Priority Development Project (PDP)
Storm Water Quality Management Plan (SWQMP)

32nd and Broadway

PTS No. 637438

[Insert Drawing Number (if applicable) and Internal Order Number (if applicable)]

☐ **Check if electing for offsite alternative compliance**

Engineer of Work:

_____

Michael Kinnear, RCE 76785
Provide Wet Signature and Stamp Above Line

Prepared For:

32nd and Broadway, LLC
3184 Airway Avenue, Suite B
Costa Mesa, CA 92626
(949)233-6700

Prepared By:

COFFEY ENGINEERING, INC.

Coffey Engineering, Inc.
9666 Businesspark Ave., Suite 210
San Diego, CA 92131
(858) 831-0111

Date:
6/30/2020

Approved by: City of San Diego Date

The City of SAN DIEGO

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Project Name: 32nd and Broadway

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- Attachment 3: Structural BMP Maintenance Plan
    - Maintenance Agreement (Form DS-3247) (when applicable)
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Acronyms

APN	Assessor's Parcel Number
ASBS	Area of Special Biological Significance
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CGP	Construction General Permit
DCV	Design Capture Volume
DMA	Drainage Management Areas
ESA	Environmentally Sensitive Area
GLU	Geomorphic Landscape Unit
GW	Ground Water
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
HU	Harvest and Use
INF	Infiltration
LID	Low Impact Development
LUP	Linear Underground/Overhead Projects
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
POC	Pollutant of Concern
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWPPP	Stormwater Pollutant Protection Plan
SWQMP	Storm Water Quality Management Plan
TMDL	Total Maximum Daily Load
WMAA	Watershed Management Area Analysis
WPCP	Water Pollution Control Program
WQIP	Water Quality Improvement Plan

Certification Page

Project Name: 32nd and Broadway
Permit Application

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Engineer of Work's Signature

76785 — PE#

12/31/2020 — Expiration Date

Michael Kinnear

Print Name

Coffey Engineering, Inc.

Company

6/30/2020

Date

Engineer's Stamp

Project Name: 32nd and Broadway

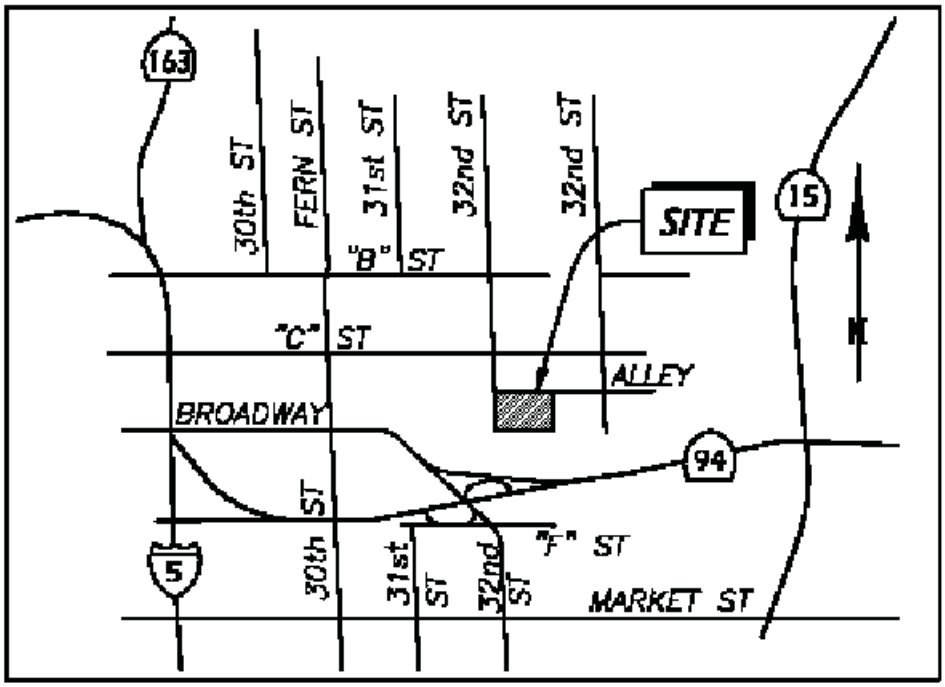
Submittal Record

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments.

Submittal Number	Date	Project Status	Changes
1	2/28/19	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Initial Submittal
2	9/10/19	☑ Preliminary Design/Planning/CEQA ☐ Final Design	
3		☐ Preliminary Design/Planning/CEQA ☐ Final Design	
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

Project Vicinity Map

Project Name: 32nd and Broadway
Permit Application



VICINITY MAP

THOMAS BROS. MAP 1289–F3
NO SCALE

Project Name: 32nd and Broadway

City of San Diego Form DS-560 Storm Water Requirements Applicability Checklist

Attach DS-560 form.

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

Storm Water Requirements Applicability Checklist

FORM
DS-560
November 2018

Project Address: 1000 Block, 32nd Street, San Diego, CA 92103 | Project Number:

SECTION 1. Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1], which is administered by the State Regional Water Quality Control Board.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with Construction Activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

   ☒ Yes; SWPPP required, skip questions 2-4 ☐ No; next question

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity resulting in ground disturbance and/or contact with storm water?

   ☐ Yes; WPCP required, skip questions 3-4 ☐ No; next question

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as pipeline/utility replacement)

   ☐ Yes; WPCP required, skip question 4 ☐ No; next question

4. Does the project only include the following Permit types listed below?

   - Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
   - Individual Right of Way Permits that exclusively include only ONE of the following activities: water service, sewer lateral, or utility service.
   - Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, pot holing, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes; no document required

Check one of the boxes below, and continue to PART B:

☒ If you checked "Yes" for question 1, **a SWPPP is REQUIRED. Continue to PART B**

☐ If you checked "No" for question 1, and checked "Yes" for question 2 or 3, **a WPCP is REQUIRED.** If the project proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

☐ If you checked "No" for all questions 1-3, and checked "Yes" for question 4 PART B **does not apply and no document is required. Continue to Section 2.**

1. More information on the City's construction BMP requirements as well as CGP requirements can be found at: www.sandiego.gov/stormwater/regulations/index.shtml

PART B: Determine Construction Site Priority

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk determination approach of the State Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete PART B and continued to Section 2

1. ☐ **ASBS**
   a. Projects located in the ASBS watershed.

2. ☒ **High Priority**
   a. Projects that qualify as Risk Level 2 or Risk Level 3 per the Construction General Permit (CGP) and not located in the ASBS watershed.
   b. Projects that qualify as LUP Type 2 or LUP Type 3 per the CGP and not located in the ASBS watershed.

3. ☐ **Medium Priority**
   a. Projects that are not located in an ASBS watershed or designated as a High priority site.
   b. Projects that qualify as Risk Level 1 or LUP Type 1 per the CGP and not located in an ASBS watershed.
   c. WPCP projects (>5,000sf of ground disturbance) located within the Los Penasquitos watershed management area.

4. ☐ **Low Priority**
   a. Projects not subject to a Medium or High site priority designation and are not located in an ASBS watershed.

SECTION 2. Permanent Storm Water BMP Requirements.

Additional information for determining the requirements is found in the Storm Water Standards Manual.

PART C: Determine if Not Subject to Permanent Storm Water Requirements.

Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of the numbers in Part C continue to Part D.

1.	Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?	☐ Yes	☒ No
2.	Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?	☐ Yes	☒ No
3.	Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).	☐ Yes	☒ No

PART D: PDP Exempt Requirements.

PDP Exempt projects are required to implement site design and source control BMPs.

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."

If "no" was checked for all questions in Part D, continue to Part E.

1. **Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:**
   - **Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;**
   - **Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;**
   - **Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?**

   ☐ Yes; PDP exempt requirements apply ☒ No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

   ☐ Yes; PDP exempt requirements apply ☒ No; project not exempt.

PART E: Determine if Project is a Priority Development Project (PDP).

Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".

If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Development Project".

1. **New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☒ Yes ☐ No

2. **Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☐ Yes ☒ No

3. **New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface. ☐ Yes ☒ No

4. **New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater. ☒ Yes ☐ No

5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).** ☐ Yes ☒ No

6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site). ☒ Yes ☐ No

7.	**New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands).	☐ Yes ☒ No
8.	**New development or redevelopment projects of a retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.	☐ Yes ☒ No
9.	**New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.	☐ Yes ☒ No
10.	**Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces.	☐ Yes ☒ No

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1.	The project is **NOT SUBJECT TO PERMANENT STORM WATER REQUIREMENTS.**	☐
2.	The project is a **STANDARD DEVELOPMENT PROJECT.** Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
3.	The project is **PDP EXEMPT.** Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
4.	The project is a **PRIORITY DEVELOPMENT PROJECT.** Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires a hydromodification plan management	☒

Michael Rein - Coffey Engineering, Inc.	Engineering Designer (Agent)
Name of Owner or Agent *(Please Print)*	Title
Michael Rein	02/15/2019
Signature	Date

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Project Name: 32nd and Broadway

Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: 32nd and Broadway		
Permit Application Number:		Date:
Determination of Requirements		
The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements. Answer each step below, starting with **Step 1** and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.		
Step	**Answer**	**Progression**
Step 1: Is the project a "development project"? See Section 1.3 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Go to **Step 2**.
	☐ No	**Stop**. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):		
Step 2: Is the project a Standard Project, PDP, or PDP Exempt? To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, Storm Water Requirements Applicability Checklist.	☐ Standard Project	**Stop.** Standard Project requirements apply
	☑ PDP	PDP requirements apply, including PDP SWQMP. Go to **Step 3**.
	☐ PDP Exempt	**Stop.** Standard Project requirements apply. Provide discussion and list any additional requirements below.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		

Project Name: 32nd and Broadway

Form I-1 Page 2 of 2		
Step	**Answer**	**Progression**
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to **Step 4**.
	☑ No	BMP Design Manual PDP requirements apply. Go to **Step 4**.
Discussion / justification of prior lawful approval, and identify requirements (not required if prior lawful approval does not apply):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to **Step 5**.
	☐ No	**Stop**. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do not apply:		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). **Stop**.
	☑ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. **Stop**.
Discussion / justification if protection of critical coarse sediment yield areas does not apply: There are no critical course sediment yield areas (CCSYA) on-site.		

HMP Exemption Exhibit

Attach a HMP Exemption Exhibit that shows direct storm water runoff discharge from the project site to HMP exempt area. Include project area, applicable underground storm drain line and/or concrete lined channels, outfall information and exempt waterbody.
Reference applicable drawing number(s).

Exhibit must be provided on 11"x17" or larger paper.

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Project Name: 32nd and Broadway

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	32nd and Broadway
Project Address	1000 Block 32nd Street San Diego, CA 92103
Assessor's Parcel Number(s) (APN(s))	539-563-06, 07, 10
Permit Application Number	637438
Project Watershed	Select One: ☐ San Dieguito River ☐ Penasquitos ☐ Mission Bay ☐ San Diego River ☑ San Diego Bay ☐ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX)	908.22
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	1.44 Acres (62,525 Square Feet)
Area to be disturbed by the project (Project Footprint)	1.44 Acres (62,525 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	1.12 Acres (48,874 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	0.31 Acres (13,651 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Project Area.	
The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition	N/A % No ex. imp. area

Project Name: 32nd and Broadway

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):

- ☐ Existing development
- ☐ Previously graded but not built out
- ☐ Agricultural or other non-impervious use
- ☑ Vacant, undeveloped/natural

Description / Additional Information:

In existing conditions, the site is vacant and undeveloped.

Existing Land Cover Includes (select all that apply):

- ☑ Vegetative Cover
- ☐ Non-Vegetated Pervious Areas
- ☐ Impervious Areas

Description / Additional Information:

Vegetative cover includes natural vegetation.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

- ☐ NRCS Type A
- ☐ NRCS Type B
- ☐ NRCS Type C
- ☑ NRCS Type D

Approximate Depth to Groundwater:

- ☐ Groundwater Depth < 5 feet
- ☐ 5 feet < Groundwater Depth < 10 feet
- ☐ 10 feet < Groundwater Depth < 20 feet
- ☑ Groundwater Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- ☐ Watercourses
- ☐ Seeps
- ☐ Springs
- ☐ Wetlands
- ☑ None

Description / Additional Information:

Project Name: 32nd and Broadway

Form I-3B Page 3 of 11
Description of Existing Site Topography and Drainage
How is storm water runoff conveyed from the site? At a minimum, this description should answer: 1. Whether existing drainage conveyance is natural or urban; 2. If runoff from offsite is conveyed through the site? If yes, quantification of all offsite drainage areas, design flows, and locations where offsite flows enter the project site and summarize how such flows are conveyed through the site; 3. Provide details regarding existing project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels; 4. Identify all discharge locations from the existing project along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.
Descriptions/Additional Information
1. Existing drainage conveyance is natural. 2. Run-on from the northerly site currently runs through the site. However, a condominium complex is being permitted with the City under PTS # 595288. All storm water run-on will be captured by this development and routed around the site. 3. Drainage is conveyed offsite via sheet flow, there are no storm drain installations currently on-site. 4. The site's storm water runs off the site via sheet flow. There is an existing 60" RCP southeast of the site that receives all storm water runoff from the existing site. In existing conditions, the site generates approximately Q(100)= 1.92 cfs.

