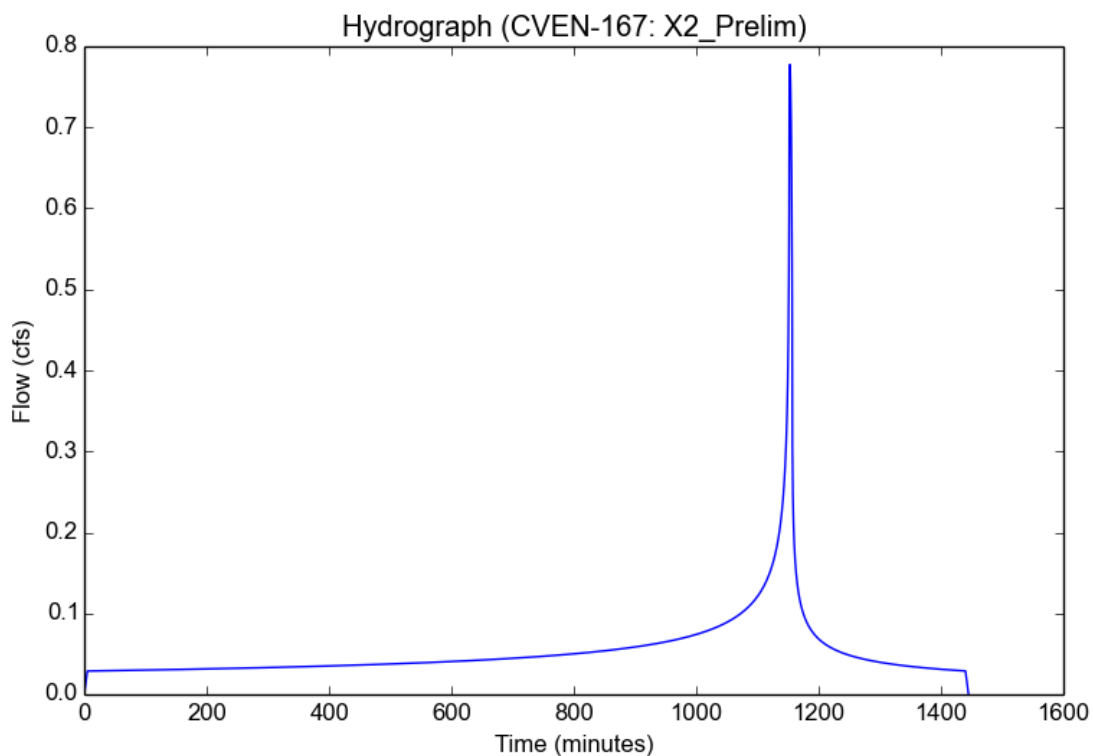
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	CVEN-167
Subarea ID	X2_Prelim
Area (ac)	0.39
Flow Path Length (ft)	200.0
Flow Path Slope (vft/hft)	0.08
50-yr Rainfall Depth (in)	5.2
Percent Impervious	1.0
Soil Type	10
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	3.7128
Peak Intensity (in/hr)	2.2152
Undeveloped Runoff Coefficient (Cu)	0.4287
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.7775
Burned Peak Flow Rate (cfs)	0.7775
24-Hr Clear Runoff Volume (ac-ft)	0.1077
24-Hr Clear Runoff Volume (cu-ft)	4691.4956



Peak Flow Hydrologic Analysis

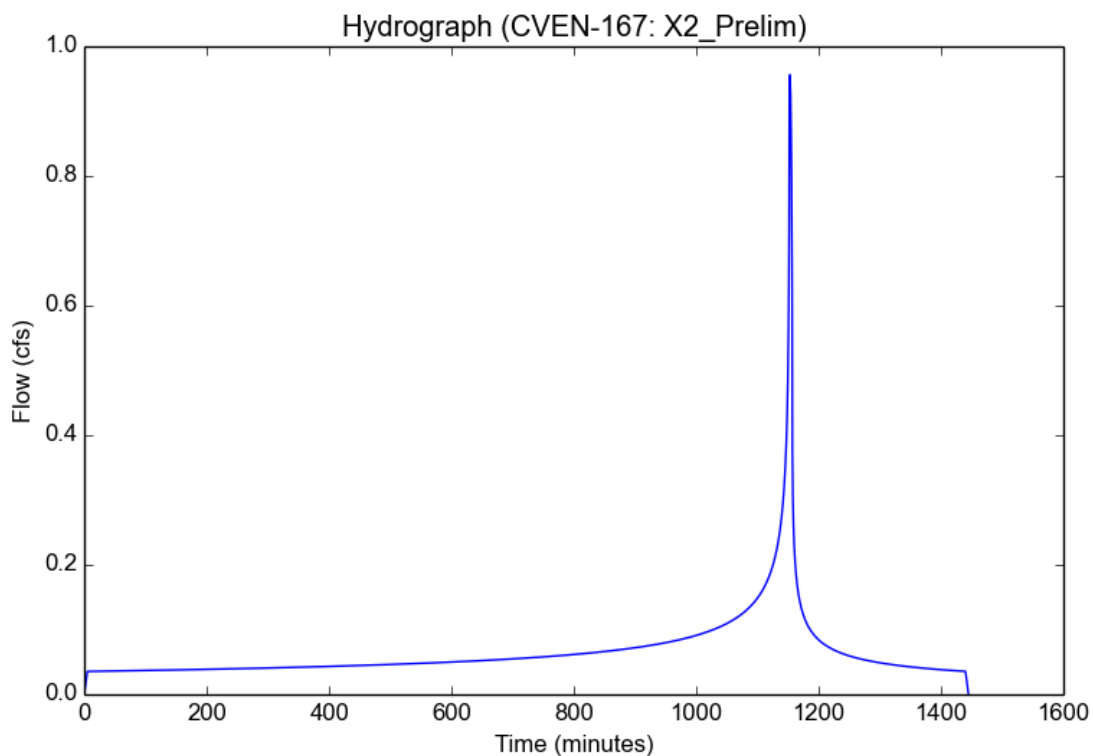
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Input Parameters

Project Name	CVEN-167
Subarea ID	X2_Prelim
Area (ac)	0.39
Flow Path Length (ft)	200.0
Flow Path Slope (vft/hft)	0.08
50-yr Rainfall Depth (in)	5.2
Percent Impervious	1.0
Soil Type	10
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	4.5656
Peak Intensity (in/hr)	2.724
Undeveloped Runoff Coefficient (Cu)	0.5131
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.9561
Burned Peak Flow Rate (cfs)	0.9561
24-Hr Clear Runoff Volume (ac-ft)	0.1324
24-Hr Clear Runoff Volume (cu-ft)	5769.094



Peak Flow Hydrologic Analysis

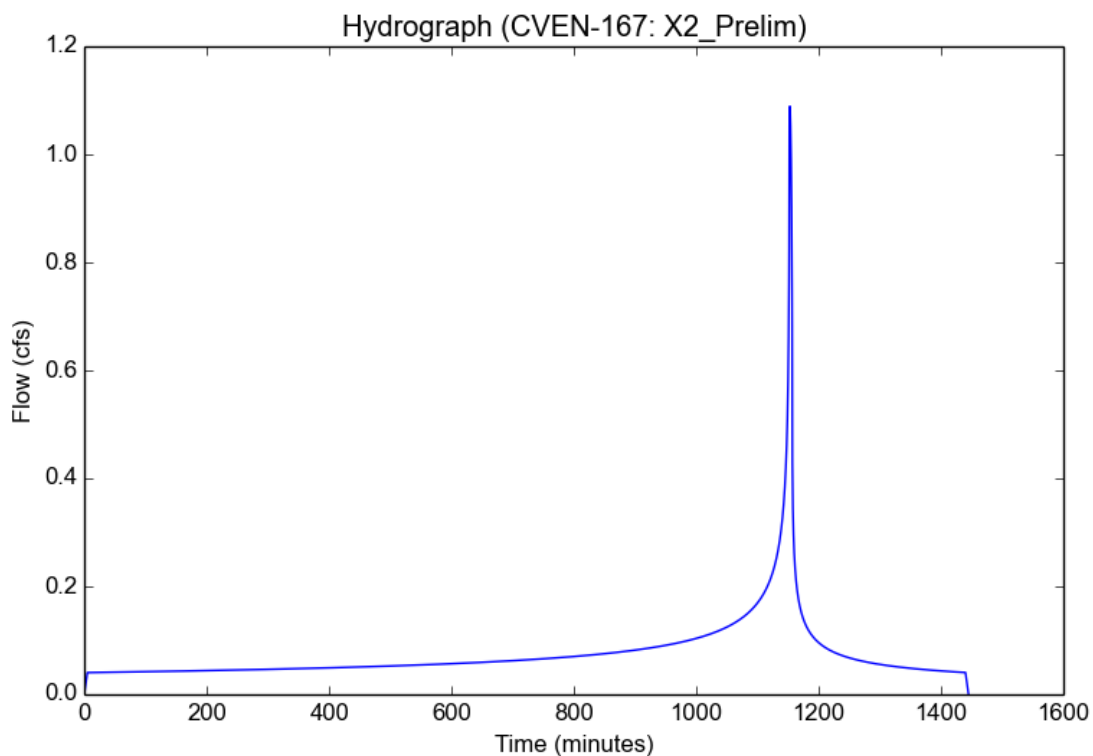
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Input Parameters

Project Name	CVEN-167
Subarea ID	X2_Prelim
Area (ac)	0.39
Flow Path Length (ft)	200.0
Flow Path Slope (vft/hft)	0.08
50-yr Rainfall Depth (in)	5.2
Percent Impervious	1.0
Soil Type	10
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.2
Peak Intensity (in/hr)	3.1025
Undeveloped Runoff Coefficient (Cu)	0.5643
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.089
Burned Peak Flow Rate (cfs)	1.089
24-Hr Clear Runoff Volume (ac-ft)	0.1508
24-Hr Clear Runoff Volume (cu-ft)	6570.7221



Peak Flow Hydrologic Analysis

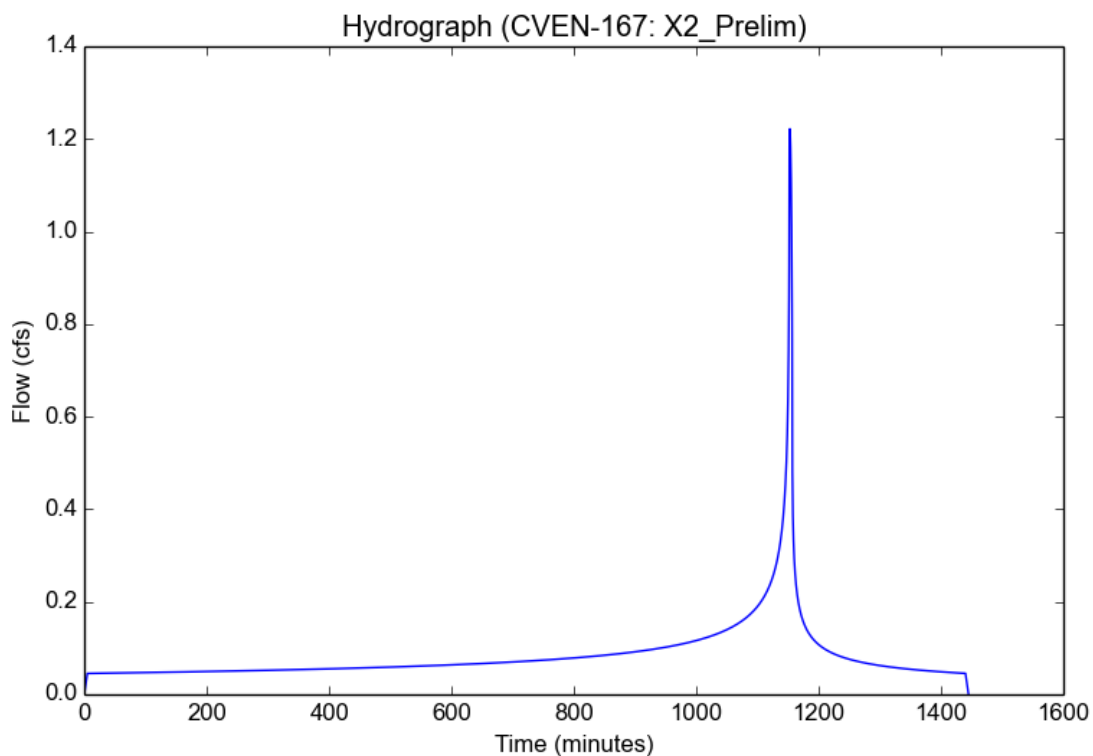
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Input Parameters