Form I-3B Page 4 of 11

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The project proposes to develop a 38 unit condominium complex with driveway and landscaped areas. Also proposed is an extension of the existing 32nd Street to the southerly property line of the subject property.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

Proposed impervious features include the proposed building footprints, driveway, and street improvements.

List/describe proposed pervious features of the project (e.g., landscape areas):

Pervious features include landscape areas and the proprietary biofiltration device for storm water treatment.

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

Grading and retaining walls are proposed site-wide in order to create flat pad areas for the proposed condo units.

Form I-3B Page 5 of 11

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☑ Yes

☐ No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural and constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Description / Additional Information:

In post-construction conditions, the project site will be heavily developed with 42 units and driveway. All runoff from developed areas will be directed to a system of storm drain inlets throughout the site that collectively channel into an underground storm water storage tank for hydromodification requirements (Basin A). This storage tank then discharges runoff to a storm water treatment device located at the southeasterly corner of the site. Once treated, storm water is released from the site directly to a proposed rip-rap within the 25' drainage easement, near the existing 60" RCP inlet. The 100-year storm event flow rate Q100 has been calculated at 3.62 cfs for this basin (Basin A).

There is a small strip of vegetated hillside along the perimeter of the site that will not be required to be treated, and will sheet flow off the site (Basin B). Flows from this basin are expected to be Q100=0.07 cfs.

Also proposed is an extension of the paved 32nd Street to the southerly extent of the project site. A storm drain inlet will collect street flows and route them to the storm water storage tank as well (Basin C). The flow rate was calculated to be Q100=0.94 cfs.

Run-on from the westerly hillside also contributes runoff to the site. This hillside has been divided into two basins, the first (Basin D) discharges 0.36 cfs to a proposed catch basin that outlets to a rip rap south of the site. A much smaller strip of undeveloped hillside sheet flows around the proposed street extension to the hillside, totaling 0.14 cfs.

Considering the same size drainage basin footprint (including run-on), the site will feature an increase of flow from pre-construction to post-construction conditions of 1.78 cfs (3.35 cfs to 5.13 cfs).

Form I-3B Page 6 of 11

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

- ☑ Onsite storm drain inlets
- ☑ Interior floor drains and elevator shaft sump pumps
- ☑ Interior parking garages
- ☑ Need for future indoor & structural pest control
- ☑ Landscape/outdoor pesticide use
- ☑ Pools, spas, ponds, decorative fountains, and other water features
- ☑ Food service
- ☐ Refuse areas
- ☐ Industrial processes
- ☑ Outdoor storage of equipment or materials
- ☐ Vehicle and equipment cleaning
- ☐ Vehicle/equipment repair and maintenance
- ☐ Fuel dispensing areas
- ☐ Loading docks
- ☑ Fire sprinkler test water
- ☑ Miscellaneous drain or wash water
- ☑ Plazas, sidewalks, and parking lots

Description/Additional Information:

Project Name: 32nd and Broadway

Form I-3B Page 7 of 11
Identification and Narrative of Receiving Water
Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable) Storm water runoff will reach the existing 60" RCP located southeast of the site, and travel south under the SR-94 to a system of storm drains that lead to Chollas Creek. The runoff ultimately discharges to the San Diego Bay.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations Chollas Creek - Contact Water Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Wildlife Habitat (WILD)
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations N/A
Provide distance from project outfall location to impaired or sensitive receiving waters The project site is approximately 1800 feet from Chollas Creek.
Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands The site's permanent post-construction storm water BMPs are located approximately 3,900 feet from the City's nearest Multi-Habitat Planning Area, and approximately 3,600 feet from the nearest ESA.

Project Name: 32nd and Broadway

Form I-3B Page 8 of 11		
Identification of Receiving Water Pollutants of Concern		
List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:		
303(d) Impaired Water Body (Refer to Appendix K)	**Pollutant(s)/Stressor(s) (Refer to Appendix K)**	**TMDLs/WQIP Highest Priority Pollutant (Refer to Table 1-4 in Chapter 1)**
Chollas Creek	Copper	Indicator Bacteria
	Diazinon	Dissolved Copper
	Indicator Bacteria	Lead
	Lead	Zinc (Wet Weather)
	Phosphorus	
	Total Nitrogen as N	
	Trash	
	Zinc	
SD Bay Shoreline, 32nd St SD Naval Station	Benthic Community Effects	
	Sediment Toxicity	

Identification of Project Site Pollutants*

*Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)

Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see Appendix B.6):

Pollutant	Not Applicable to the Project Site	Anticipated from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	☐	☐	☐
Nutrients	☐	☐	☐
Heavy Metals	☐	☐	☐
Organic Compounds	☐	☐	☐
Trash & Debris	☐	☐	☐
Oxygen Demanding Substances	☐	☐	☐
Oil & Grease	☐	☐	☐
Bacteria & Viruses	☐	☐	☐
Pesticides	☐	☐	☐

Project Name: 32nd and Broadway

Form I-3B Page 9 of 11

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6)?

☑ Yes, hydromodification management flow control structural BMPs required.

☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

Note: If "No" answer has been selected the SWQMP must include an exhibit that shows the storm water conveyance system from the project site to an exempt water body. The exhibit should include details about the conveyance system and the outfall to the exempt water body.

Critical Coarse Sediment Yield Areas*
*This Section only required if hydromodification management requirements apply

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

☐ Yes

☑ No

Discussion / Additional Information:

Form I-3B Page 10 of 11

Flow Control for Post-Project Runoff*

***This Section only required if hydromodification management requirements apply**

List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.

POC 1 - Flow control for hydromodification management occurs at the cistern outlet orifice.

Has a geomorphic assessment been performed for the receiving channel(s)?

☑ No, the low flow threshold is $0.1Q_2$ (default low flow threshold)

☐ Yes, the result is the low flow threshold is $0.1Q_2$

☐ Yes, the result is the low flow threshold is $0.3Q_2$

☐ Yes, the result is the low flow threshold is $0.5Q_2$

If a geomorphic assessment has been performed, provide title, date, and preparer:

Discussion / Additional Information: (optional)

Project Name: 32nd and Broadway

Form I-3B Page 11 of 11
Other Site Requirements and Constraints
When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements. N/A
Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed.

Project Name: 32nd and Broadway

Source Control BMP Checklist for PDPs	Form I-4B

Source Control BMPs

All development projects must implement source control BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following.

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

Source Control Requirement	Applied?		
4.2.1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.3 not implemented:			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.2.4 not implemented:			
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.5 not implemented:			

Project Name: 32nd and Broadway

Form I-4B Page 2 of 2			
Source Control Requirement	**Applied?**		
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☑ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☑ N/A
Interior parking garages	☐ Yes	☐ No	☑ N/A
Need for future indoor & structural pest control	☑ Yes	☐ No	☐ N/A
Landscape/Outdoor Pesticide Use	☐ Yes	☐ No	☑ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☑ N/A
Food service	☐ Yes	☐ No	☑ N/A
Refuse areas	☐ Yes	☐ No	☑ N/A
Industrial processes	☐ Yes	☐ No	☑ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☑ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☑ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☑ N/A
Loading Docks	☐ Yes	☐ No	☑ N/A
Fire Sprinkler Test Water	☑ Yes	☐ No	☐ N/A
Miscellaneous Drain or Wash Water	☑ Yes	☐ No	☐ N/A
Plazas, sidewalks, and parking lots	☑ Yes	☐ No	☐ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☑ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☑ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☑ N/A
SC-6D: Automotive Facilities	☐ Yes	☐ No	☑ N/A

Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.

All BMPs listed as 'N/A' do not apply to the proposed multi-family development and street improvements.

Project Name: 32nd and Broadway

Site Design BMP Checklist for PDPs	Form I-5B

Site Design BMPs

All development projects must implement site design BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist.

Answer each category below pursuant to the following.

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

A site map with implemented site design BMPs must be included at the end of this checklist.

Site Design Requirement	Applied?		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.1 not implemented:			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☑ Yes	☐ No	☐ N/A
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
1-3 Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☐ No	☑ N/A
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
4.3.2 Have natural areas, soils and vegetation been conserved?	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.3.2 not implemented:			

Project Name: 32nd and Broadway

Form I-5B Page 2 of 4			
Site Design Requirement	**Applied?**		
4.3.3 Minimize Impervious Area	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.3.3 not implemented: The majority of the site to be covered with impervious surfaces. Runoff not running through landscaped areas prior to collection will be routed to the storm water treatment device.			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented:			
4.3.5 Impervious Area Dispersion	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.3.5 not implemented: The majority of the site to be covered with impervious surfaces.			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☐ Yes	☐ No	☑ N/A
5-2 Does the pervious area satisfy the design criteria in 4.3.5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☐ No	☑ N/A
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

Project Name: 32nd and Broadway

Form I-5B Page 3 of 4			
Site Design Requirement	Applied?		
4.3.6 Runoff Collection	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.3.6 not implemented:			
6a-1 Are green roofs implemented in accordance with design criteria in 4.3.6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
6a-2 Is the green roof credit volume calculated using Appendix B.2.1.2 and 4.3.6A Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
6b-1 Are permeable pavements implemented in accordance with design criteria in 4.3.6B Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
6b-2 Is the permeable pavement credit volume calculated using Appendix B.2.1.3 and 4.3.6B Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
4.3.7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.7 not implemented:			
4.3.8 Harvest and Use Precipitation	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.3.8 not implemented:			
8-1 Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
8-2 Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

Project Name: 32nd and Broadway

Form I-5B Page 4 of 4
Insert Site Map with all site design BMPs identified:

Project Name: 32nd and Broadway

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

General Strategy per Section 5.1 of BMP Design Manual:

Step #1) The drainage management areas (DMAs) were determined for post-construction conditions. The basin was determined to require design for pollutant and flow control measures.
#1b) The adjusted runoff factor for pollutant control was calculated based on Table B.1-1 of the BMP Design Manual. The DCV was then calculated to be 1715.17 cubic-feet.

Step #2) Harvest and Use was deemed infeasible - see Form I-7 in Attachment 1c.

(Continue on page 2 as necessary.)

Project Name: 32nd and Broadway

Form I-6 Page 2 of 2

(Continued from page 1)

Step #3) Based on the NRCS soils map, the soils on-site are "undetermined". Therefore, Type D soils are assumed. An infiltration test will be performed to determine the hydrologic soil group.
Step #3A&B) Therefore, a NO infiltration condition was selected.
Step #3C) The proposed proprietary biofiltration device was selected based on the estimated 100-yr. flows expected to be treated for pollutant control. The cistern was sized separately based on the minimum required cubic feet to be stored based on the HMP sizing factors for flow control.

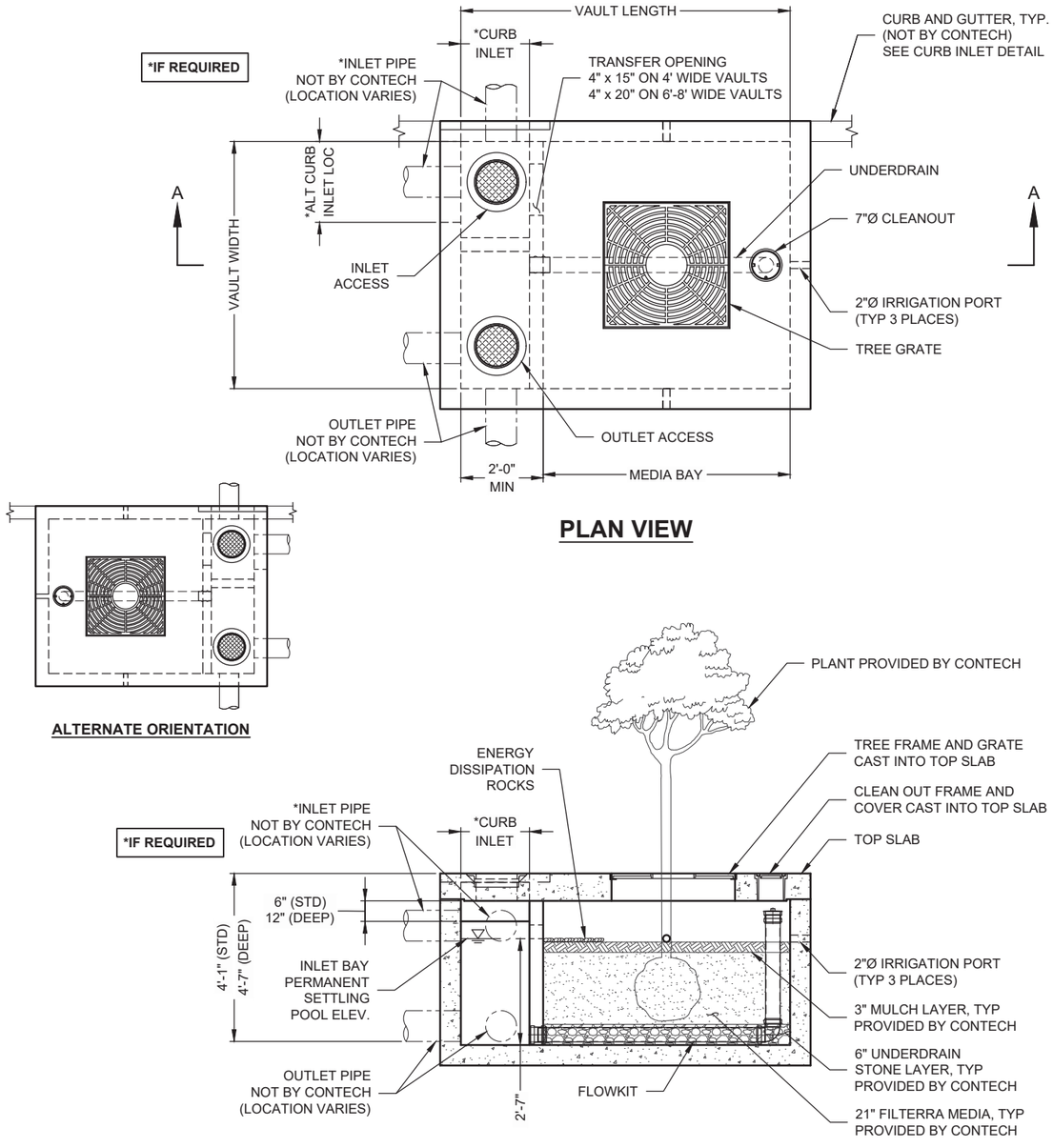
See hydromod sizing calcs provided in Attachment 2d.

Step #4) The biofiltration device was selected for the remaining DCV.
Step #4A) The biofiltration device was selected in consideration of the requirements outlined in Appendix E of the BMP Design manual.

Pollutant and Flow control requirements are handled separately. The proposed tree well will provide pollutant control. A cistern design is implemented to satisfy flow control requirements. Storm water will be released at the low flow threshold and pumped to the tree well for storm water treatment, before ultimately discharging from the site to a rip-rap near the location of the existing 60" RCP inlet.

Project Name: 32nd and Broadway

Form I-6 Page 1 of 2 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. Filterra Peak Diversion - BMP B	
Construction Plan Sheet No. C.1	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☑ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☑ Pollutant control only ☐ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Coffey Engineering - Michael Kinnear 9666 Businesspark Ave., Suite 210 San Diego, CA 92131
Who will be the final owner of this BMP?	32nd and Broadway, LLC
Who will maintain this BMP into perpetuity?	32nd and Broadway, LLC
What is the funding mechanism for maintenance?	32nd and Broadway, LLC



PLAN VIEW

ALTERNATE ORIENTATION

SECTION A-A
(STANDARD DEPTH SHOWN)

INTERNAL PIPE CONFIGURATION MAY VARY DEPENDING UPON OUTLET LOCATION.

FTPD STANDARD HEIGHT CONFIGURATION

DESIGNATION (OPTIONS: -P, -T, -PT)	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (W x L)	WEIR LENGTH/ MAX CURB OPENING	*MAX BYPASS FLOW (CFS)	INLET/ OUTLET ACCESS DIA	TREE GRATE QTY & SIZE
FTPD0404	N/A CA	4 x 4	4 x 6	1'-8"	1.4	12"/12"	(1) 3' x 3'
FTPD04045	CA ONLY	4 x 4.5	4 x 6.5	1'-8"	1.4	12"/12"	(1) 3' x 3'
FTPD0406	N/A MID-ATL	4 x 6	4 x 8	1'-8"	1.4	12"/12"	(1) 3' x 3'
FTPD045058	MID-ATL ONLY	4.5 x 5.83	4.5 x 7.83	1'-8"	1.4	12"/12"	(1) 3' x 3'
FTPD0604	ALL	6 x 4	6 x 6	1'-8"	1.4	12"/12"	(1) 3' x 3'
FTPD0606	ALL	6 x 6	6 x 8	1'-8"	1.4	12"/12"	(1) 3' x 3'
FTPD0608	ALL	6 x 8	6 x 10	1'-8"	1.4	12"/12"	(1) 4' x 4'
FTPD0610	ALL	6 x 10	6 x 12	1'-8"	1.4	12"/12"	(1) 4' x 4'
FTPD0710	ALL	7 x 10	7 x 13	2'-6"	2.1	24"/24"	(1) 4' x 4'
FTPD08105	ALL	8 x 10.5	8 x 14	3'-0"	2.5	24"/24"	(1) 4' x 4'
FTPD08125	ALL	8 x 12.5	8 x 16	3'-0"	2.5	24"/24"	(2) 4' x 4'

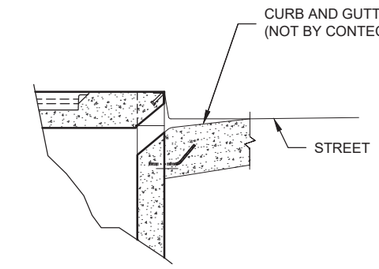
N/A = NOT AVAILABLE

FTPD-D DEEP OPTION CONFIGURATION

DESIGNATION (OPTIONS: -P, -T, -PT)	AVAILABILITY	MEDIA BAY SIZE	VAULT SIZE (W x L)	WEIR LENGTH/ MAX CURB OPENING	*MAX BYPASS FLOW (CFS)	INLET/ OUTLET ACCESS DIA	TREE GRATE QTY & SIZE
FTPD0404-D	N/A CA	4 x 4	4 x 6	1'-8"	4.6	12"/12"	(1) 3' x 3'
FTPD04045-D	CA ONLY	4 x 4.5	4 x 6.5	1'-8"	4.6	12"/12"	(1) 3' x 3'
FTPD0406-D	N/A MID-ATL	4 x 6	4 x 8	1'-8"	4.6	12"/12"	(1) 3' x 3'
FTPD045058-D	MID-ATL ONLY	4.5 x 5.83	4.5 x 7.83	1'-8"	4.6	12"/12"	(1) 3' x 3'
FTPD0604-D	ALL	6 x 4	6 x 6	1'-8"	4.6	12"/12"	(1) 3' x 3'
FTPD0606-D	ALL	6 x 6	6 x 8	1'-8"	4.6	12"/12"	(1) 3' x 3'
FTPD0608-D	ALL	6 x 8	6 x 10	1'-8"	4.6	12"/12"	(1) 4' x 4'
FTPD0610-D	ALL	6 x 10	6 x 12	1'-8"	4.6	12"/12"	(1) 4' x 4'
FTPD0710-D	ALL	7 x 10	7 x 13	2'-6"	6.8	24"/24"	(1) 4' x 4'
FTPD08105-D	ALL	8 x 10.5	8 x 14	3'-0"	8.2	24"/24"	(1) 4' x 4'
FTPD08125-D	ALL	8 x 12.5	8 x 16	3'-0"	8.2	24"/24"	(2) 4' x 4'

N/A = NOT AVAILABLE

*MAX BYPASS FLOW IS INTERNAL WEIR FLOW . SITE SPECIFIC ANALYSIS IS REQUIRED TO DETERMINE CURB INLET FLOW CAPACITY



CURB INLET DETAIL

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA PEAK DIVERSION (FTPD) CONFIGURATION DETAIL

Project Name: 32nd and Broadway

Form I-6 Page 2 of 2 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. Cistern - BMP A	
Construction Plan Sheet No. C.1	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☐ Biofiltration (BF-1) ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☑ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☑ Hydromodification control only ☐ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☐ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Coffey Engineering - Michael Kinnear 9666 Businesspark Ave., Suite 210 San Diego, CA 92131
Who will be the final owner of this BMP?	32nd and Broadway, LLC
Who will maintain this BMP into perpetuity?	32nd and Broadway, LLC
What is the funding mechanism for maintenance?	32nd and Broadway, LLC

GENERAL NOTES:

THE STORMCAPTURE SYSTEM BY OLDCASTLE STORMWATER SOLUTIONS IS PART OF THE STORMWATER MANAGEMENT SYSTEM FOR THE RESPECTIVE SITE, AS PREPARED BY THE PROJECT DESIGN ENGINEER. IT IS THE RESPONSIBILITY OF THE DESIGN ENGINEER TO DETERMINE DESIGN FLOW RATES, PRE-TREATMENT AND POST-TREATMENT REQUIREMENTS, STORAGE VOLUME, AND ENSURE THE FINAL DESIGN MEETS ALL CONVEYANCE AND STORAGE REQUIREMENTS. SYSTEM DESIGN AND TYPE, SOIL ANALYSIS, LOADING REQUIREMENTS, COVER HEIGHT AND MODULE SIZE DETERMINE THE FOUNDATION TYPE AND REQUIREMENTS AS STATED HEREIN. ANY VARIATIONS FOUND DURING CONSTRUCTION FROM THE SITE AND SYSTEM ANALYSIS MUST BE REPORTED TO THE PROJECT DESIGN ENGINEER. THE PROJECT DESIGN ENGINEER IS RESPONSIBLE FOR OBTAINING A GEOTECHNICAL ENGINEERING REPORT VERIFYING THE BEARING CAPACITY STATED IN DESIGN NOTES.

DESIGN NOTES:

1. DESIGN LOADINGS:
   - A. AASHTO HS20-44 W/ IMPACT.
   - B. DEPTH OF COVER = 6" TO 5'-0".
   - C. ASSUMED WATER TABLE = BELOW BOTTOM.
   - D. EQUIVALENT FLUID PRESSURE = 45 PCF.
   - E. LATERAL LIVE LOAD SURCHARGE = 80 PSF.
   - F. NO LATERAL SURCHARGE FROM ADJACENT STRUCTURES.
2. CONCRETE 28 DAY COMPRESSIVE STRENGTH SHALL BE 6,000 PSI.
3. STEEL REINFORCEMENT: REBAR, ASTM A-615, GRADE 60.
4. CEMENT: ASTM C-150 SPECIFICATION.
5. STORMCAPTURE MODULE TYPE = DETENTION.
6. REQUIRED BASE LAYER DEPTH = 2" SAND BEDDING LAYER.
7. REQUIRED NATIVE ALLOWABLE SOIL BEARING PRESSURE = 2,500 PSF.
8. REFERENCE STANDARDS:
   - A. ASTM C 890
   - B. ASTM C 891
   - C. ASTM C 913
9. LESS THAN 6" OR GREATER THAN 5'-0" OF COVER REQUIRES CUSTOM STRUCTURAL DESIGN AND MAY REQUIRE THICKER SUBGRADE.

INSTALLATION NOTES:

STORMCAPTURE MODULES ARE TO BE INSTALLED IN ACCORDANCE WITH ASTM C891, INSTALLATION OF UNDERGROUND PRECAST UTILITY STRUCTURES. PROJECT PLAN AND SPECIFICATIONS MUST BE FOLLOWED ALONG WITH ANY APPLICABLE REGULATIONS.