Project Name	CVEN-167
Subarea ID	X2_Prelim
Area (ac)	0.39
Flow Path Length (ft)	200.0
Flow Path Slope (vft/hft)	0.08
50-yr Rainfall Depth (in)	5.2
Percent Impervious	1.0
Soil Type	10
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	5.8344
Peak Intensity (in/hr)	3.481
Undeveloped Runoff Coefficient (Cu)	0.6154
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.2218
Burned Peak Flow Rate (cfs)	1.2218
24-Hr Clear Runoff Volume (ac-ft)	0.1692
24-Hr Clear Runoff Volume (cu-ft)	7372.3502



HYDROCALC OUTPUT

PROPOSED CONDITIONS

Peak Flow Hydrologic Analysis

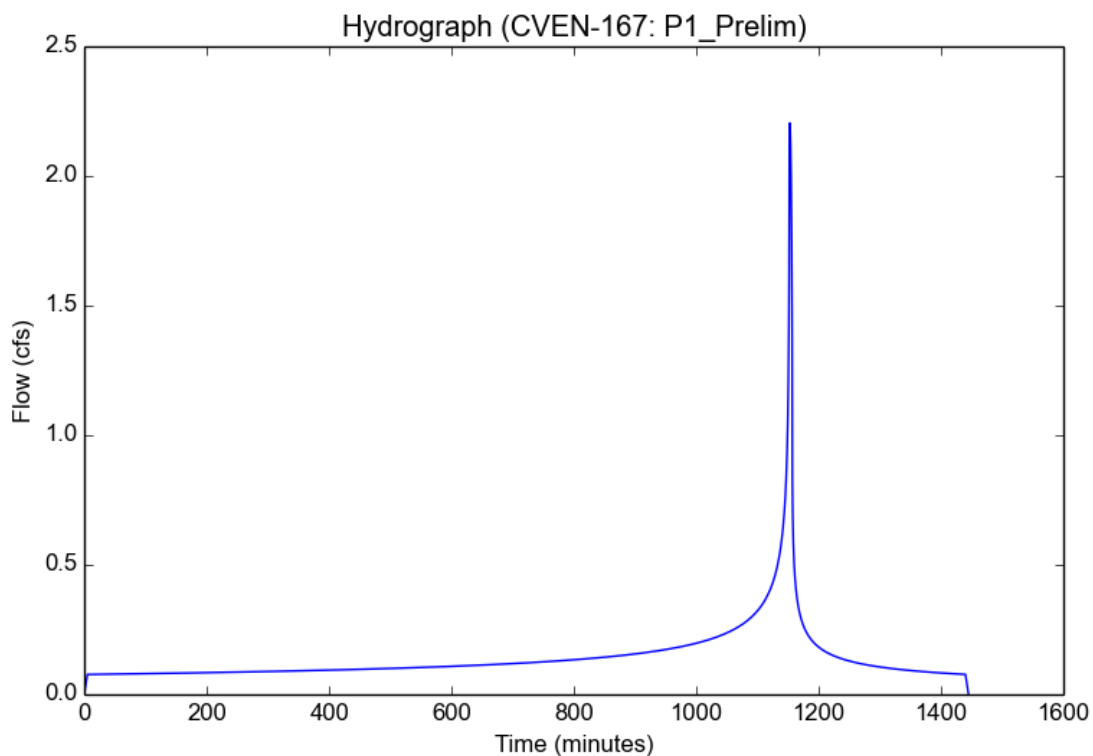
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	CVEN-167
Subarea ID	P1_Prelim
Area (ac)	1.2
Flow Path Length (ft)	174.0
Flow Path Slope (vft/hft)	0.016
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.85
Soil Type	10
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	3.7128
Peak Intensity (in/hr)	2.2152
Undeveloped Runoff Coefficient (Cu)	0.4287
Developed Runoff Coefficient (Cd)	0.8293
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.2045
Burned Peak Flow Rate (cfs)	2.2045
24-Hr Clear Runoff Volume (ac-ft)	0.2881
24-Hr Clear Runoff Volume (cu-ft)	12548.6185



Peak Flow Hydrologic Analysis

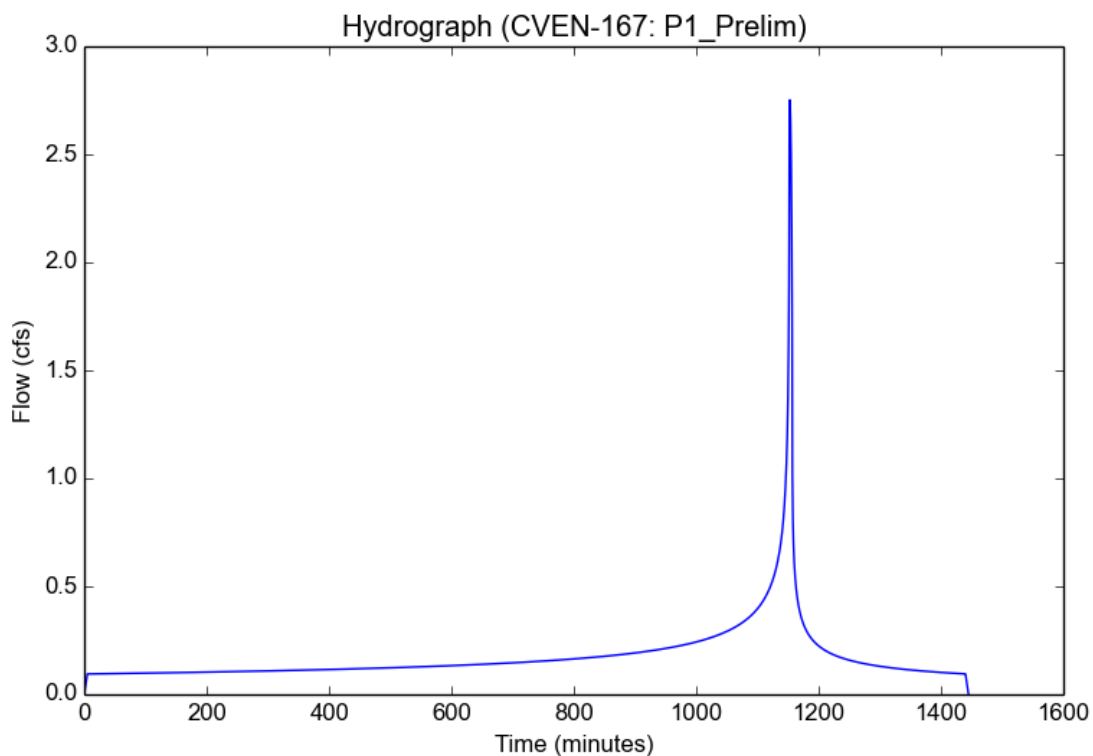
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	CVEN-167
Subarea ID	P1_Prelim
Area (ac)	1.2
Flow Path Length (ft)	174.0
Flow Path Slope (vft/hft)	0.016
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.85
Soil Type	10
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	4.5656
Peak Intensity (in/hr)	2.724
Undeveloped Runoff Coefficient (Cu)	0.5131
Developed Runoff Coefficient (Cd)	0.842
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.7522
Burned Peak Flow Rate (cfs)	2.7522
24-Hr Clear Runoff Volume (ac-ft)	0.3547
24-Hr Clear Runoff Volume (cu-ft)	15449.6167



Peak Flow Hydrologic Analysis

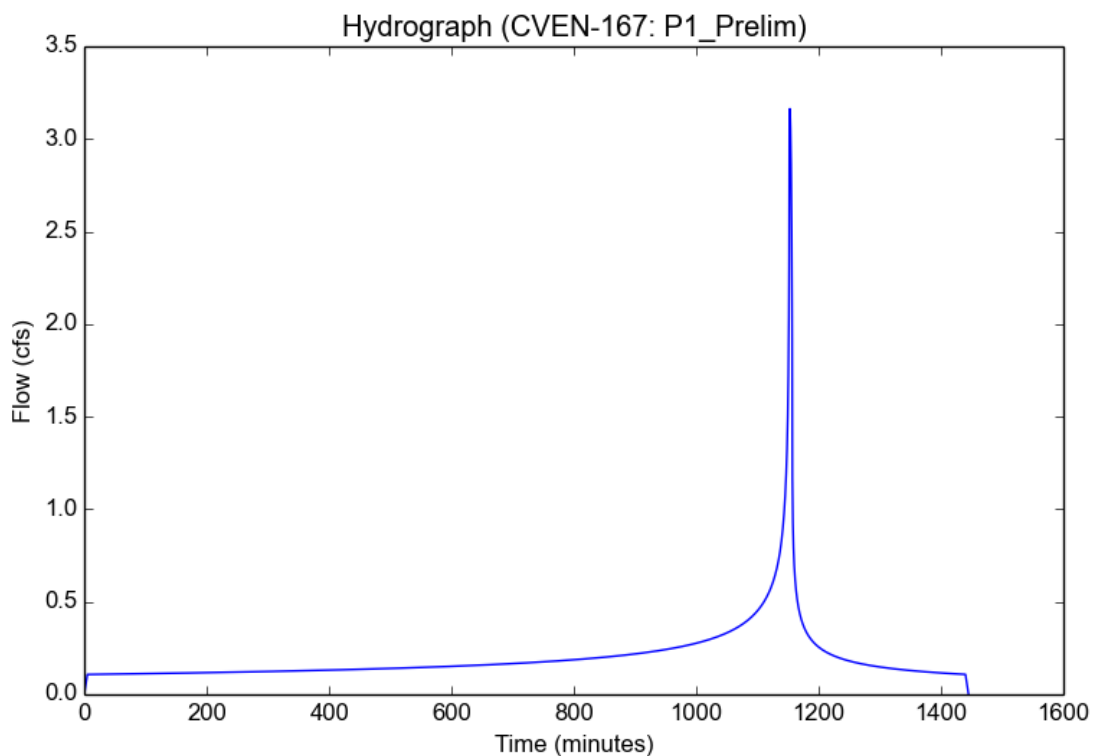
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Input Parameters

Project Name	CVEN-167
Subarea ID	P1_Prelim
Area (ac)	1.2
Flow Path Length (ft)	174.0
Flow Path Slope (vft/hft)	0.016
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.85
Soil Type	10
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.2
Peak Intensity (in/hr)	3.1025
Undeveloped Runoff Coefficient (Cu)	0.5643
Developed Runoff Coefficient (Cd)	0.8496
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.1632
Burned Peak Flow Rate (cfs)	3.1632
24-Hr Clear Runoff Volume (ac-ft)	0.4043
24-Hr Clear Runoff Volume (cu-ft)	17611.9123



Peak Flow Hydrologic Analysis

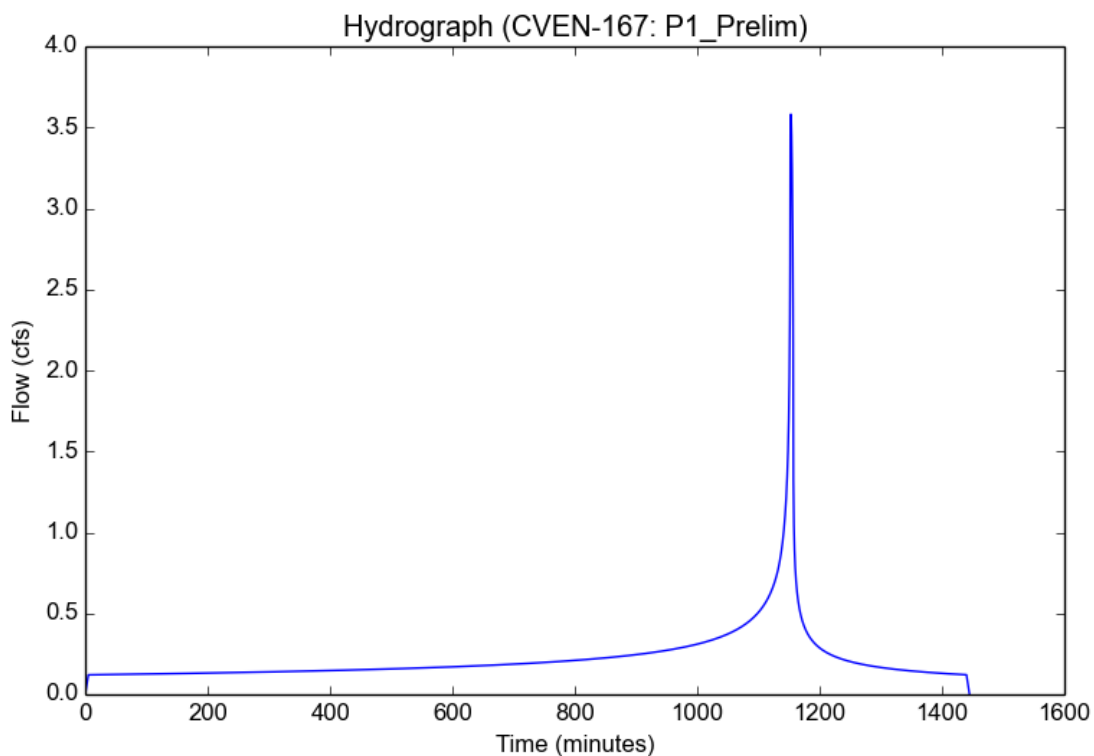
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Input Parameters