1. PLAN LINE, GRADE AND ELEVATIONS MUST BE FOLLOWED.
2. WHERE SPECIFIED, AN 8 OZ. NON-WOVEN GEOTEXTILE FABRIC MUST BE USED AS A SEPARATION LAYER AROUND THE STORMCAPTURE SYSTEM.
3. PENETRATIONS IN THE GEOTEXTILE MAY ONLY BE MADE WITH SMOOTH WALL PIPES. MAKE PENETRATIONS FOR ALL OUTLETS BEFORE MAKING PENETRATIONS FOR ANY INLETS.
4. SUBGRADE MATERIALS, IF SPECIFIED, SHALL BE CLEAN, DURABLE CRUSHED AGGREGATE COMPACTED AS DIRECTED BY THE ENGINEER. OLDCASTLE RECOMMENDS SIZE 5, 56, OR 57 (PER ASTM C33).
5. DESIGNATED EMBEDDED LIFTERS MUST BE USED. USE PROPER RIGGING TO ASSURE ALL LIFTERS ARE EQUALLY ENGAGED WITH A MINIMUM 60 DEGREE ANGLE ON SLINGS AS NOTED AND IN ACCORDANCE WITH OLDCASTLE LIFTING PROCEDURES.
6. MODULES MUST BE PLACED AS CLOSE TOGETHER AS POSSIBLE, AND GAPS SHALL NOT BE GREATER THAN 3/4". ALL EXTERIOR SYSTEM JOINTS SHALL BE COVERED WITH A MIN. 8" JOINT WRAP ON SIDES AND TOP (CS-212 CONSEAL OR EQUIVALENT). IN A CLAMSHELL DESIGN INSTALL ONE ROW CS-102 CONSEAL (OR EQUIVALENT) BETWEEN PRECAST PIECES.
7. AUTHORIZATION SHALL BE GIVEN BY THE PROJECT ENGINEER OR DESIGNATED PERSON PRIOR TO PLACEMENT ON BACKFILL FOR THE SYSTEM. CARE MUST BE TAKEN DURING PLACEMENT OF BACKFILL NOT TO DISPLACE MODULES OR JOINT WRAP. BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR DENSITY OR AS SPECIFIED, AND SHALL NOT BE COMPACTED WITHIN 6" OF MODULE.
8. CONSTRUCTION EQUIPMENT EXCEEDING DESIGN LOADING SHALL NOT BE ALLOWED ON STRUCTURE.
9. TERMADUCTS TO BE KNOCKED OUT AT SPECIFIED LOCATIONS IN FIELD BY OTHERS. SEE SITE LAYOUT FOR LOCATIONS.

INLETS AND RISERS:

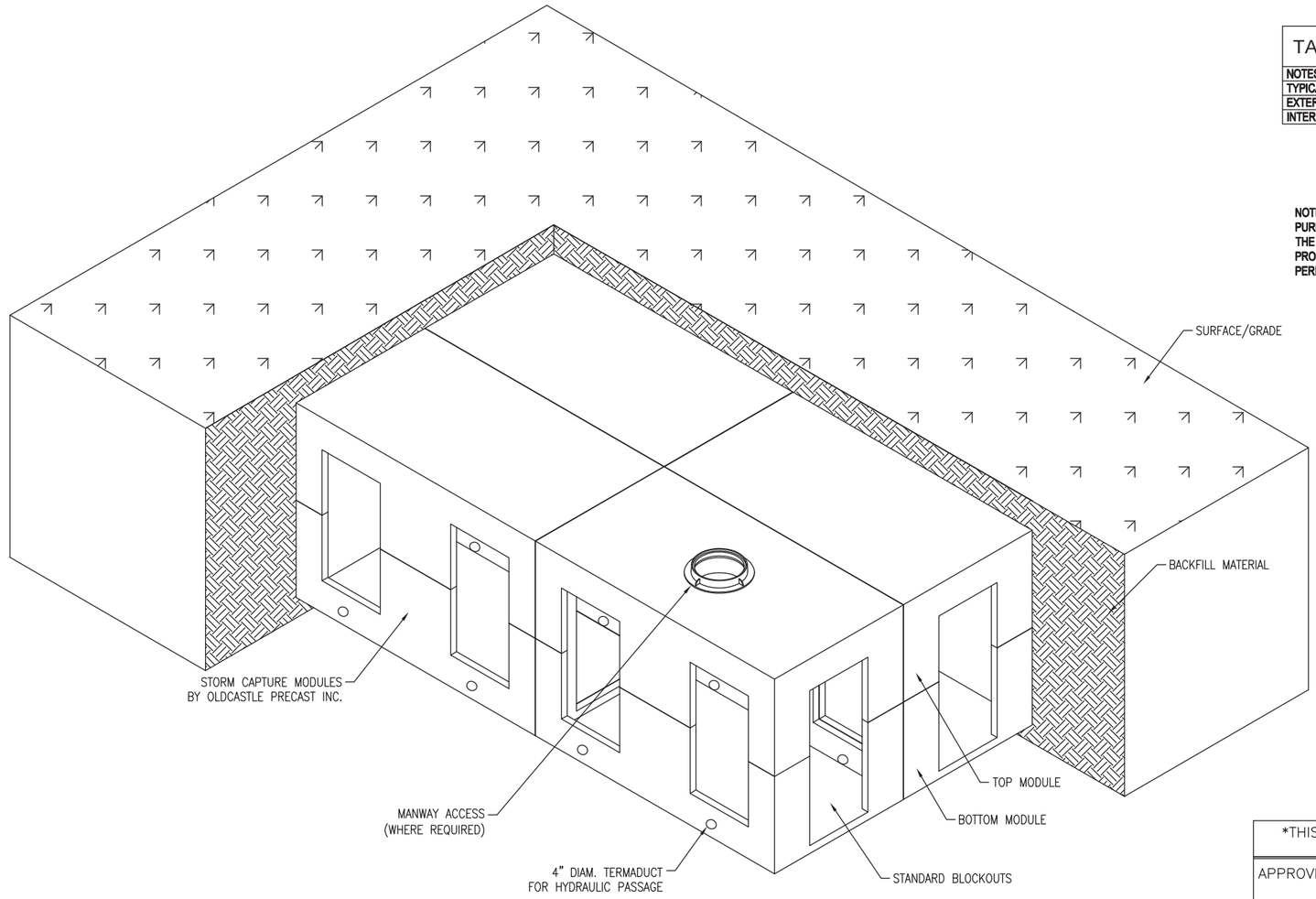
ALL PIPE INLETS SHALL EXTEND INSIDE MODULE A MINIMUM OF 4". PLACE A NON-SHRINK, NON-METALIC GROUT, MIN. 3,000 PSI IN ANNULAR SPACE TO ELIMINATE ALL VOIDS.

REVISIONS

REVISION	DATE	SHEETS	DESCRIPTION OF REVISION

STORMCAPTURE®

TABLE OF CONTENTS



NOTE: THIS VIEW IS FOR ILLUSTRATION PURPOSES ONLY TO SHOW FEATURES OF THE SYSTEM. ACTUAL LAYOUT VARIES BY PROJECT, SEE SITE PLAN LAYOUT. ALL PERIMETER WALLS ARE SOLID.

TYPICAL ISO VIEW
N.T.S.

THIS MUST BE FILLED OUT BEFORE MANUFACTURING BEGINS

APPROVED W/ NO EXCEPTIONS TAKEN: ☐
APPROVED AS NOTED: ☐
REVISE AND RESUBMIT: ☐

- PRELIMINARY -
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SIGNATURE DATE

Oldcastle® Stormwater Solutions
7921 SOUTHPARK PLAZA, SUITE 200, LITTLETON, CO 80120
PHONE: 1-888-865-3227 FAX: 303-794-7497

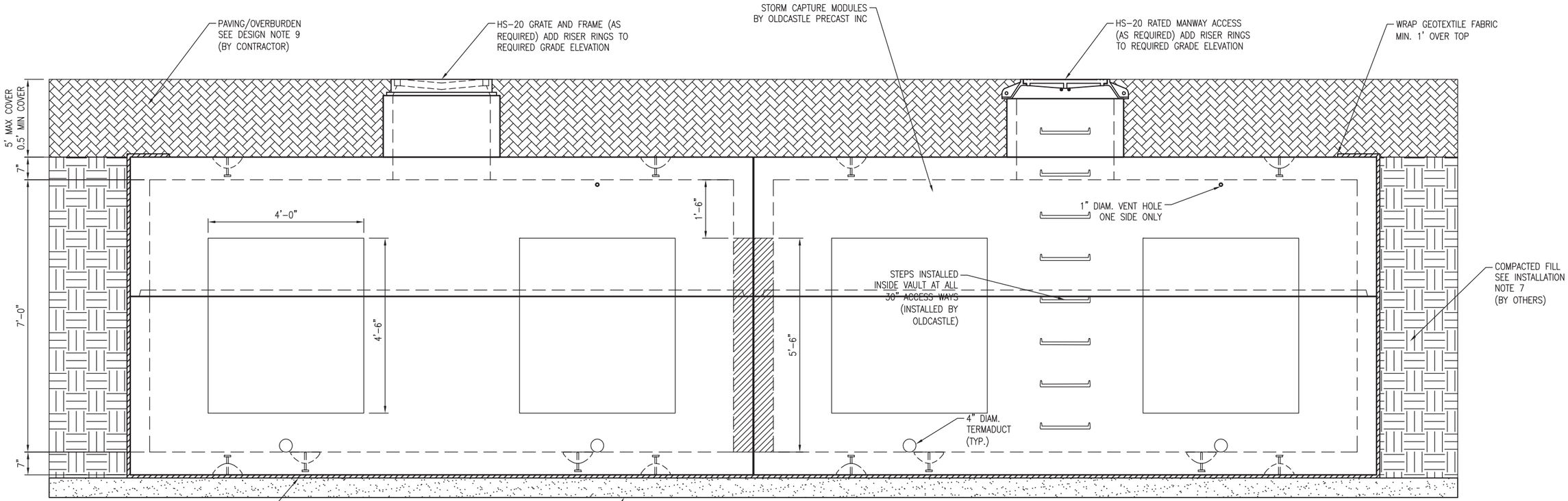
STORMCAPTURE
GENERAL ISO

CUSTOMER

DATE	SALES	DRAWN	ENGINEER	CHECKED	SALES ORDER
	STS	STS	JH		

DRAWING NUMBER	REVISION	SHEET
SC2 - 7 ft clamshell	REV DATE	1 OF 4

STORMCAPTURE®



NOTE:
TERMADUCT INSERTS TO BE KNOCKED OUT AT SPECIFIED LOCATIONS ONLY (BY OTHERS).

TYPICAL ELEVATION

SCALE: 3/8" = 1'-0"

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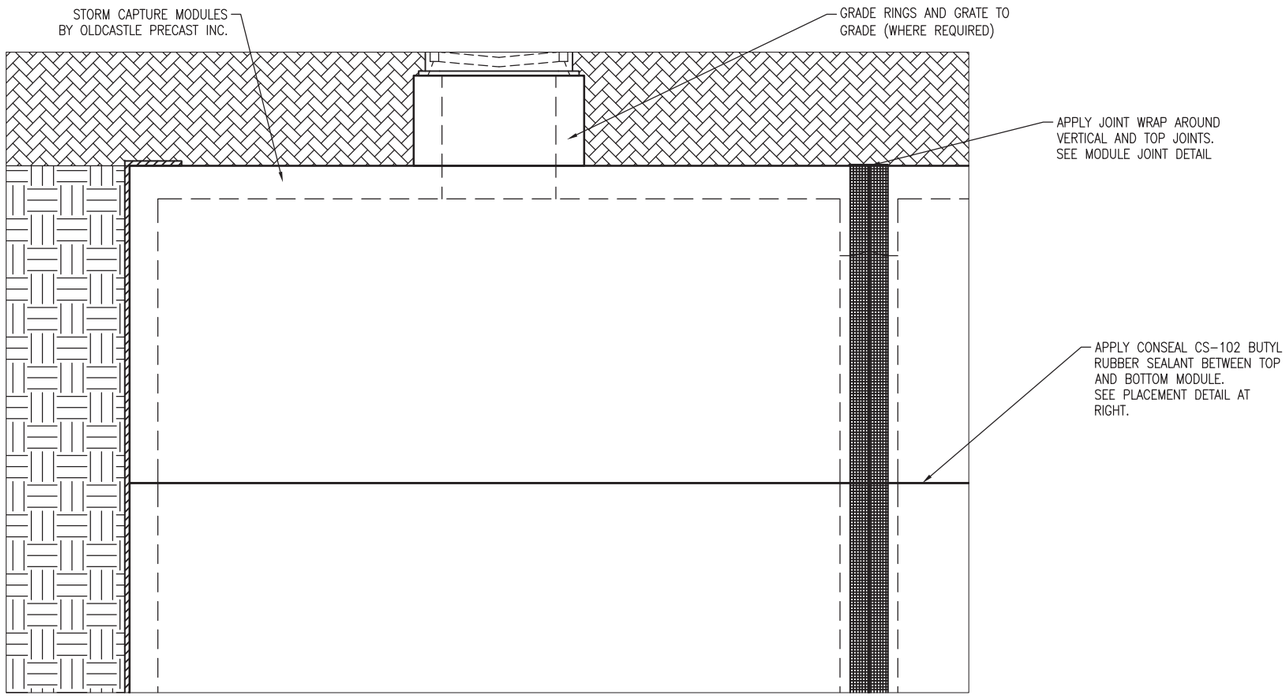
STORMCAPTURE
TYPICAL ELEVATION

CUSTOMER

DATE	SALES	DRAWN	ENGINEER	CHECKED	SALES ORDER
	STS	STS	JH		

DRAWING NUMBER	REVISION / REV DATE	SHEET
SC2 - 7 ft clamshell		3 OF 4



GRATED INLET DETAIL

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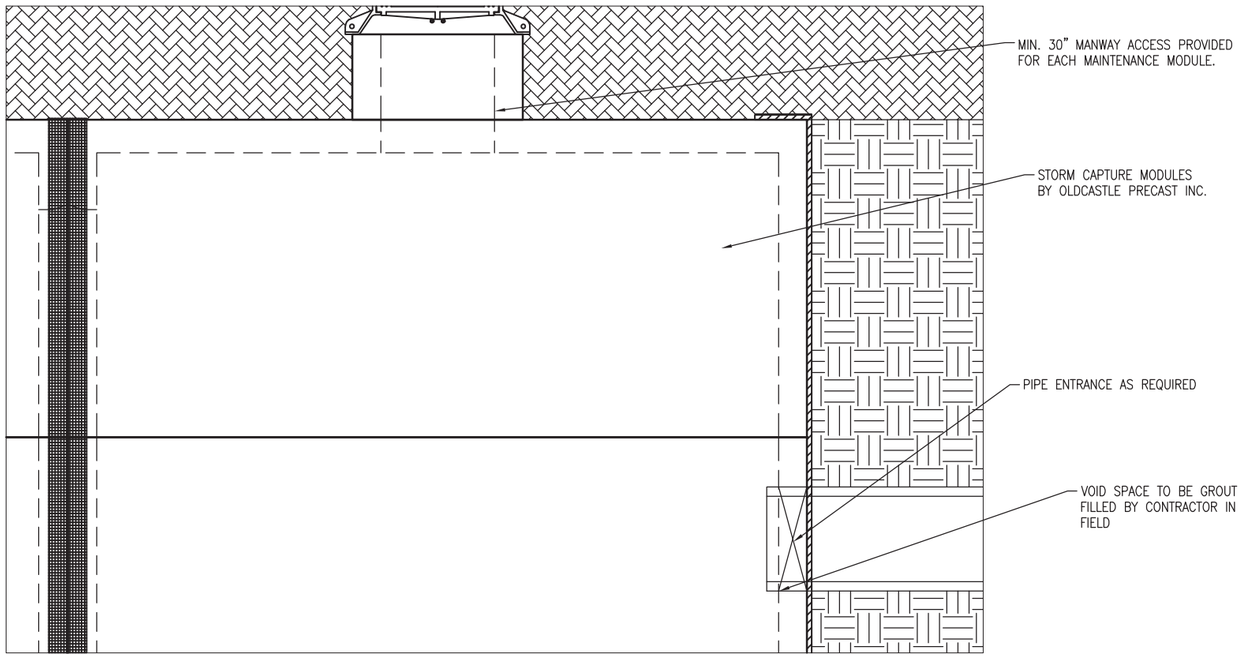
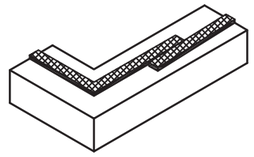


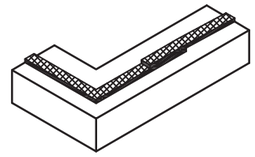
MANWAY ACCESS DETAIL

SCALE: 3/8" = 1'-0"

KEYWAYS MUST BE FREE OF DIRT, ROCKS, AND WATER. ROCKS AND DIRT PREVENT THE VAULT SECTIONS FROM SEATING AND SEALING PROPERLY. REMOVE ALL PROTECTIVE PAPER FROM RUBBER SEALANT MATERIAL. SPLICE RUBBER SEALANT MATERIAL WITH A "SIDE BY SIDE" JOINT, AWAY FROM CORNERS. CORNER SPLICING WILL NOT SEAL PROPERLY.



CORRECT – INSTALL RUBBER SEALANT MATERIAL AT THE OUTER EDGE OF THE KEYWAY. RUBBER SEALANT SHOULD BE CONTINUOUS AROUND CORNERS.



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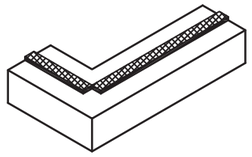
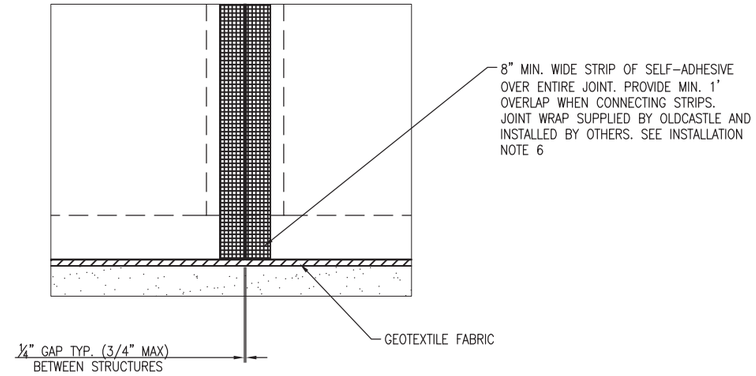


INCORRECT – DO NOT SPLICE RUBBER SEALANT MATERIAL AT A CORNER. RUBBER SEALANT SHOULD BE CONTINUOUS AROUND CORNERS.

CONSEAL CS-102 BUTYL RUBBER SEALANT PLACEMENT DETAIL

NTS



MODULE JOINT DETAIL

SCALE: 1/2" = 1'-0"

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STORMCAPTURE
EXTERIOR DETAILS

CUSTOMER

DATE	SALES	DRAWN	ENGINEER	CHECKED	SALES ORDER
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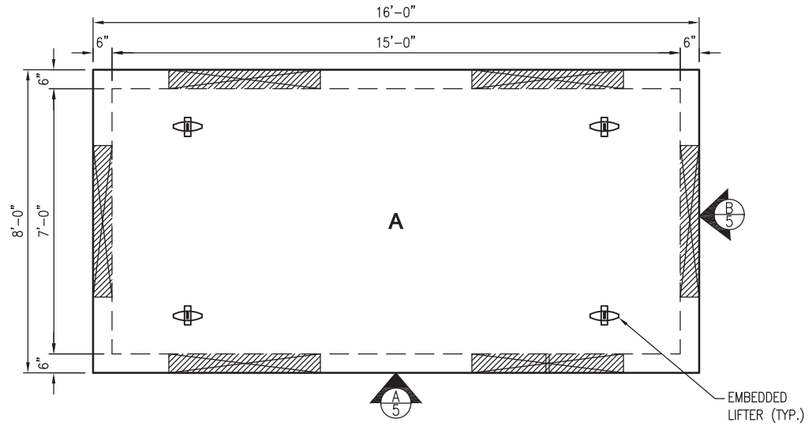
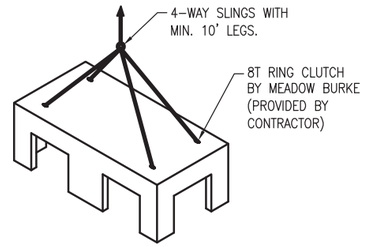
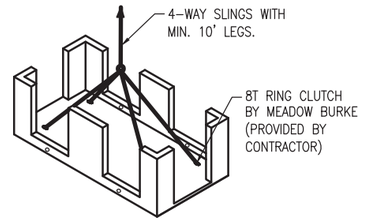
SC2 - 7 ft clamshell	REV DATE	4 OF 4



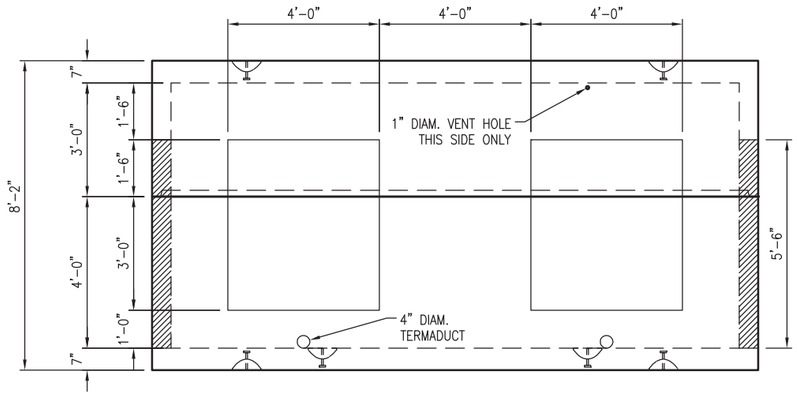
STORM CAPTURE PLAN VIEW
SCALE: 1/4" = 1'-0"



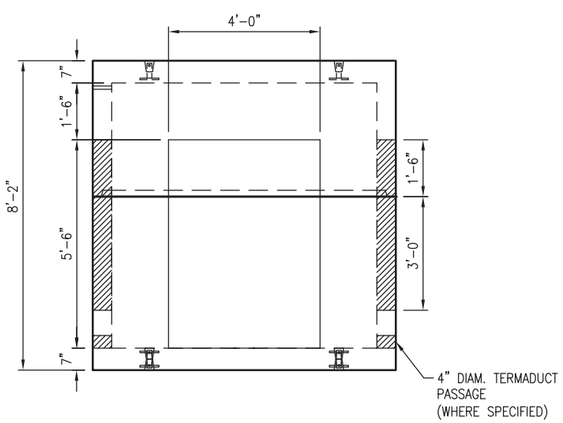
TOP MODULE LIFTING DETAIL
N.T.S.



BOTTOM MODULE LIFTING DETAIL
N.T.S.



VIEW A
SCALE: 1/4" = 1'-0"



VIEW B
SCALE: 1/4" = 1'-0"

- PRELIMINARY -
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STORMCAPTURE
INTERIOR DETAILS

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	STS	STS	JH		

DRAWING NUMBER	REVISION	SHEET
SC2 - 7 ft clamshell	REV DATE	4 OF 4

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Attachment 1
Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

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Project Name: 32nd and Broadway

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☑ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☑ Included on DMA Exhibit in Attachment 1a ☑ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☑ Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1d	Infiltration Feasibility Information. Contents of Attachment 1d depend on the infiltration condition: • No Infiltration Condition: o Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) o Form I-8A (optional) o Form I-8B (optional) • Partial Infiltration Condition: o Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) o Form I-8A o Form I-8B • Full Infiltration Condition: o Form I-8A o Form I-8B o Worksheet C.4-3 o Form I-9 Refer to Appendices C and D of the BMP Design Manual for guidance.	☑ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☑ Included

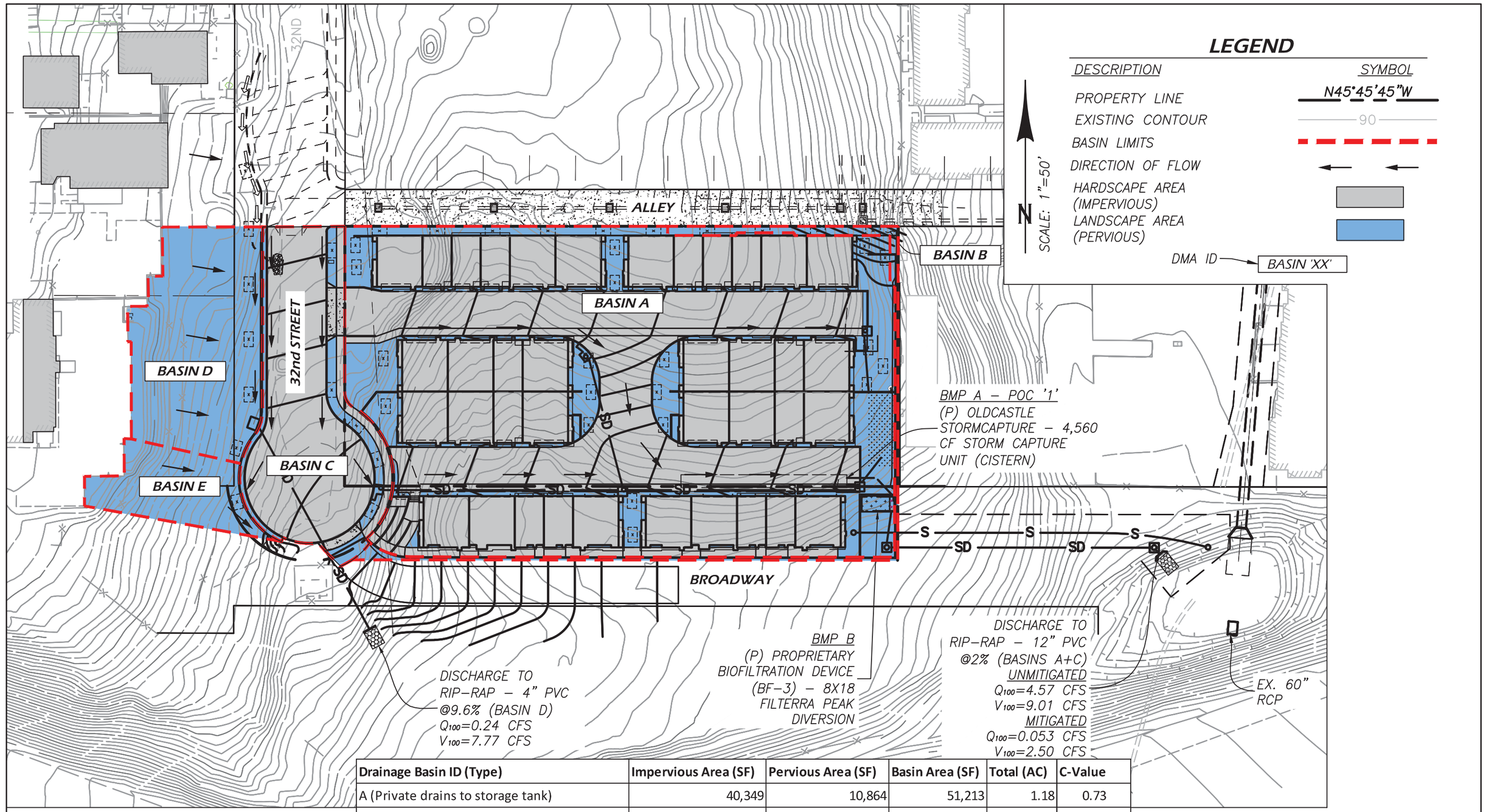
Project Name: 32nd and Broadway

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [x] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [x] Critical coarse sediment yield areas to be protected
- [x] Existing topography and impervious areas
- [x] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [x] Proposed impervious features
- [ ] Proposed design features and surface treatments used to minimize imperviousness
- [x] Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- [x] Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- [x] Structural BMPs (identify location, type of BMP, size/detail, and include cross-section)