Project Name	CVEN-167
Subarea ID	P1_Prelim
Area (ac)	1.2
Flow Path Length (ft)	174.0
Flow Path Slope (vft/hft)	0.016
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.85
Soil Type	10
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	5.8344
Peak Intensity (in/hr)	3.481
Undeveloped Runoff Coefficient (Cu)	0.6154
Developed Runoff Coefficient (Cd)	0.8573
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	3.5811
Burned Peak Flow Rate (cfs)	3.5811
24-Hr Clear Runoff Volume (ac-ft)	0.4541
24-Hr Clear Runoff Volume (cu-ft)	19778.7288



Peak Flow Hydrologic Analysis

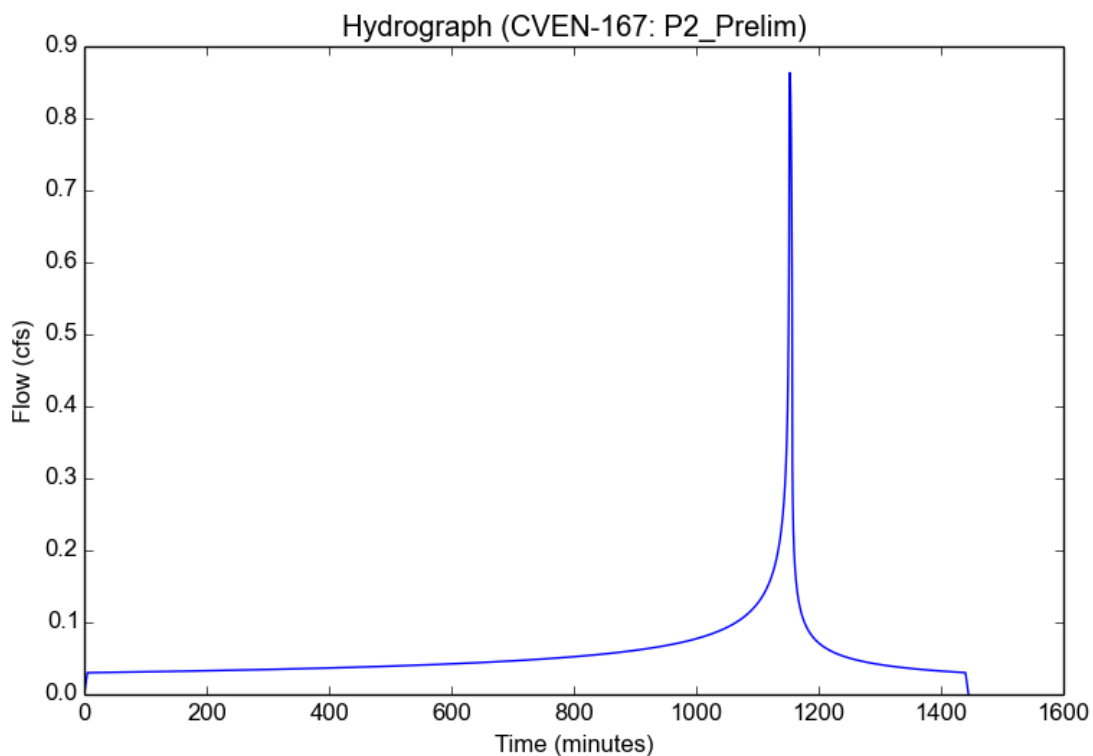
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	CVEN-167
Subarea ID	P2_Prelim
Area (ac)	0.47
Flow Path Length (ft)	145.0
Flow Path Slope (vft/hft)	0.024
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.85
Soil Type	10
Design Storm Frequency	10-yr
Fire Factor	0
LID	False

Output Results

Modeled (10-yr) Rainfall Depth (in)	3.7128
Peak Intensity (in/hr)	2.2152
Undeveloped Runoff Coefficient (Cu)	0.4287
Developed Runoff Coefficient (Cd)	0.8293
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.8634
Burned Peak Flow Rate (cfs)	0.8634
24-Hr Clear Runoff Volume (ac-ft)	0.1128
24-Hr Clear Runoff Volume (cu-ft)	4914.8756



Peak Flow Hydrologic Analysis

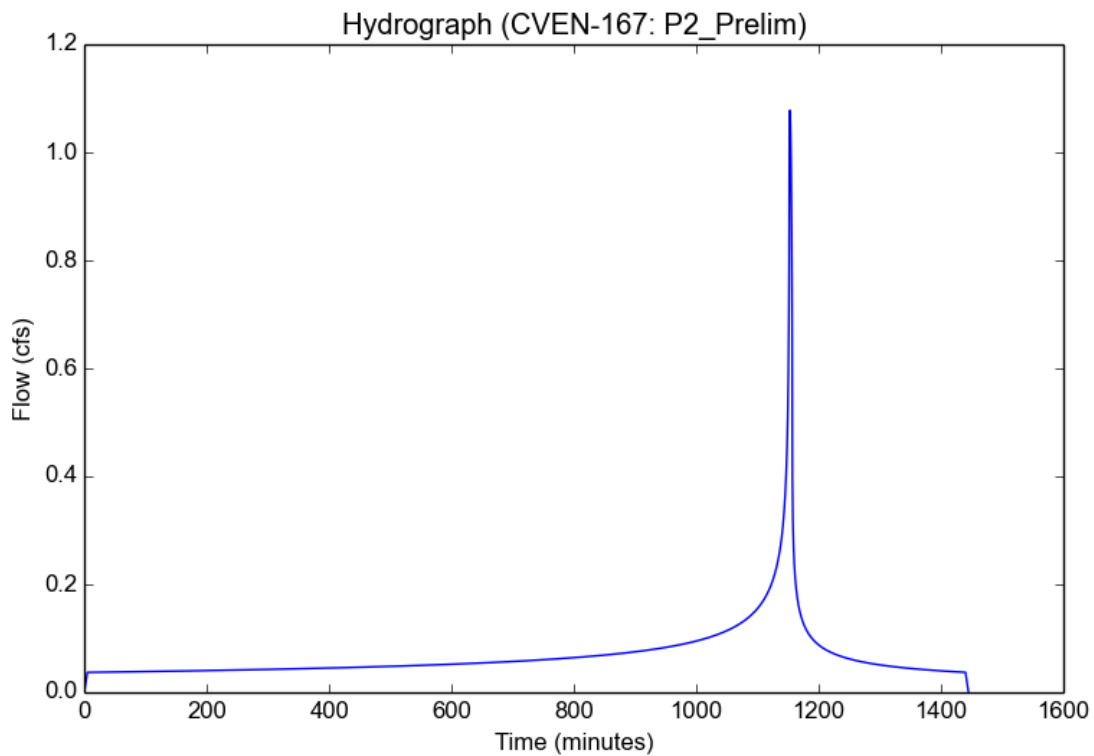
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Input Parameters

Project Name	CVEN-167
Subarea ID	P2_Prelim
Area (ac)	0.47
Flow Path Length (ft)	145.0
Flow Path Slope (vft/hft)	0.024
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.85
Soil Type	10
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	4.5656
Peak Intensity (in/hr)	2.724
Undeveloped Runoff Coefficient (Cu)	0.5131
Developed Runoff Coefficient (Cd)	0.842
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.0779
Burned Peak Flow Rate (cfs)	1.0779
24-Hr Clear Runoff Volume (ac-ft)	0.1389
24-Hr Clear Runoff Volume (cu-ft)	6051.0999



Peak Flow Hydrologic Analysis

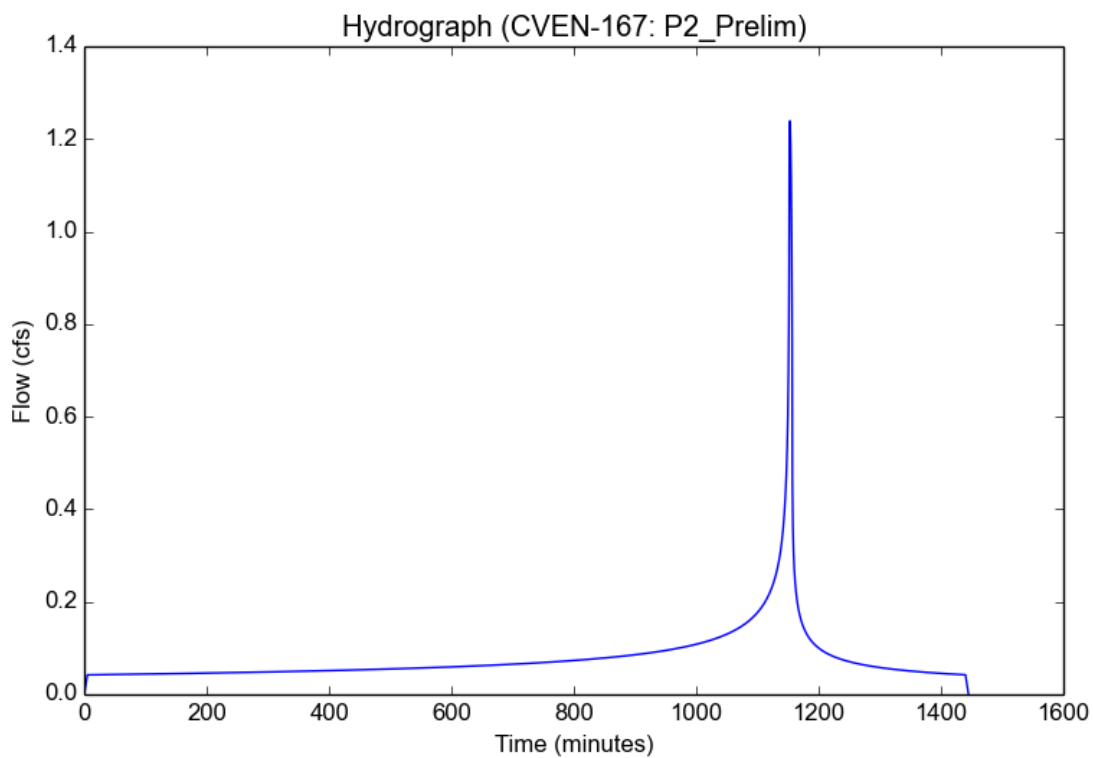
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Input Parameters

Project Name	CVEN-167
Subarea ID	P2_Prelim
Area (ac)	0.47
Flow Path Length (ft)	145.0
Flow Path Slope (vft/hft)	0.024
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.85
Soil Type	10
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	5.2
Peak Intensity (in/hr)	3.1025
Undeveloped Runoff Coefficient (Cu)	0.5643
Developed Runoff Coefficient (Cd)	0.8496
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.2389
Burned Peak Flow Rate (cfs)	1.2389
24-Hr Clear Runoff Volume (ac-ft)	0.1584
24-Hr Clear Runoff Volume (cu-ft)	6897.999



Peak Flow Hydrologic Analysis

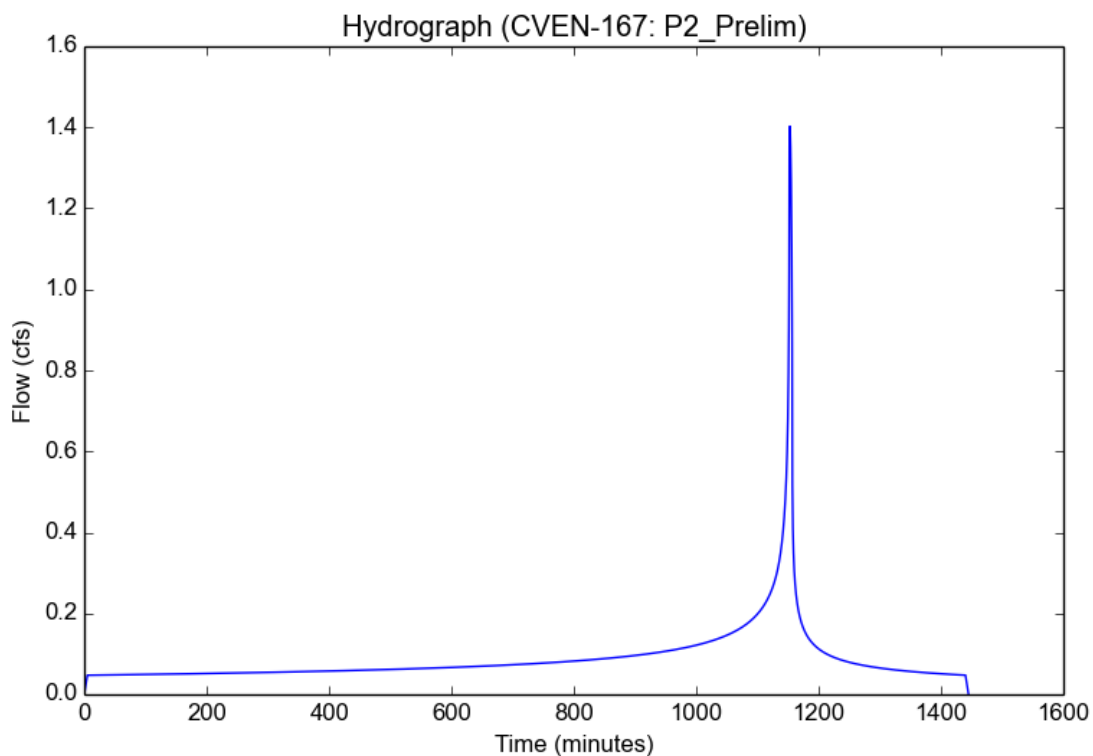
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	CVEN-167
Subarea ID	P2_Prelim
Area (ac)	0.47
Flow Path Length (ft)	145.0
Flow Path Slope (vft/hft)	0.024
50-yr Rainfall Depth (in)	5.2
Percent Impervious	0.85
Soil Type	10
Design Storm Frequency	100-yr
Fire Factor	0
LID	False

Output Results

Modeled (100-yr) Rainfall Depth (in)	5.8344
Peak Intensity (in/hr)	3.481
Undeveloped Runoff Coefficient (Cu)	0.6154
Developed Runoff Coefficient (Cd)	0.8573
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	1.4026
Burned Peak Flow Rate (cfs)	1.4026
24-Hr Clear Runoff Volume (ac-ft)	0.1778
24-Hr Clear Runoff Volume (cu-ft)	7746.6688



APPENDIX D

HYDROLOGY MAPS

HYDROLOGY MAP

EXISTING CONDITIONS

EXISTING CONDITIONS HYDROLOGY MAP TENTATIVE TRACT MAP NO. 84401

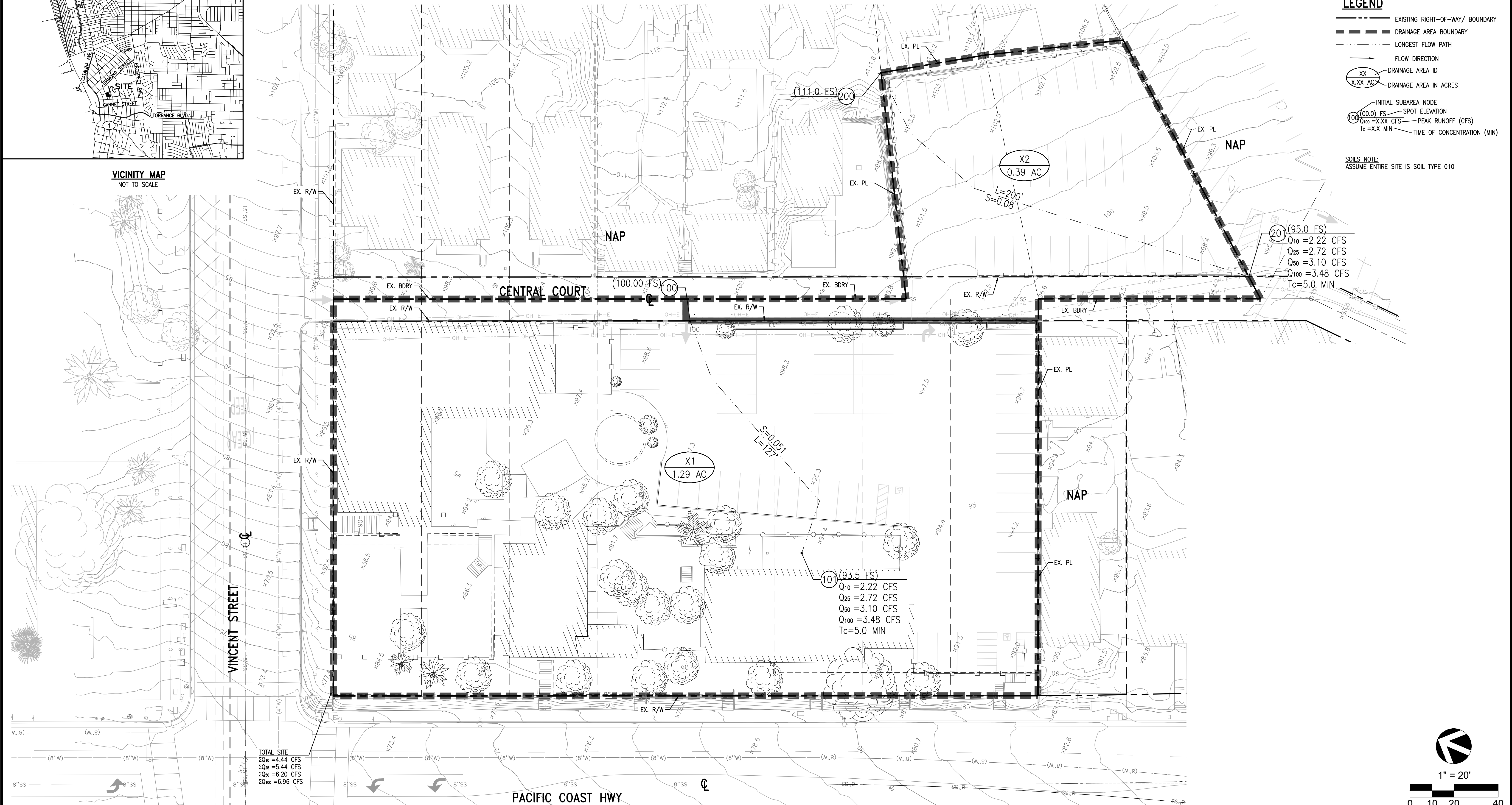


VICINITY MAP
NOT TO SCALE

LEGEND

- EXISTING RIGHT-OF-WAY/ BOUNDARY
- DRAINAGE AREA BOUNDARY
- LONGEST FLOW PATH
- FLOW DIRECTION
- XX DRAINAGE AREA ID
- X.XX AC DRAINAGE AREA IN ACRES
- INITIAL SUBAREA NODE
- (00.0) FS SPOT ELEVATION
- (00.0) FS X.XX CFS PEAK RUNOFF (CFS)
- (00.0) FS X.XX MIN TIME OF CONCENTRATION (MIN)

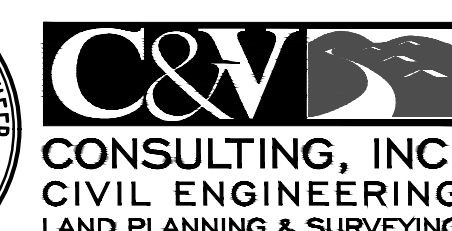
SOILS NOTE:
ASSUME ENTIRE SITE IS SOIL TYPE 010



1" = 20'



PREPARED BY:



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 CIVIL ENGINEERING
 LAND PLANNING & SURVEYING

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 (949) 916-3800
 INFO@CVC-INC.NET
 WWW.CVC-INC.NET

PREPARED FOR:

**CITY VENTURES
 HOMEBUILDING, LLC**
 3121, MICHELSON DRIVE, SUIT 150
 IRVINE, CA 92612
 (949) 258-7540

CITY OF REDONDO BEACH
 DEPARTMENT OF PLANNING AND DEVELOPMENT
 TENTATIVE TRACT MAP NO. 84401
 EXISTING CONDITIONS HYDROLOGY MAP
 REDONDO BEACH 1
 122-126 N. PACIFIC COAST HIGHWAY
 REDONDO BEACH, CALIFORNIA

PROJECT NO.
 CVEN-167

SHEET
 1
 OF
 1

DATE: 1/7/2024
 DRAWN BY: J. B. B.

HYDROLOGY MAP

PROPOSED CONDITIONS

PROPOSED CONDITIONS HYDROLOGY MAP TENTATIVE TRACT MAP NO. 84401

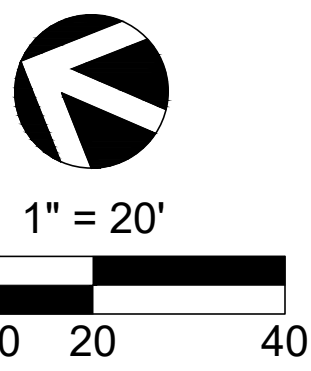
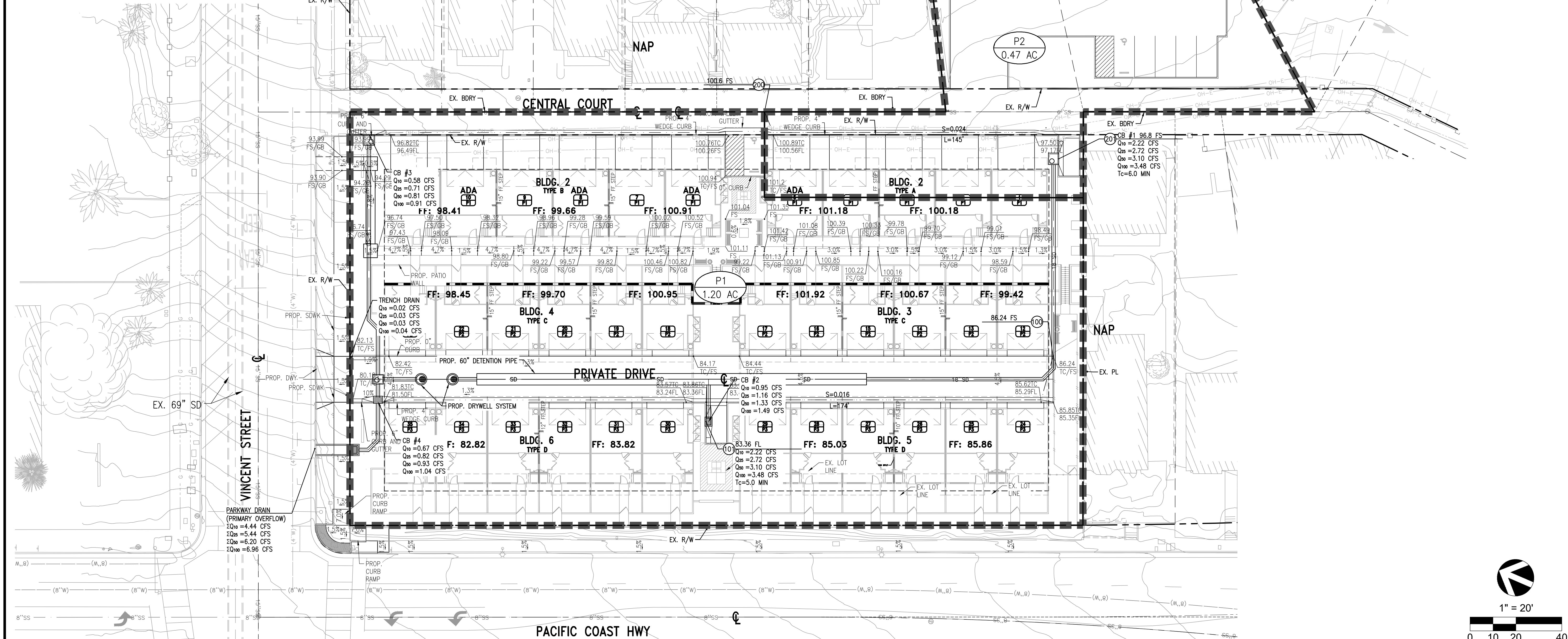


VICINITY MAP
NOT TO SCALE

LEGEND

- EXISTING RIGHT-OF-WAY/ BOUNDARY
- - - DRAINAGE AREA BOUNDARY
- LONGEST FLOW PATH
- FLOW DIRECTION
- XX DRAINAGE AREA ID
- X.XX AC DRAINAGE AREA IN ACRES
- INITIAL SUBAREA NODE
- (00.0) FS SPOT ELEVATION
- (00.0) FS Q₁₀₀ = X.XX CFS PEAK RUNOFF (CFS)
- (00.0) FS T_c = X.X MIN TIME OF CONCENTRATION (MIN)

SOILS NOTE:
ASSUME ENTIRE SITE IS SOIL TYPE 010



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CIVIL ENGINEERING
LAND PLANNING & SURVEYING

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CITY OF REDONDO BEACH
DEPARTMENT OF PLANNING AND DEVELOPMENT

TENTATIVE TRACT MAP NO. 84401
PROPOSED CONDITIONS HYDROLOGY MAP
REDONDO BEACH 1
122-126 N. PACIFIC COAST HIGHWAY
REDONDO BEACH, CALIFORNIA

PROJECT NO. CVEN-167
SHEET 1 OF 1

APPENDIX E

HYDRAULIC CALCULATIONS

HYDRAULIC CALCULATIONS

CATCH BASIN SIZING

To be provided during final engineering.