Attachment 1a – DMA Exhibit



Drainage Basin ID (Type)	Impervious Area (SF)	Pervious Area (SF)	Basin Area (SF)	Total (AC)	C-Value
A (Private drains to storage tank)	40,349	10,864	51,213	1.18	0.73
B (Sheet flow to easterly hillside)	0	1,525	1,525	0.04	0.30
C (Storm drain at street to storage tank)	8,525	1,262	9,787	0.22	0.80
D (Run-on to southerly hillside rip-rap)	0	8,027	8,027	0.18	0.30
E (Run-on diverted to southerly hillside)	0	3,048	3,048	0.07	0.30
Total	**48,874**	**24,726**	**73,600**	**1.69**	

COFFEY ENGINEERING, INC.

DRAINAGE MAP B
PROPOSED CONDITIONS-SWQMP
32ND AND BROADWAY

Attachment 1b – DMA Summary

Worksheet B-1: Tabular Summary of DMAs

Tabular Summary of DMAs								Worksheet B-1	
DMA Unique Identifier	Area (acres)	Impervious Area (acres)	% Imp	HSG	Area Weighted Runoff Coefficient	DCV (cubic feet)	Treated By (BMP ID)	Pollutant Control Type	Drains to (POC ID)
A	1.18	0.93	78.8%	D	0.730	1589.52	B (Filterra)	Biofiltration	POC 1
B	0.04	0.00	0.0%	D	0.100			N/A	
C	0.22	0.20	87.1%	D	0.797	331.44	B (Filterra)	Biofiltration	POC 1
D	0.18	0.00	0.0%	D	0.100			N/A	
E	0.07	0.00	0.0%	D	0.100			N/A	
Summary of DMA Information (Must match project description and SWQMP Narrative)									
No. of DMAs	Total DMA Area (acres)	Total Impervious Area (acres)	% Imp		Area Weighted Runoff Coefficient	Total DCV (cubic feet)	Total Area Treated (acres)		No. of POCs
2*	1.44	1.12	78.2%		0.741	1920.97	1.4		1
5	1.69	1.12	66.4%		0.762	1920.97	1.4		1

Where: DMA = Drainage Management Area; Imp = Imperviousness; HSG = Hydrologic Soil Group; DCV= Design Capture Volume; BMP = Best Management Practice; POC = Point of Compliance; ID = identifier; No. = Number

* Treatable area only

Weighted Runoff Coefficients					
Pre-Construction Conditions					
Drainage Basin ID (Type)	**Impervious Area (SF)**	**Pervious Area (SF)**	**Basin Area (SF)**	**Total (AC)**	**C-Value**
X (Sheet Flows to Hillside)	0	42,322	42,322	0.97	0.30
Y (Sheet Flows to Hillside)	0	31,278	31,278	0.72	0.30
Total	**0**	**73,600**	**73,600**	**1.69**	
Post-Construction Conditions					
Drainage Basin ID (Type)	**Impervious Area (SF)**	**Pervious Area (SF)**	**Basin Area (SF)**	**Total (AC)**	**C-Value**
A (Private drains to storage tank)	40,349	10,864	51,213	1.18	0.73
B (Sheet flow to easterly hillside)	0	1,525	1,525	0.04	0.30
C (Storm drain at street to storage tank)	8,525	1,262	9,787	0.22	0.80
D (Run-on to southerly hillside rip-rap)	0	8,027	8,027	0.18	0.30
E (Run-on diverted to southerly hillside)	0	3,048	3,048	0.07	0.30
Total	**48,874**	**24,726**	**73,600**	**1.69**	

Appendix B: Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods

B.1.1 Runoff Factor

Estimate the area weighted runoff factor for the tributary area to the BMP using runoff factor (from Table B.1-1) and area of each surface type in the tributary area and Equation B.1-2.

Equation B.1-2: Estimating Runoff Factor for Area

$$C = \frac{\sum C_x A_x}{\sum A_x}$$

where:

C_x = Runoff factor for area X

A_x = Tributary area X (acres)

These runoff factors apply to areas receiving direct rainfall only. For conditions in which runoff is routed onto a surface from an adjacent surface, see Section B.2 for determining composite runoff factors for these areas.

Table B.1-1: Runoff factors for surfaces draining to BMPs – Pollutant Control BMPs

Surface	Runoff Factor
Roofs[1]	0.90
Concrete or Asphalt[1]	0.90
Unit Pavers (grouted)[1]	0.90
Decomposed Granite	0.30
Cobbles or Crushed Aggregate	0.30
Amended, Mulched Soils or Landscape[2]	0.10
Compacted Soil (e.g., unpaved parking)	0.30
Natural (A Soil)	0.10
Natural (B Soil)	0.14
Natural (C Soil)	0.23
Natural (D Soil)	0.30

[1]Surface is considered impervious and could benefit from use of Site Design BMPs and adjustment of the runoff factor per Section B.2.1.

[2]Surface shall be designed in accordance with SD-F (Amended soils) fact sheet in Appendix E

Attachment 1c – Harvest and Use Feasibility Checklist

Harvest and Use Feasibility Checklist	Worksheet B.3-1 : Form I-7

1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?
☑ Toilet and urinal flushing
☑ Landscape irrigation
☐ Other:_____

2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.
[Provide a summary of calculations here]
4 residents x 9.3 gallons/resident/day / 7.48 gallons/cubic foot x 36 hours / 24hours/day =

7.45 cubic feet

7.45 x 42 units = 312.9 cubic feet

3. Calculate the DCV using worksheet B-2.1.
DCV = 1920.97 (cubic feet)
[Provide a summary of calculations here]
85th Percentile Storm = 0.51 inches
Area Tributary to BMP = 1.4 acres
Adjusted Runoff Factor = 0.741
DCV = 85th x Area x Runoff Factor = 0.51 x 1.4 x 0.741 x (3630 cubic feet/acre-inches) =

3a. Is the 36-hour demand greater than or equal to the DCV?	3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV?	3c. Is the 36-hour demand less than 0.25DCV?
☐ Yes ⇩ / ☑ No ⇨	☐ Yes ⇩ / ☑ No ⇨	☑ Yes ⇩
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	Harvest and use is considered to be infeasible.

Is harvest and use feasible based on further evaluation?
☐ Yes, refer to Appendix E to select and size harvest and use BMPs.
☑ No, select alternate BMPs.

Worksheet B.2-1: DCV (BASIN A)

	Design Capture Volume	Worksheet B.2-1		
1	85th Percentile 24-hr storm depth from Figure b.1-1	d =	0.51	inches
2	Area tributary to BMP (s)	A =	1.18	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1	C =	0.730	unitless
4	Street trees volume reduction	TCV =	0	cubic-feet
5	Rain barrels volume reduction	RCV =	0	cubic-feet
6	Calculated DCV = (3630 x C x d x A) - TCV - RCV	**DCV =**	**1589.52**	**cubic-feet**

Worksheet B.2-1: DCV (BASIN C)

	Design Capture Volume	Worksheet B.2-1		
1	85th Percentile 24-hr storm depth from Figure b.1-1	d =	0.51	inches
2	Area tributary to BMP (s)	A =	0.22	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1	C =	0.797	unitless
4	Street trees volume reduction	TCV =	0	cubic-feet
5	Rain barrels volume reduction	RCV =	0	cubic-feet
6	Calculated DCV = (3630 x C x d x A) - TCV - RCV	**DCV =**	**331.44**	**cubic-feet**

Worksheet B.2-1: DCV (TOTAL)

	Design Capture Volume	Worksheet B.2-1		
1	85th Percentile 24-hr storm depth from Figure b.1-1	d =	0.51	inches
2	Area tributary to BMP (s)	A =	1.40	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1	C =	0.741	unitless
4	Street trees volume reduction	TCV =	0	cubic-feet
5	Rain barrels volume reduction	RCV =	0	cubic-feet
6	Calculated DCV = (3630 x C x d x A) - TCV - RCV	**DCV =**	**1920.97**	**cubic-feet**