HYDRAULIC CALCULATIONS

PARKWAY DRAIN SIZING
To be provided during final engineering.

HYDRAULIC CALCULATIONS

100-YEAR WATER SURFACE ELEVATIONS

To be provided during final engineering.

APPENDIX E

REFERENCES

TENTATIVE TRACT MAP NO. 84401

LOT 1 FOR CONDOMINIUM PURPOSES IN THE CITY OF REDONDO BEACH, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA



VICINITY MAP
NTS

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF REDONDO BEACH, IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL 1: (APN: 7505-010-015 AND 7505-010-036)

LOTS 12, 13, 14, 15, 16, 17, 18 AND 19 INCLUSIVE IN BLOCK 150 OF REDONDO BEACH, IN THE CITY OF REDONDO BEACH, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 39, PAGE 1, OF MISCELLANEOUS RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

PARCEL 2: (APN: 7505-010-035)

THE WESTERLY PORTIONS OF LOTS 4 AND 5 IN BLOCK 150 OF REDONDO BEACH, IN THE CITY OF REDONDO BEACH, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS PER MAP RECORDED IN BOOK 39, PAGES 1 THROUGH 17 INCLUSIVE OF MISCELLANEOUS RECORDS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF LOT 5; THE EASTERLY 103.30 ON THE NORTHERLY LINE OF SAID LOT 5 TO A POINT, THE SOUTHERLY IN A DIRECT LINE TO A POINT IN THE SOUTHERLY LINE OF SAID LOT 5; THE SOUTHERLY 113.30 FROM THE SOUTHWEST CORNER OF SAID LOT 5, THE SOUTHERLY IN A DIRECT LINE TO A POINT IN THE SOUTHERLY LINE OF LOT 4 DISTANT 1.33 FROM THE SOUTHWEST CORNER OF SAID LOT 4, THE WESTERLY TO SAID SOUTHWEST CORNER OF LOT 4, THE NORTHERLY ALONG WESTERLY LINES OF LOTS 4 AND 5 TO POINT OF BEGINNING.

SITE ADDRESS:

122-126 N. PACIFIC COAST HIGHWAY
REDONDO BEACH, CA 90278

VESTED OWNER:

ARCHDIOCESE OF LOS ANGELES EDUCATION AND WELFARE CORPORATION, A CORPORATION

BASIS OF BEARINGS:

THE BEARINGS SHOWN HEREON ARE BASED ON THE BEARING N44°14'43.9"E BETWEEN CALIFORNIA SPATIAL REFERENCE CENTER, CSRC, CONTINUOUSLY OPERATING REFERENCE STATIONS, CORS, "TORP" AND "CSDH".

DATUM STATEMENT:

ALL COORDINATES SHOWN HEREON ARE GRID VALUES BASED ON THE CALIFORNIA COORDINATE SYSTEM OF 1983, CGS83, ZONE 5, (2017.50 EPOCH), IN ACCORDANCE WITH THE CALIFORNIA PUBLIC RESOURCES CODE SECTIONS 8801-8819. ALL DISTANCES SHOWN HEREON ARE GROUND VALUES IN U.S. SURVEY FEET UNLESS OTHERWISE NOTED. A COMBINATION SCALE FACTOR OF 1.00004724 WAS USED FOR THIS PROJECT AT NORTING 1765413.135, EASTING 6444920.952. TO OBTAIN GRID DISTANCES, MULTIPLY GROUND DISTANCES BY THE COMBINATION SCALE FACTOR.

BENCHMARK STATEMENT:

LOS ANGELES COUNTY BENCHMARK NO. QY10904
ELEV: 70.981 (NAVD88)
DESCRIBED AS: DPW BM TAG IN E CB 10FT N/O
BOR @ NE COR CATALINA AVE & EMERALD ST

FLOOD NOTE:

THE SUBJECT PROPERTY FALLS WITHIN "ZONE X - AREA OF MINIMAL FLOOD HAZARD" PER FEMA MAP NO. 06037C1909G, A PRINTED PANEL, EFFECTIVE APRIL 21, 2021.

LAND USE SUMMARY:

GROSS AREA: 1.674 AC
NET AREA: 1.564 AC
TOTAL PROPOSED PARCELS: 2
TOTAL PROPOSED DWELLING UNITS: 35

UTILITY PROVIDERS:

WATER
CALIFORNIA WATER SERVICE
(310) 257-1400

SEWER
CITY OF REDONDO BEACH
PUBLIC WORKS DEPARTMENT
(310) 318-0686, EXT. 4167

CABLE

SPECTRUM
892-2253
FRONTIER
(800) 921-8101

ELECTRICITY

SOUTHERN CALIFORNIA EDISON
(562) 655-4555

GAS

THE GAS COMPANY
(800) 427-2200

TELEPHONE

FRONTIER
(801) 921-8101

EXISTING EASEMENTS:

① DENOTES PLOTTED ITEM.

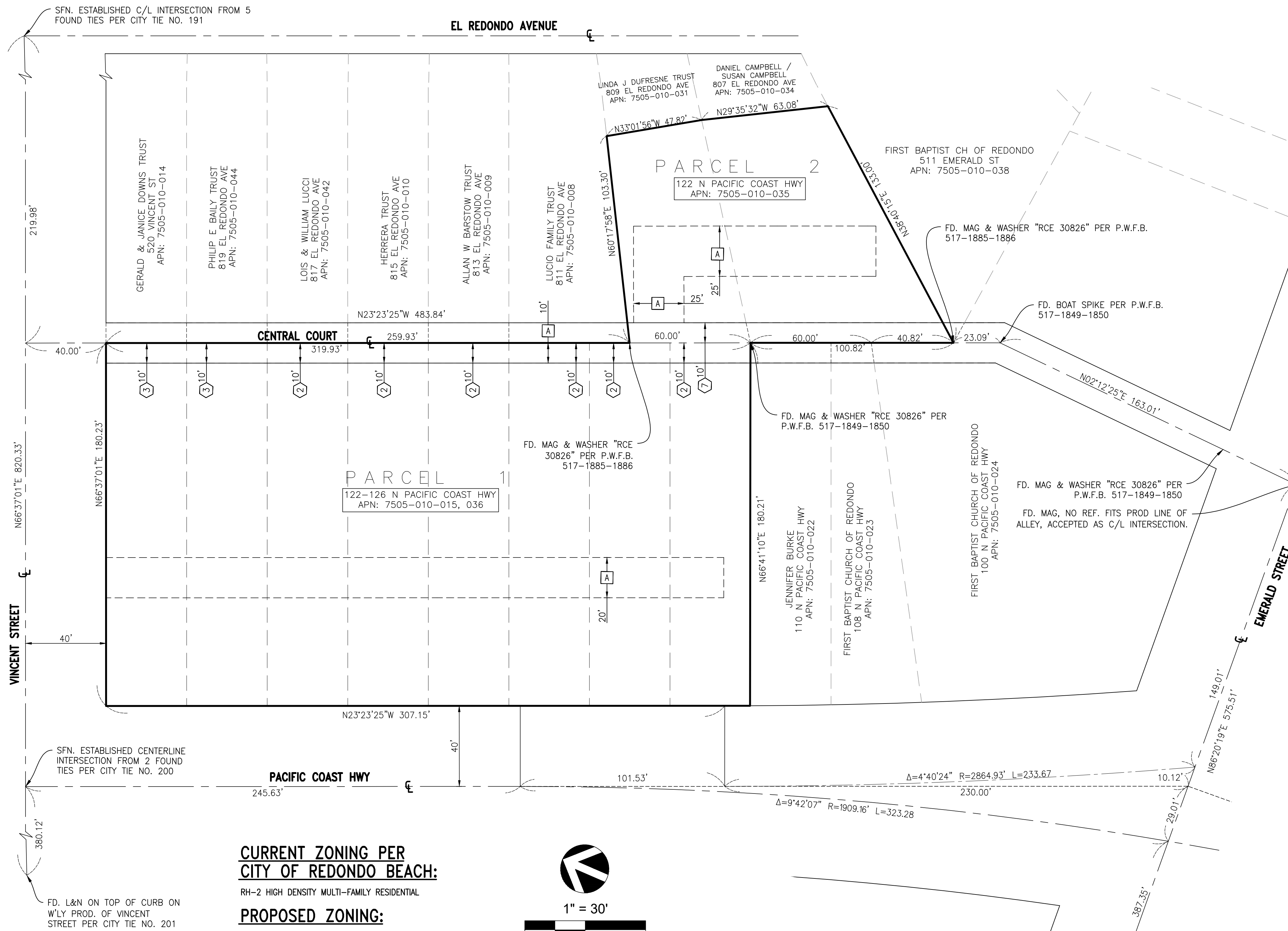
② EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: CITY OF REDONDO BEACH
PURPOSE: ALLEY
RECORDING NO: BOOK 3331, PAGE 28 OF DEEDS.

③ EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT: GRANTED TO: CITY OF REDONDO BEACH
PURPOSE: ALLEY
RECORDING NO: BOOK 3304, PAGE 72 OF DEEDS

4 AN OIL AND GAS LEASE FOR THE TERM THEREIN PROVIDED WITH CERTAIN COVENANTS, CONDITIONS AND PROVISIONS, TOGETHER WITH EASEMENTS, IF ANY, AS SET FORTH THEREIN.
DATED: OCTOBER 25, 1956
LESSOR: ARCHDIOCESE OF LOS ANGELES EDUCATION AND WELFARE CORPORATION, A CORPORATION
LESSEE: KEANS, SPRINGMANN, AND STIPEK, INCORPORATED, A CALIFORNIA CORPORATION
RECORDING DATE: NOVEMBER 7, 1956
RECORDING NO: 3400 OF OFFICIAL RECORDS
(ITEM IS BLANKET IN NATURE)

6 COVENANTS, CONDITIONS AND RESTRICTIONS
RECORDING NO: BOOK 2369, PAGE 39 OF DEEDS
(DOCUMENT IS ILLEGIBLE, APPEARS TO BE BLANKET IN NATURE)

⑦ EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT: GRANTED TO: CITY OF REDONDO BEACH
PURPOSE: ALLEY
RECORDING NO: BOOK 3322, PAGE 63 OF DEEDS



CURRENT ZONING PER CITY OF REDONDO BEACH:

RH-2 HIGH DENSITY MULTI-FAMILY RESIDENTIAL

PROPOSED ZONING:

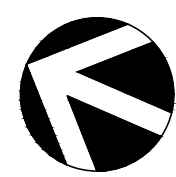
RH-2 HIGH DENSITY MULTI-FAMILY RESIDENTIAL

WATER NOTE:

PROJECT IS PROPOSED TO BE SERVED BY CALIFORNIA WATER SERVICE. ONSITE PROPOSED WATER SYSTEM TO BE PRIVATE.

PROPOSED EASEMENTS:

① INDICATES AN EASEMENT FOR EMERGENCY AND SOLID WASTE COLLECTION SERVICE PURPOSES INCLUDING INGRESS AND EGRESS RIGHTS FOR ACCESS PURPOSES, DEDICATED TO THE CITY REDONDO BEACH, CA



1" = 30'



SURVEYOR'S STATEMENT:

THE SURVEY ON WHICH THIS VESTING TENTATIVE MAP IS BASED WAS DONE BY ME, OR UNDER MY DIRECTION. FIELDWORK WAS COMPLETED ON [SURVEY DATE].

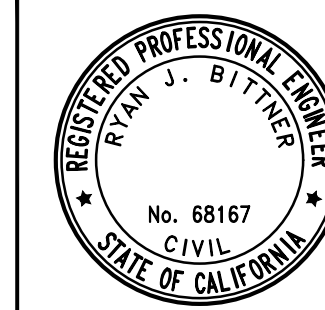
DANE P. MCDUGALL, L.S. 9297

ENGINEER'S STATEMENT:

THIS VESTING TENTATIVE MAP WAS PREPARED BY ME, OR UNDER MY DIRECTION ON DECEMBER 19, 2023.

[ENGINEER], R.C.E. [#####]

PREPARED BY:



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PREPARED FOR:

**CITY VENTURES
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(949) 258-7540

CITY OF REDONDO BEACH
DEPARTMENT OF PLANNING AND DEVELOPMENT

TENTATIVE TRACT MAP NO. 84401

TITLE SHEET
REDONDO BEACH 1
122-126 N. PACIFIC COAST HIGHWAY
REDONDO BEACH, CALIFORNIA

PROJECT NO.
CVEN-167

SHEET
1
OF
5

CIVIL ENGINEER:

C&V CONSULTING, INC.
9860 IRVINE CENTER DRIVE, CA 92630
T (949) 916-3800
RYAN J. BITTNER, P.E., PRINCIPAL
SARAH MCMASTERS, PROJECT MANAGER

SUBDIVIDER:

CITY VENTURES HOMEBUILDING, LLC
3121 MICHELSOL DRIVE, SUIT 150
REDONDO BEACH, CA 90276
(949)258-7540
CONTACT: PATRICK CHIEN

GEOTECHNICAL ENGINEER:

ALTA CALIFORNIA GEOTECHNICAL INC.
170 MAPLE STREET, SUIT 108
CORONA, CA 92880
T: (951) 509-7090

ARCHITECT:

KTGY ARCHITECTURE & PLANNING
17911 VON KARMAN AVE, SUIT 200
IRVINE, CA 92614
T: (949) 547-2200

LANDSCAPE ARCHITECT:

COLLABORATIVE LANDSCAPE ARCHITECTURE
100 AVENIDA MIRAMAR
SAN CLEMENTE, CA 92672
T: (949) 366-6624

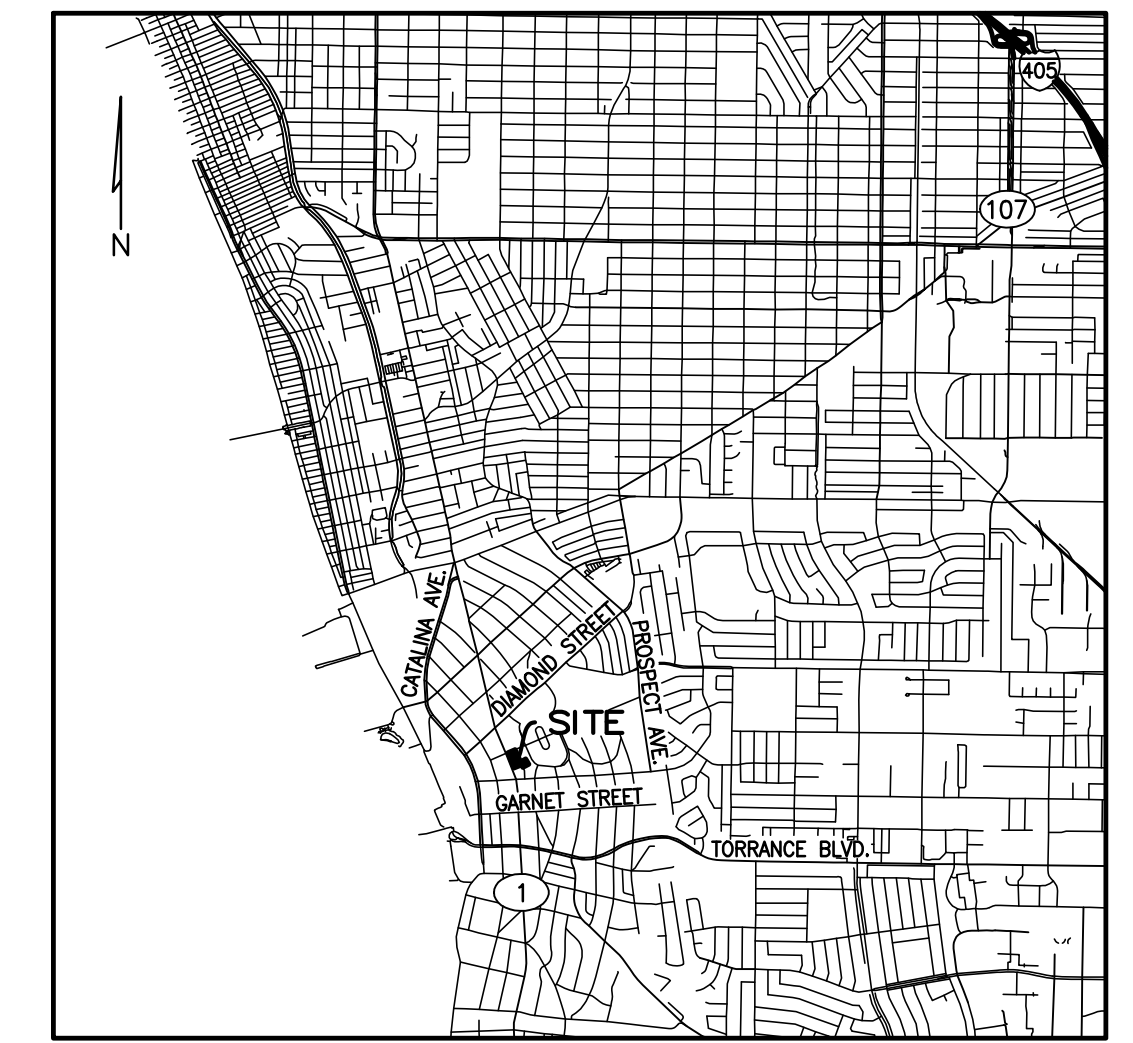
ABBREVIATIONS:

AD	AREA DRAIN	PA	PLANTING AREA
ASPH	ASPHALT	PB	PULL BOX
AP	ANGLE POINT	PLT	PLANTER
ARCH	ARCHITECT	PL	PROPERTY LINE
BC	BUILDING CORNER	PP	POWER POLE
BF	BOTTOM OF FOOTING	PVMT	PAVEMENT
BMP	BEST MGMT PRACTICE	RCP	REINFORCED CONC. PIPE
BOP	BOTTOM OF PIPE	RD	ROOF DRAIN
BP	BEGIN PIPE	RG	ROUGH GRADE
BW	BACK OF SIDEWALK	R/W	RIGHT OF WAY
C&G	CURB & GUTTER	RW	RETAINING WALL
CASQA	CA STORMWATER QUALITY ASSOCIATION	S/W	SIDEWALK
CB	CATCH BASIN	SD	STORM DRAIN
CONC	CONCRETE	SF	SQUARE FEET
CF	CURB FACE	SHT	SHEET
CLF	CHAIN LINK FENCE	SMH	SEWER MANHOLE
CO	CLEANOUT	SS	SANITARY SEWER
DI	DROP INLET	STD	STANDARD
DJ	DRY UTILITY	TBS	TOP OF BOTTOM STEP
DW	DOMESTIC WATER	TC	TOP OF CURB
DWY	DRIVEWAY	TCB	TOP OF CATCH BASIN
EG	EXISTING GROUND	TE	TRASH ENCLOSURE
ELEC	ELECTRIC	TF	TOP OF FOOTING
EOC	EDGE OF CONCRETE	TG	TOP OF GRATED INLET
EOD	EDGE OF DRIVE	THW	TOP OF HEADWALL
EOP	EDGE OF PAVEMENT	TOP	TOP OF PIPE
EP	END PIPE	TOE	TOE OF SLOPE
FG	FINISHED GRADE	TRANS	TRANSFORMER
FL	FLOW LINE	TRG	TOP OF ROUGH GRADE
FF	FINISHED FLOOR	TRW	TOP OF RETAINING WALL
FH	FIRE HYDRANT	TTT	TOP OF TOP STEP
FS	FINISHED SURFACE	TW	TOP OF WALL
GM	GAS METER	TYP	TYPICAL
GR	GUARD RAIL	UB	UTILITY BOX
HDWL	CONC HEADWALL	VCP	VITRIFIED CLAY PIPE
INV	INVERT	WM	WATER METER
LIP	LIP OF CURB	WV	WATER VALVE
LP	LOW POINT	VLT	VAULT
MH	MANHOLE		
NTS	NOT TO SCALE		
OH	OVERHEAD WIRES		

LEGEND:

---	EXISTING BOUNDARY/ RIGHT-OF-WAY LINE
---	PROP. BOUNDARY/ RIGHT-OF-WAY LINE
---	CENTERLINE
---	EX. LOT LINE
---	BUILDING FOOTPRINT
---	FLOWLINE
---	SITE DISTANCE TRIANGLE

PRELIMINARY SITE PLAN TENTATIVE TRACT MAP NO. 84401



VICINITY MAP
NTS

EXISTING EASEMENTS:

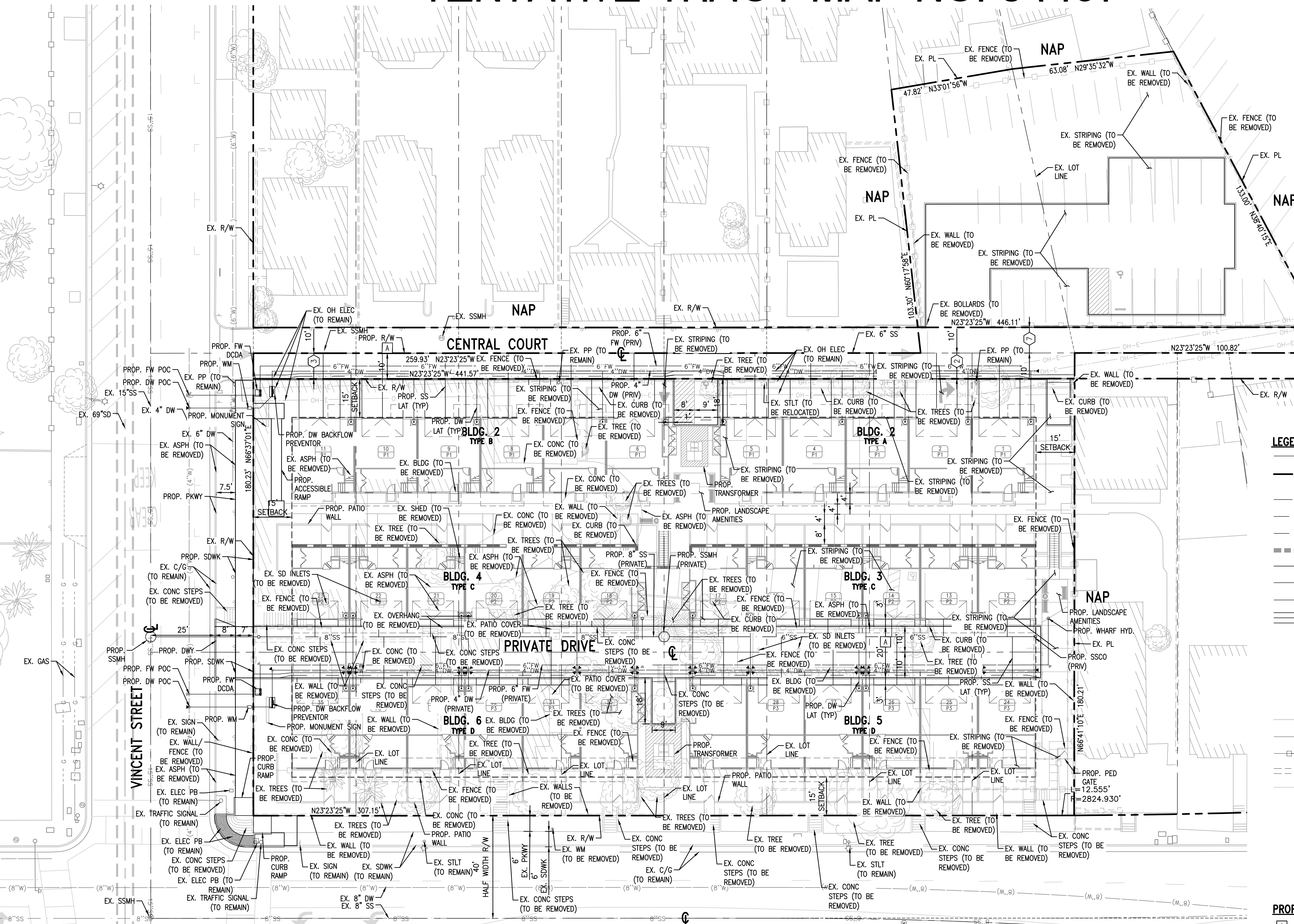
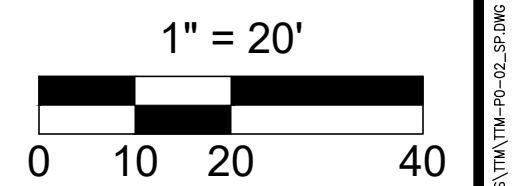
- ① DENOTES PLOTTED ITEM.
- ② EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: CITY OF REDONDO BEACH
PURPOSE: ALLEY
RECORDING NO: BOOK 3331, PAGE 28 OF DEEDS.
- ③ EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
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- ⑦ EASEMENT(S) FOR THE PURPOSE(S) SHOWN BELOW AND RIGHTS INCIDENTAL THERETO, AS GRANTED IN A DOCUMENT:
GRANTED TO: CITY OF REDONDO BEACH
PURPOSE: ALLEY
RECORDING NO: BOOK 3322, PAGE 63 OF DEEDS