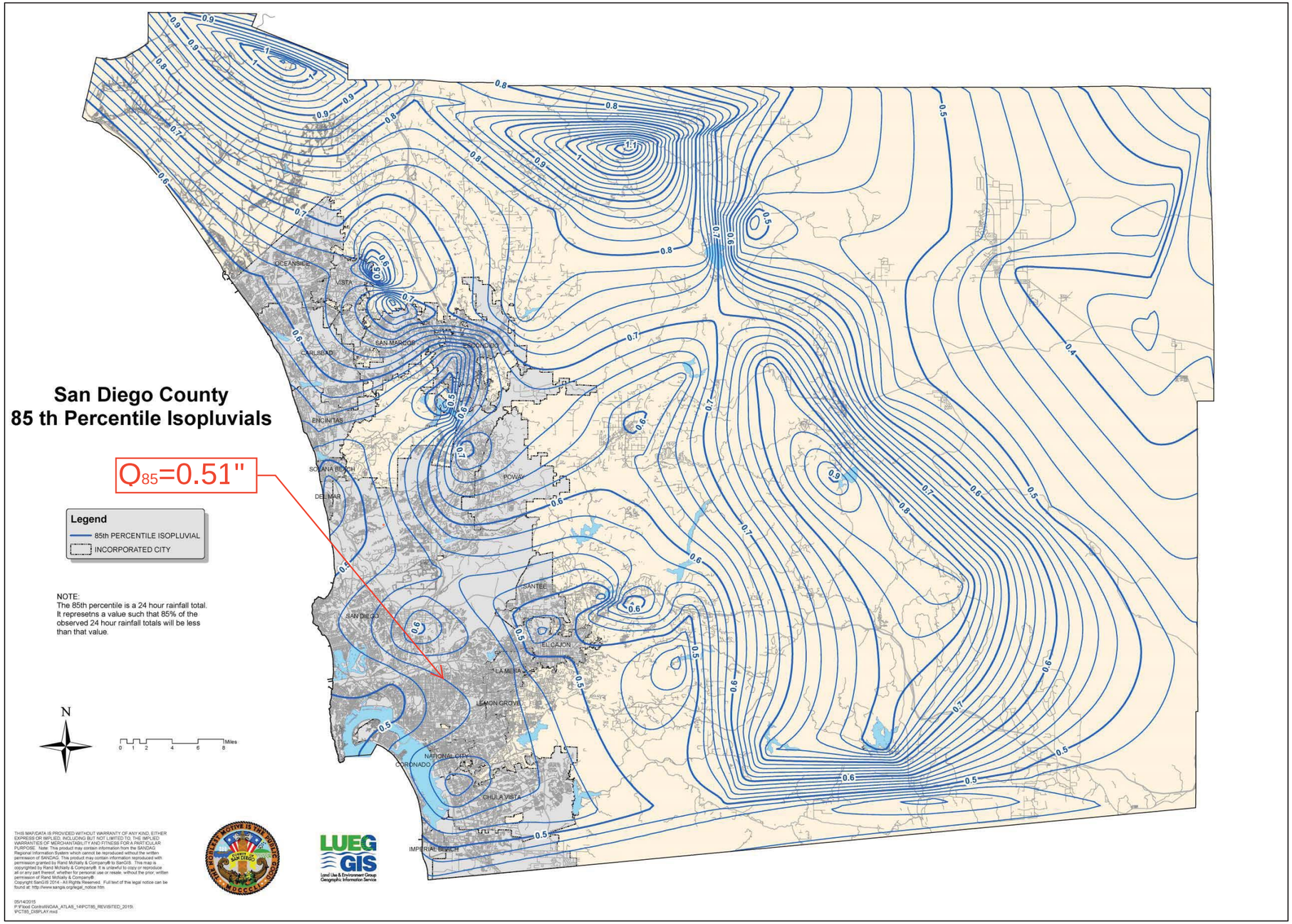
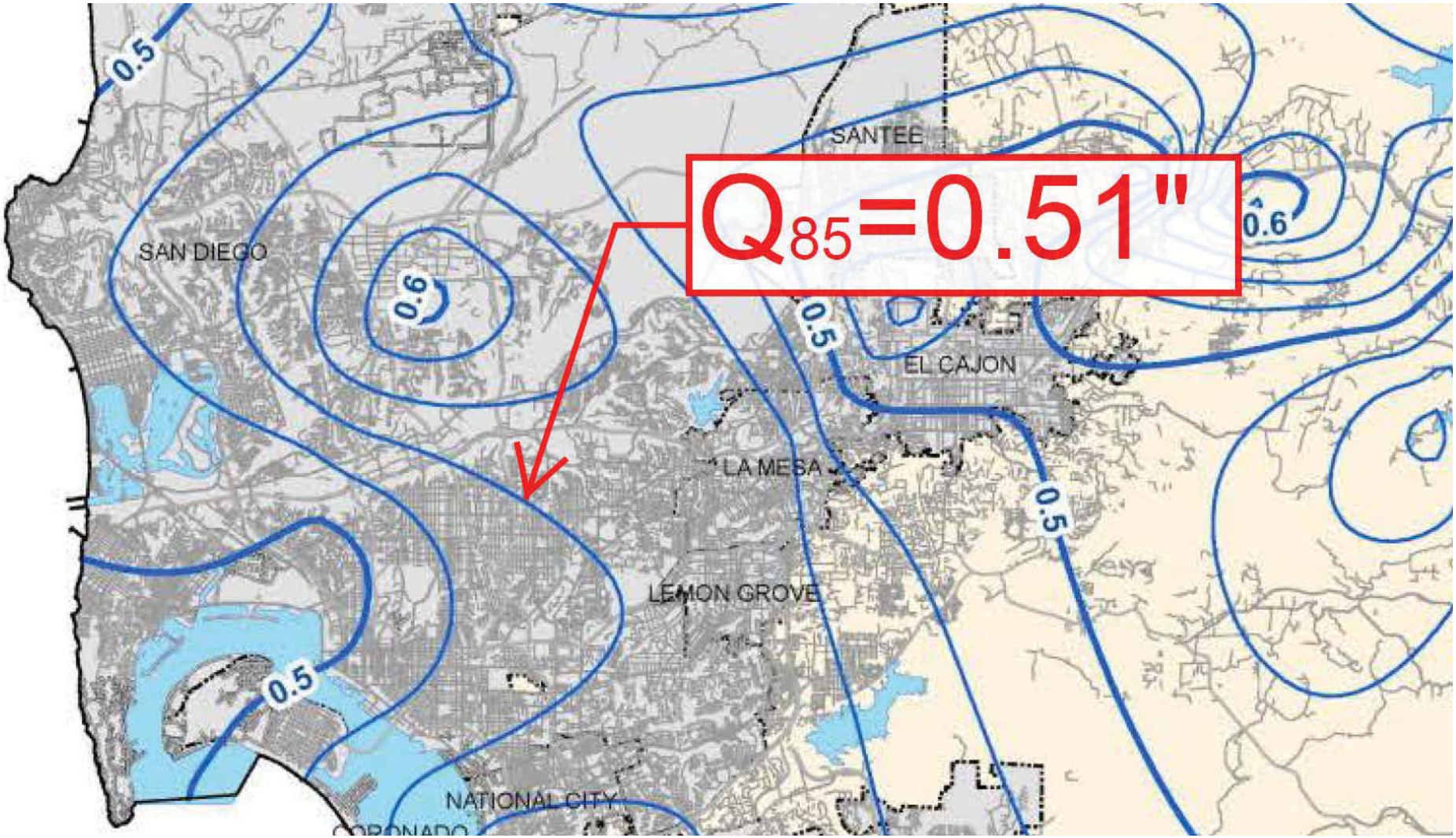


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map


Q_{85}=0.51"
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
NATIONAL CITY
0.5
0.6

Attachment 1d – Infiltration Feasibility

NOVA
GEOTECHNICAL ■ MATERIALS ■ SPECIAL INSPECTIONS
SBE ■ SLBE ■ SCOOP
4373 Viewridge Avenue, Ste. B
San Diego, CA 92123
858.292.7575

32nd & Broadway, LLC
3184 Airway Avenue, Suite B
Costa Mesa, CA 92626

April 28, 2020
NOVA Project No. 2019066

Attention Ben C. Anderson

Subject: Infiltration Feasibility Conditions (Revised)
Proposed 32nd & Broadway Homes
1000 Block 32nd Street, San Diego, California

References: See Attachment.

Dear Mr. Anderson:

The intent of this letter is to address the infiltration conditions and related feasibility for permanent stormwater Best Management Practices ('stormwater BMPs') for drainage management areas (DMAs) at the above-referenced site. This letter is in response to a request from a City of San Diego project reviewer.

This letter has been prepared by NOVA Services, Inc. (NOVA) for 32nd & Broadway, LLC. NOVA is retained by 32nd & Broadway as Geotechnical Engineer-of-Record (GEOR) for the project.

Background

General

The proposed project is currently within the planning phase for the site's development. This site was the object of a 2006 geotechnical investigation by Construction Testing & Engineering, Inc. (reference, *Preliminary Geotechnical Investigation, proposed 28 Row Homes Northeast Corner of 32nd Street and Broadway (Proposed), San Diego, California,* Construction Testing & Engineering, Inc., Job No. 10-8520, 29 August 2006, hereinafter, 'CTE 2006').

Additional geotechnical analysis for this project is reported in NOVA 2019. This assessment provides analysis of the infiltration feasibility in accordance with the criteria detailed in the referenced City of San Diego BMP Design Manual (San Diego 2018).

Section C.1 of the BMP Manual states that if one of the standard setbacks listed cannot be achieved, the DMA may classify as a 'no infiltration condition'. Consideration of several criteria listed in the BMP Manual preclude the implementation of infiltration for the proposed BMP. NOVA concludes that the site is not feasible for development of permanent stormwater infiltration BMPs.

Current Site Conditions

Location
The residential development is proposed to be developed on a vacant parcel located southeast of the intersection of 32nd Street and C Street (hereafter, 'the site'). The site is bounded to the north by a vacant lot, to the west by 32nd street, to the south by vacant land, and to the east by an existing apartment development. The apartment development abuts the property line to the east of the site.

Figure 1 provides a recent aerial image depicting the site location.

Figure 1. Site Location and Limits
(source: adapted from *Google Earth 2019)*

Surface
The undeveloped site is currently lightly vegetated. Ground surface elevations across the site vary from 177 feet msl at the northwest corner to 130 feet msl at the southeast corner. The ground surface descends to the east and south.

Proposed BMP

Coffey 2019 depicts planning for the proposed residential development. The proposed location for the stormwater BMP is at the southeast corner at the periphery of the development. Figure 2 (following page) depicts the location of the BMP. Figure 3 (following page) depicts the current site conditions at the proposed BMP.

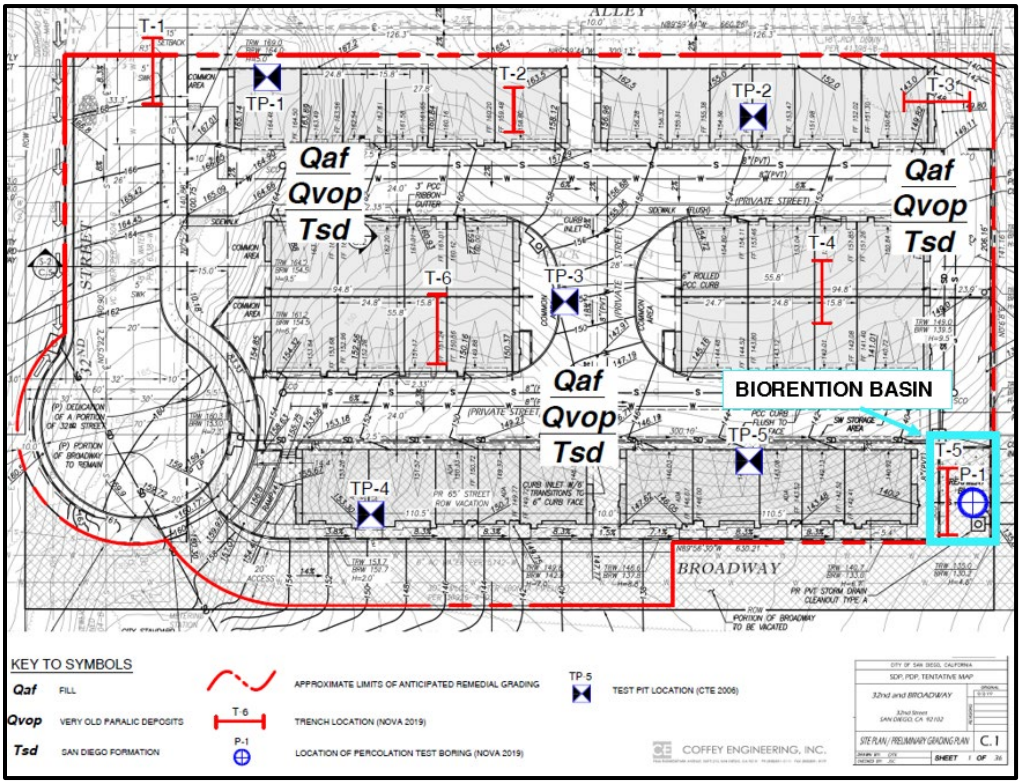


Figure 2. Proposed BMP Location
(source: adapted from Coffey 2019)

Figure 3. Existing Site Conditions near BMP

Figure 4 depicts the existing site conditions in relation to the proposed BMP. Based on the BMP Manual, full and partial BMPs should not be sited within 10 feet of existing structures or within 50 feet of natural slopes. As may be seen by review of Figure 4, the BMP is located in areas where the required setbacks cannot be achieved.

Figure 4. Existing Site Conditions within 10 to 50 Feet of Proposed BMP
(source: adapted from *Google Earth 2019)*

Review of Conditions for Storm Water Infiltration

Geotechnical Analysis Conducted in the Project Area

The trenches and borings completed for this assessment disclose the sequence of soil units described below.

1. Unit 1, Fill. The site is covered by a mantle of fill approximately 1 to 5.5 feet in thickness. The fill is comprised of silty to clayey sands of loose to medium dense consistency and sandy clays of firm consistency.

2. Unit 2, Paralics. Beneath the fill, the site is underlain by Quaternary-aged Very Old Paralic deposits (Qvop). The unit is characteristically cemented silty sandstone with gravel of dense to very dense consistency. The backhoe met refusal on very dense paralics in trenches T-3, T-4 and T-5. The paralics extend to below the depths explored in trenches T-1 through T-5.

3. Unit 3, San Diego. Trench T-6 exposed the Tertiary-aged San Diego Formation (Tsd). This formation is known to occur below the paralics across this area of San Diego. Trenches T-1 through T-5 did not extend through the Paralics to expose this unit. As encountered at the site, the San Diego Formation consists of medium dense and friable well-graded sandstone.

No groundwater was encountered in the borings above the maximum depth explored. As such, groundwater is expected to first occur below a depth of about 30 feet.

Infiltrating storm water from prolonged wet periods can 'perch' atop localized zones of lower permeability soil that exist above the static groundwater level. No perched groundwater was observed during excavation of the test trenches.

Review of Feasibility Criteria

As stated in the BMP Design Manual, when one standard setback in the simple feasibility criteria cannot be achieved, the DMA is classified in a 'no infiltration' condition. At a minimum, the site fails the feasibility criteria listed below.

1. Foundations and Structures. Full or partial infiltration BMPs may not be proposed within 10 feet of structures or retaining walls. The proposed BMP is located adjacent to the neighboring structures that border the site to the east. Water infiltrating through soil may weaken foundation soils/rock. The site has limited space to achieve the minimum setbacks from foundations or retaining walls.