LEGEND:

- CENTERLINE
- - - EX. TRACT BOUNDARY/
RIGHT-OF-WAY LINE
- LOT LINE
- - - EX. EASEMENT LINE
- - - PROP. EASEMENT LINE
- ADA PATH OF TRAVEL
- 8"SS — PROP. SS LINE
- 6"DW — PROP. DW LINE
- 8"FW — PROP. FW LINE
- PROP. SD LINE
- PROP. SS MH
- PROP. SS CO
- ⊗ PROP. WATER VALVE
- ⊗ PROP. FIRE HYDRANT
- ⊗ PROP. FW DCCA
- ⊗ (8"SS) — EX. SS LINE
- (16"DW) — EX. DW LINE
- EX. CHAIN LINK FENCE
- EX. SCREEN WALL
- OH-E — EX. OVERHEAD POWERLINE
- ⊙ EX. SS MH
- ⊙ EX. SD MH
- ⊗ EX. FIRE HYDRANT
- ⊗ EX. WATER VALVE
- ⊗ EX. POWER POLE
- ⊗ EX. STREET LIGHT POLE

PROPOSED EASEMENTS:

- ⊗ INDICATES AN EASEMENT FOR EMERGENCY AND SOLID WASTE COLLECTION SERVICE PURPOSES INCLUDING INGRESS AND EGRESS RIGHTS FOR ACCESS PURPOSES, DEDICATED TO THE CITY OF REDONDO BEACH, CA



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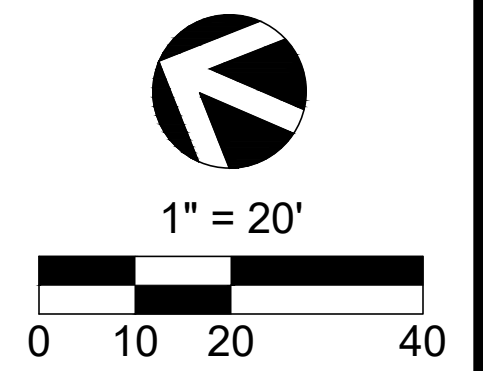
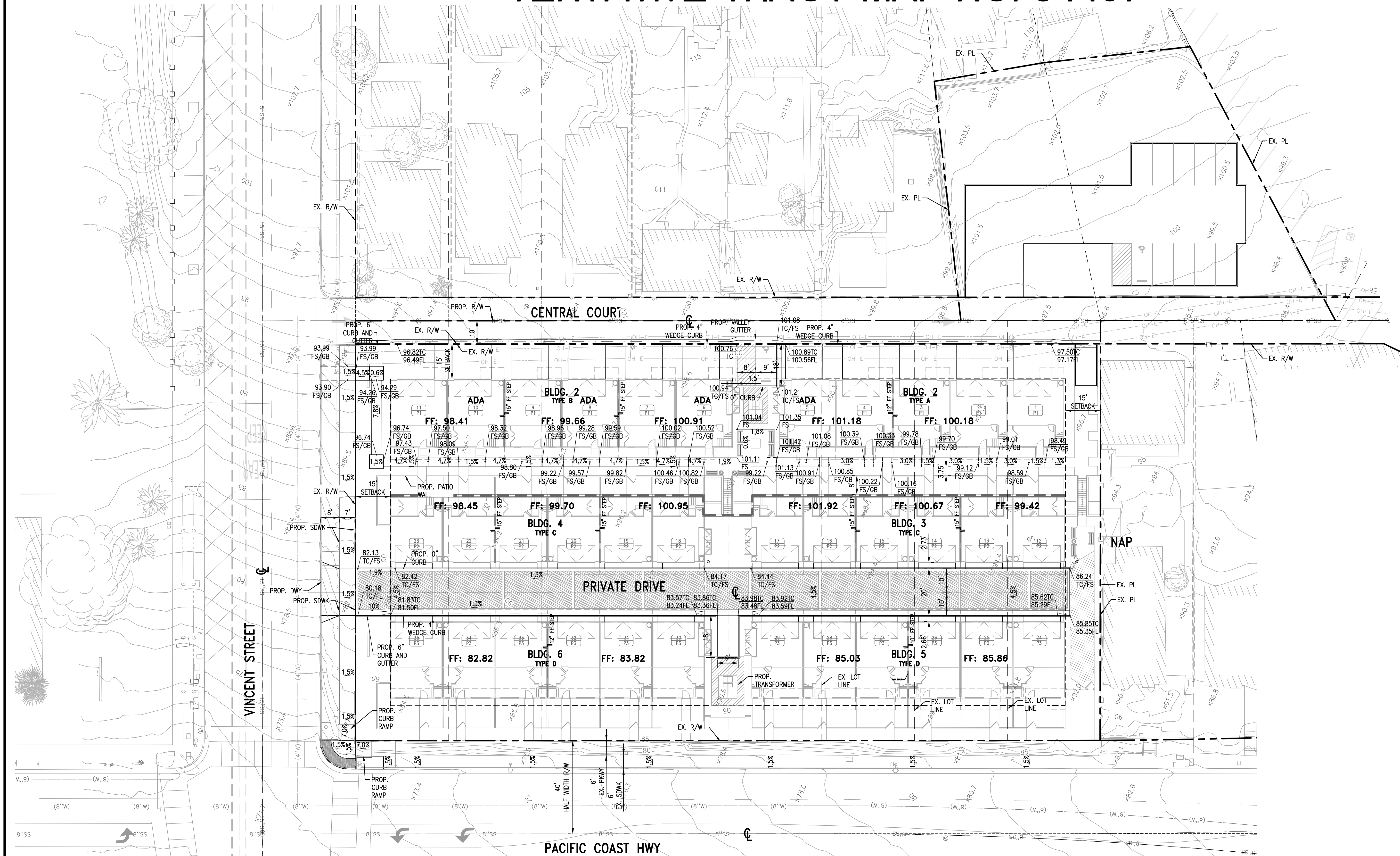
PREPARED FOR:


**CITY VENTURES
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IRVINE, CA 92612
(949) 258-7540

CITY OF REDONDO BEACH
DEPARTMENT OF PLANNING AND DEVELOPMENT
TENTATIVE TRACT MAP NO. 84401
PRELIMINARY SITE PLAN
REDONDO BEACH 1
122-126 N. PACIFIC COAST HIGHWAY
REDONDO BEACH, CALIFORNIA

PROJECT NO.
CVEN-167
SHEET
2
OF
5

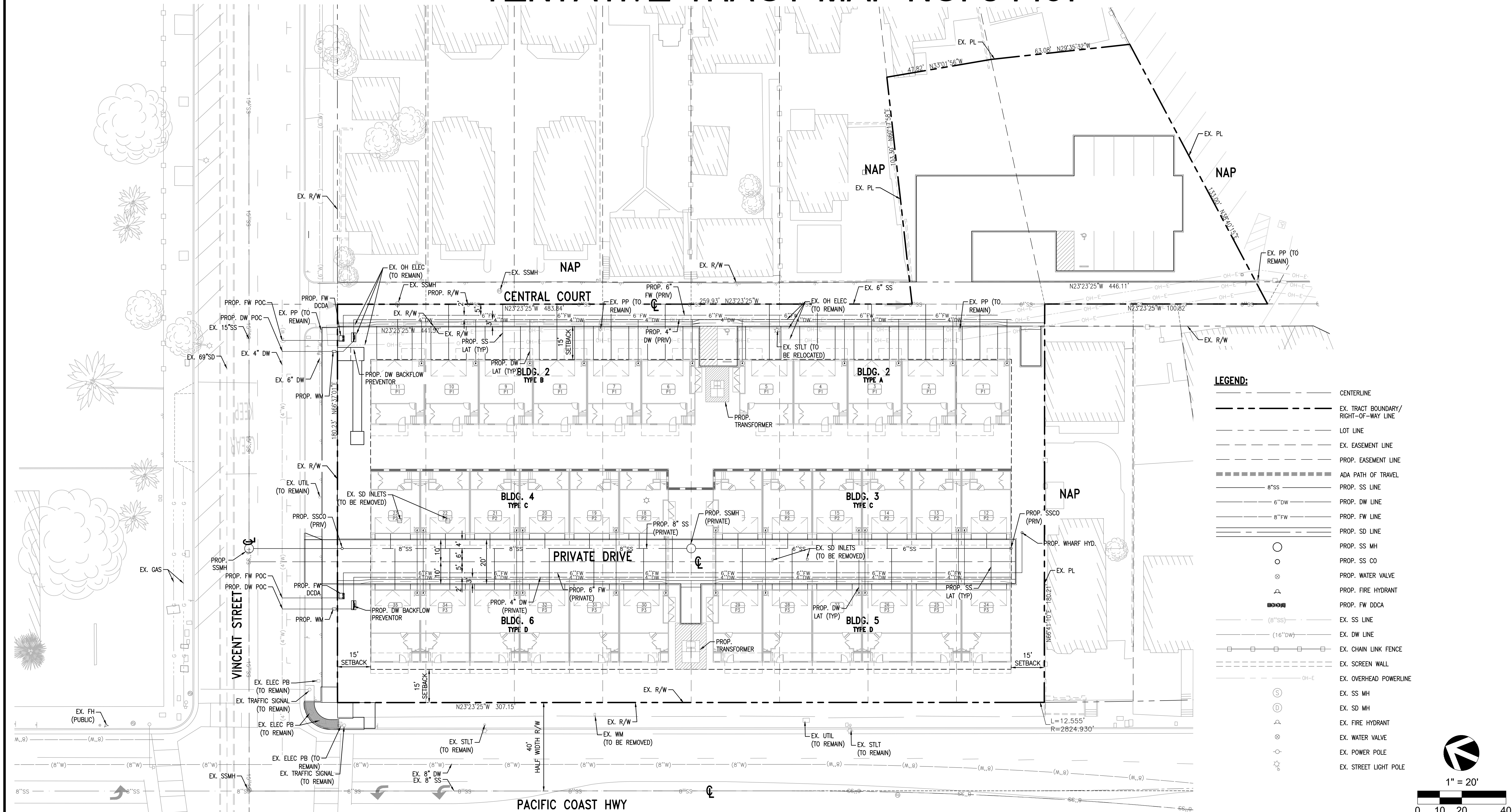
PRELIMINARY GRADING PLAN TENTATIVE TRACT MAP NO. 84401



PREPARED BY: 	PREPARED FOR: CITY VENTURES HOMEBUILDING, LLC 3121, MICHELSON DRIVE, SUIT 150 IRVINE, CA 92612 (949) 258-7540	CITY OF REDONDO BEACH DEPARTMENT OF PLANNING AND DEVELOPMENT TENTATIVE TRACT MAP NO. 84401 PRELIMINARY GRADING PLAN REDONDO BEACH 1 122-126 N. PACIFIC COAST HIGHWAY REDONDO BEACH, CALIFORNIA
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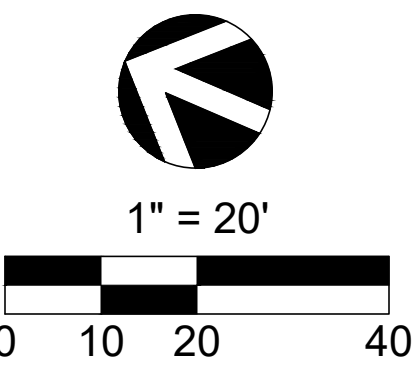
PROJECT NO. CVEN-167	SHEET 3 OF 5
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PRELIMINARY UTILITY PLAN TENTATIVE TRACT MAP NO. 84401