2. Slopes. Full and partial BMPs should not be proposed within 50 feet of a natural slope or within 1.5 times the height from fill slopes. The proposed basin is located near slopes steeper than 4H:1V as shown in Figures 3 and 4.

In addition to the above, according to NRCS Web Soil Survey, the mapped hydrologic soil group is Group D and "urban". Full infiltration is not required for this hydrologic soil group.

Recommendation for 'No Infiltration'

Based on the BMP Design Manual guidelines, it is the judgment of NOVA that the site is not suitable for full or partial BMPs.

Closure

NOVA appreciates the opportunity to be of service to 32nd & Broadway, LLC on this most interesting project. Should you have any questions regarding this letter or other matters, please contact the undersigned at (858) 292-7575.

Sincerely,
NOVA Services, Inc.

John F. O'Brien, P.E., G.E.
Principal Geotechnical Engineer

Hillary A. Price
Staff Geologist

ATTACHMENT

REFERENCES

1. San Diego 2018. *The City of San Diego Storm Water Standards, Part 1 BMP Design Manual,* October 2018 Edition, The City of San Diego.

2. CE 2019. *Development Plans and Tentative Map for 32nd & Broadway Homes, 32nd Street, San Diego, California*; Coffey Engineering Inc., September 3, 2019.

3. NOVA 2019. *Report, Geotechnical Investigation, Proposed 32nd & Broadway Homes, 1000 Block 32nd Street, San Diego, California,* NOVA Services, Inc., NOVA Project No. 2019066, May 24, 2019.

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition Based on Geotechnical Conditions[9]

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 1 - Full Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
Proposed BMP Location	Planning
Criteria 1: Infiltration Rate Screening	
1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[11]? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ☐ No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ☒ No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ☐ No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ☐ Yes; Continue to Step 1C. ☐ No; Skip to Step 1D.
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☐ No; full infiltration is not required. Answer "No" to Criteria 1 Result.
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ☐ Yes; continue to Step 1E. ☐ No; select an appropriate infiltration testing method.

[9] Note that it is not required to investigate each and every criterion in the worksheet, a single "no" answer in Part 1, Part 2, Part 3, or Part 4 determines a full, partial, or no infiltration condition.

[10] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site storm water design.

[11] Available data includes site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ☐ Yes; continue to Step 1F. ☐ No; conduct appropriate number of tests.
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ☐ Yes; continue to Step 1G. ☐ No; select appropriate factor of safety.
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ☐ Yes; answer "Yes" to Criteria 1 Result. ☐ No; answer "No" to Criteria 1 Result.
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ☐ Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ☒ No; full infiltration is not required. Skip to Part 1 Result.
Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report. See Geotechnical Investigation (NOVA 2019)	

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 2: Geologic/Geotechnical Screening			
2A	If all questions in Step 2A are answered "Yes," continue to Step 2B. For any "No" answer in Step 2A answer "No" to Criteria 2, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
2A-1	Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?	☐ Yes	☐ No
2A-2	Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐ Yes	☐ No
2A-3	Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☐ No
2B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result. If there are "No" answers continue to Step 2C.		
2B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☐ No
2B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☐ No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☐ No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☐ No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	☐ Yes	☐ No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☐ No
Summarize findings and basis; provide references to related reports or exhibits.			

Part 1 Result – Full Infiltration Geotechnical Screening [12]	Result
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.	☐ Full infiltration Condition ☒ Complete Part 2

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[10]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
Proposed BMP Location	Planning
Criteria 3 : Infiltration Rate Screening	
3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☐ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☒ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B.
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ☒ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ☐ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ☒ Yes; Continue to Criteria 4. ☐ No: Skip to Part 2 Result.
Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate). See Geotechnical Investigation (NOVA 2019)	

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 2B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
4A-1	Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick?	☒ Yes	☐ No
4A-2	Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐ Yes	☒ No
4A-3	Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☐ No
4B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1 If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result. If there are any "No" answers continue to Step 4C.		
4B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☐ No
4B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☐ No
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☐ No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☐ No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☐ No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	☐ Yes	☐ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☐ No
Summarize findings and basis; provide references to related reports or exhibits.			

Part 2 – Partial Infiltration Geotechnical Screening Result[13]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	☐ Partial Infiltration Condition ☒ No Infiltration Condition

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

Attachment 1e – Pollutant Control BMP Design

Infiltration Feasibility Condition	Performance Standard
No Infiltration Condition (Based on Infiltration Feasibility Condition Letter and/or Worksheet C.4-1: Form I-8A and/or Worksheet C.4-2: Form I-8B) [There is no hierarchy in selecting the type of biofiltration BMP as long as the performance standard for the selected biofiltration BMP is met]	**Standard Biofiltration BMPs:** BMPs must meet the criteria in Appendix B.5.1.2
	Non-Standard Biofiltration BMPs: Pollutant Removal: BMP must be sized using Worksheet B.5-1 and Worksheet B.5-4; **AND** Volume Retention: DMA must meet the target volume retention calculated using Worksheet B.5-2 (based on Figure B.5-2). Compliance with volume retention requirements can be documented by: • DMA has a combined BMP footprint and landscaped area (that meet the criteria in SD-B and SD-F factsheet) of 3% of contributing area times adjusted runoff factor or greater. The landscaped area must have an impervious area to pervious area ratio greater than 1.5:1. This can be documented using Worksheet B.5-6. [OR] • Applicant has an option to use other site design BMPs that will meet the target volume retention calculated using Worksheet B.5-2. This can be documented using Worksheet B.5-6 and/or Worksheet B.5-7.
	Compact Biofiltration BMPs: Pollutant Removal: BMP must meet the criteria in Appendix F. Form I-10 must be completed and submitted with the PDP SWQMP; **AND** Volume Retention: DMA must meet the target volume retention calculated using Worksheet B.5-2 (based on Figure B.5-2). Compliance with volume retention requirements can be documented by: • DMA has a combined BMP footprint and landscaped area (that meet the criteria in SD-B and SD-F factsheet) of 3% of contributing area times adjusted runoff factor or greater. The landscaped area must have an impervious area to pervious area ratio greater than 1.5:1. This can be documented using Worksheet B.5-6. [OR] • Applicant has an option to use other site design BMPs that will meet the target volume retention calculated using Worksheet B.5-2. This can be documented using Worksheet B.5-6 and/or Worksheet B.5-7.

The City of SAN DIEGO	Project Name	32nd and Broadway	
	BMP ID	B (Filterra)	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	61000	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.740970492	
3	85th percentile 24-hour rainfall depth	0.51	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	1921	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.16	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.08	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	20.0	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.145	
10	Target volume retention [Line 9 x Line 4]	279	cu. ft.

The City of SAN DIEGO	Project Name	32nd and Broadway
	BMP ID	B (Filterra)

Volume Retention for No Infiltration Condition			Worksheet B.5-6	
1	Area draining to the biofiltration BMP		61000	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)		0.740970492	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]		45199	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]		1356	sq. ft.
5	Biofiltration BMP Footprint		144	sq. ft.

Landscape Area (must be identified on DS-3247)

		Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)		0				
7	Impervious area draining to the landscape area (sq. ft.)		48874				
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]				0		sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				144		sq. ft.

Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	No, Proceed to Line 13	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	0.11	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	279	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	247.9006623	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1	Amended Soils Basin	249	cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		249	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

The City of SAN DIEGO	Project Name	32nd and Broadway	
	BMP ID	B (Filterra)	
Volume Retention From Amended Soils		**Worksheet B.5-7**	
1	Impervious area draining to the pervious area	61000	sq. ft.
2	Pervious area (must meet the requirements in SD-B and SD-F Fact Sheets)	600	sq. ft.
3	Dispersion Ratio [Line 1/Line 2] Note: This worksheet is not applicable when Line 3 > 50 or Line 3 < 0.25	101.67	
4	Adjusted runoff factor [(Line 1 * 0.9 + Line 2 * 0.1) / (Line 1 + Line 2)]	0.89	
5	85th percentile 24-hour rainfall depth	0.51	inches
6	Design capture volume [(Line 1 + Line 2) x Line 4 x (Line 5/12)]	2330	cu. ft.
7	Amendment Depth (Choose from 3", 6", 9", 12", 15" and 18")	18	inches
8	Storage [(porosity – field capacity) + 0.5 * (field capacity – wilting point)]	0.25	in./in.
9	Pervious Storage [Line 2 * (Line 7/12) * Line 8]	225	cu. ft.
10	Fraction of DCV [Line 9 / Line 6]	0.1	
11	Measured Infiltration Rate When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.16	in/hr.
12	Factor of Safety	2	
13	Reliable Infiltration Rate [Line 11/Line 12]	0.08	in/hr.
14	Dispersion Credit (Based on Figures B.5.6 to B.5.11; Line 10 and Line 13)	0.096	
15	Volume retention due to amendment [Line 1 * (Line 5/12) * Line 14]	249	cu. ft.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.

A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA **and** the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.

An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.

Section 1: Biofiltration Criteria Checklist (Appendix F)

Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.

Criteria	Answer	Progression
Criteria 1 and 3: What is the infiltration condition of the DMA? Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination: • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal	○ Full Infiltration Condition	**Stop**. Compact biofiltration BMP is not allowed.
	○ Partial Infiltration Condition	Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction). If the required volume reduction is achieved **proceed to Criteria 2**. If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. **Stop**.
	◉ No Infiltration Condition	Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP. If the criteria in Table B.5-1 is met **proceed to Criteria 2**. If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. **Stop**.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 1 and 3:

Feasibility Analysis:

Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.

If Partial Infiltration Condition:

Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.

If No Infiltration Condition:

Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.

Criteria	Answer	Progression
Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit? Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Meets Flow based Criteria	Use guidance from **Appendix F.2.2** to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP. Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.) **Proceed to Criteria 4.**
	○ Meets Volume based Criteria	Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite. **Proceed to Criteria 4.**
	○ Does not Meet either criteria	**Stop**. Compact biofiltration BMP is not allowed.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 2:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).

The flow rate was calculated using the equation Q=1.5*C*I*A, and then divided the flow rate by the infiltration rate of 175 in/hr, which is the infiltration rate on the TAPE approval. I=0.2in/hr, and the 1.5 multiplier is stated in Appendix F.

Criteria	Answer	Progression
Criteria 4: Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern? Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes, meets the TAPE certification.	Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern. **Proceed to Criteria 5.**
	○ Yes, through other third-party documentation	Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2. **Proceed to Criteria 5.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 4:

Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

See attached TAPE certification.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 5: Is the compact biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process? Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes	Provide documentation that the compact biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance. **Proceed to Criteria 6.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 5: Provide documentation that appropriate biological activity is supported by the compact biofiltration BMP to maintain treatment process. See attached documentation.		
Criteria	**Answer**	**Progression**
Criteria 6: Is the compact biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP?	◉ Yes	Provide documentation that the compact biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification. **Proceed to Criteria 7.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.
Provide basis for Criteria 6: Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable). See attached documentation.		

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?	◉ Yes, and the compact BMP is privately owned, operated and not in the public right of way.	Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification. **Stop**. The compact biofiltration BMP meets the required criteria.
	○ Yes, and the BMP is either owned or operated by the City or in the public right of way.	Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination. **Stop**. Consult the City Engineer for a determination.
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 7:

Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

Compact (high rate) Biofiltration BMP Checklist	Form I-10
Section 2: Verification (For City Use Only)	
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	◉ Yes ○ No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:	

WASHINGTON STATE DEPARTMENT OF ECOLOGY

September 2019

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS), ENHANCED, PHOSPHORUS & OIL TREATMENT

For

CONTECH Engineered Solutions Filterra®

Ecology's Decision:

Based on Contech's submissions, including the Final Technical Evaluation Reports, dated August 2019, March 2014, December 2009, and additional information provided to Ecology dated October 9, 2009, Ecology hereby issues the following use level designations:

1. A General Use Level Designation for Basic, Enhanced, Phosphorus, and Oil Treatment for the Filterra® system constructed with a minimum media thickness of 21 inches (1.75 feet), at the following water quality design hydraulic loading rates:

Treatment	Infiltration Rate (in/hr) for use in Sizing
Basic	175
Phosphorus	100
Oil	50
Enhanced	175

2. The Filterra is not appropriate for oil spill-control purposes.
3. Ecology approves Filterra systems for treatment at the hydraulic loading rates listed above, to achieve the maximum water quality design flow rate. Calculate the water quality design flow rates using the following procedures:

- Western Washington: for treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three flow rate based methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

4. This General Use Level Designation has no expiration date, but Ecology may revoke or amend the designation, and is subject to the conditions specified below.

Ecology's Conditions of Use:

Filterra systems shall comply with these conditions shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the Filterra systems in accordance with