LEGEND:

	CENTERLINE
	EX. TRACT BOUNDARY/ RIGHT-OF-WAY LINE
	LOT LINE
	EX. EASEMENT LINE
	PROP. EASEMENT LINE
	ADA PATH OF TRAVEL
	8"SS PROP. SS LINE
	6"DW PROP. DW LINE
	8"FW PROP. FW LINE
	16"DW PROP. SD LINE
	PROP. SS MH
	PROP. SS CO
	PROP. WATER VALVE
	PROP. FIRE HYDRANT
	PROP. FW DCCA
	8"SS EX. SS LINE
	16"DW EX. DW LINE
	EX. CHAIN LINK FENCE
	EX. SCREEN WALL
	EX. OVERHEAD POWERLINE
	EX. SS MH
	EX. SD MH
	EX. FIRE HYDRANT
	EX. WATER VALVE
	EX. POWER POLE
	EX. STREET LIGHT POLE



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CITY OF REDONDO BEACH
DEPARTMENT OF PLANNING AND DEVELOPMENT
TENTATIVE TRACT MAP NO. 84401
PRELIMINARY UTILITY PLAN
REDONDO BEACH 1
122-126 N. PACIFIC COAST HIGHWAY
REDONDO BEACH, CALIFORNIA

PROJECT NO. CVEN-167	SHEET 4
	OF 5

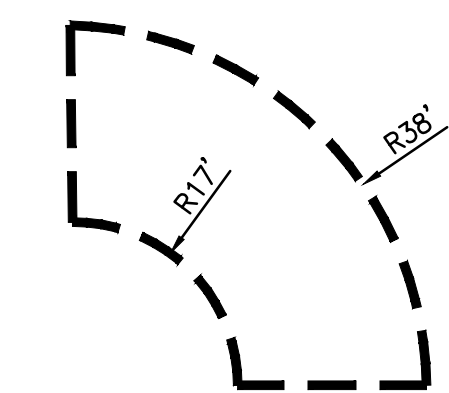
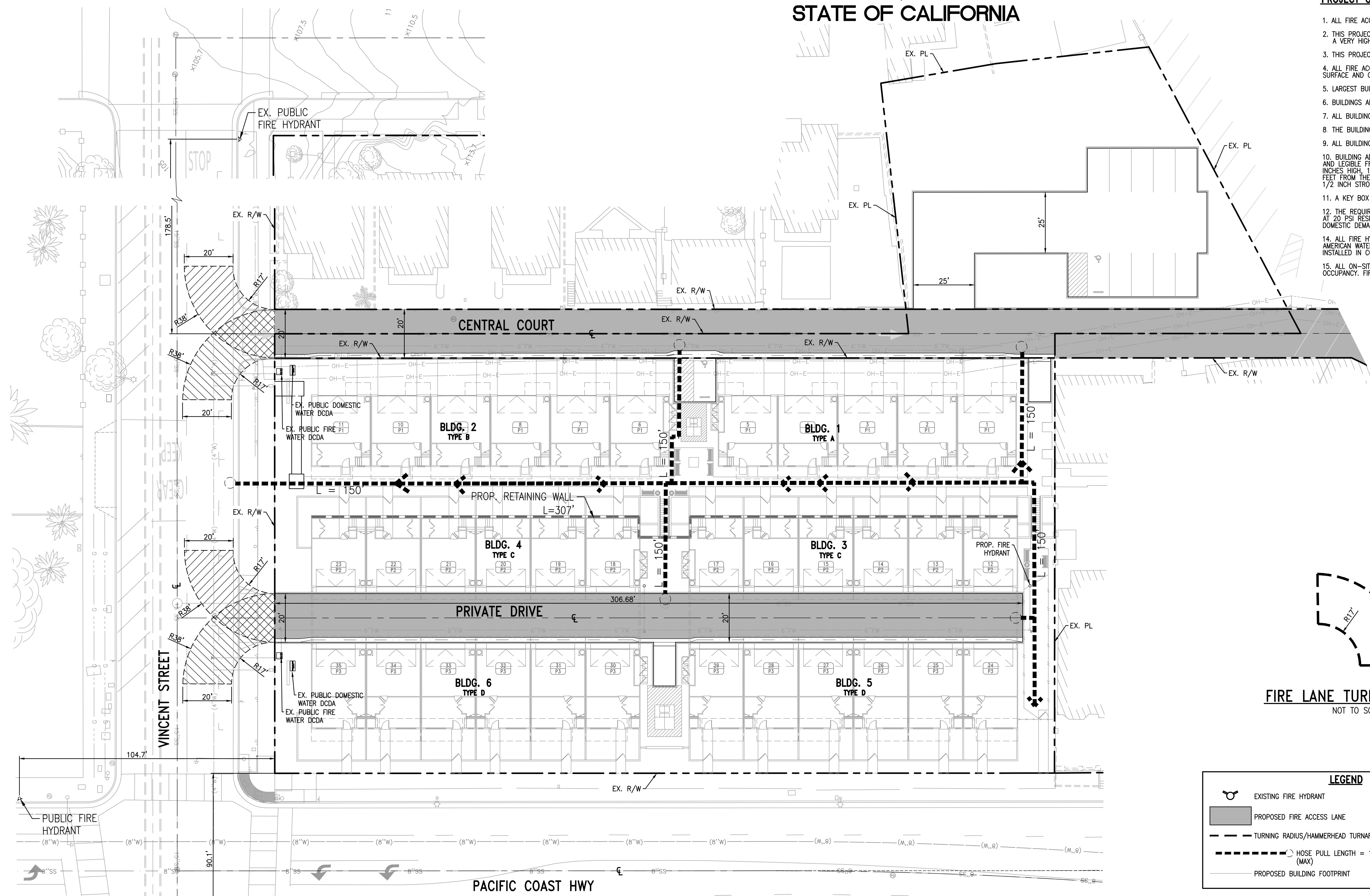
DATE: 11/27/2023 BY: SALEM HANSEN

VESTING TENTATIVE TRACT MAP NO. 84401

FOR CONDOMINIUM PURPOSES
CITY OF REDONDO BEACH, COUNTY OF LOS ANGELES
STATE OF CALIFORNIA

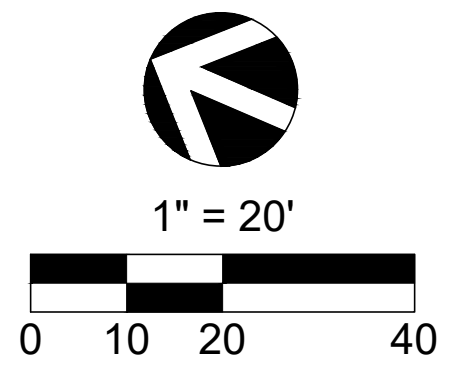
PROJECT GENERAL NOTES:

1. ALL FIRE ACCESS LANES MEET CA FIRE CODE MINIMUM REQUIREMENTS 17' & 30' RADII.
2. THIS PROJECT DOES NOT HAVE ANY FUEL MODIFICATION OR WILD LAND EXPOSURES AND IS NOT IN A VERY HIGH FIRE HAZARD ZONE.
3. THIS PROJECT IS DESIGNED IN CONFORMANCE WITH THE CBC, 2022 EDITION.
4. ALL FIRE ACCESS ROADS SHALL BE ALL WEATHER, MEET THE CRITERIA OF AN ALL WEATHER DRIVING SURFACE AND COMPLY WITH LACOFD GUIDELINE FOR FIRE APPARATUS ROADS.
5. LARGEST BUILDING SQ. FOOTAGE = 6,637 SQ. FT.
6. BUILDINGS ARE DESIGNATED CONSTRUCTION TYPE V-B.
7. ALL BUILDING OCCUPANCIES ARE RH-2.
8. THE BUILDING HEIGHTS ARE APPROXIMATELY 35' FEET MAX.
9. ALL BUILDINGS ON THE SITE WILL BE SPRINKLERED PER NFPA-13D.
10. BUILDING ADDRESS NUMBER SHALL BE PROVIDED AND MAINTAINED SO AS TO BE PLAINLY VISIBLE AND LEGIBLE FROM THE STREET FRONTING THE PROPERTY. THE NUMBERS SHALL BE A MINIMUM 3 INCHES HIGH, 1 INCH WIDE WITH A 3/8 INCH STROKE. FOR BUILDINGS SET BACK MORE THAN 150 FEET FROM THE STREET, THE NUMBERS SHALL BE A MINIMUM 5 INCHES HIGH, 2 INCHES WIDE WITH A 1/2 INCH STROKE. FIRE CODE 505.1.
11. A KEY BOX SHALL BE PROVIDED AT THE MAIN ENTRANCE, IN ACCORDANCE WITH FIRE CODE 506.1.
12. THE REQUIRED FIRE FLOW FOR FIRE HYDRANTS AT THIS LOCATION IS 2,500 GALLONS PER MINUTE, AT 20 PSI RESIDUAL PRESSURE, FOR A DURATION OF 2 HOURS OVER AND ABOVE MAXIMUM DAILY DOMESTIC DEMAND. FIRE CODE 510.5.
14. ALL FIRE HYDRANTS SHALL MEASURE 6"x4"x2-1/2", BRASS OR BRONZE, CONFORMING TO AMERICAN WATER WORKS ASSOCIATION STANDARD C503, OR APPROVED EQUAL; AND SHALL BE INSTALLED IN COMPLIANCE WITH FIRE DEPARTMENT REGULATION 8. FIRE CODE 507.5.
15. ALL ON-SITE FIRE HYDRANTS SHALL BE INSTALLED, TESTED AND APPROVED PRIOR TO BUILDING OCCUPANCY. FIRE CODE 501.4.



FIRE LANE TURNING RADIUS
NOT TO SCALE

LEGEND	
	EXISTING FIRE HYDRANT
	PROPOSED FIRE ACCESS LANE
	TURNING RADIUS/HAMMERHEAD TURNAROUND
	HOSE PULL LENGTH = 150' (MAX)
	PROPOSED BUILDING FOOTPRINT
R/W	RIGHT OF WAY
R	RADIUS
EX.	EXISTING
N.A.P.	NOT A PART
PL	PROPERTY LINE
PROP.	PROPOSED
CL	CENTERLINE
FH	FIRE HYDRANT



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PREPARED FOR:

CITY VENTURES HOMEBUILDING, LLC
3121, MICHELSOL DRIVE, SUIT 150
IRVINE, CA 92612
(949) 258-7540

CITY OF REDONDO BEACH
DEPARTMENT OF PLANNING AND DEVELOPMENT

TENTATIVE TRACT MAP NO. 84401
FIRE ACCESS PLAN
& HYDRANT LOCATION PLAN
REDONDO BEACH 1
122-126 N. PACIFIC COAST HIGHWAY
REDONDO BEACH, CALIFORNIA

PROJECT NO.	CVEN-167
SHEET	5
OF	5

PLAN, SET: 11/27/2023 BY: SALEM HANCOCK
 DATE: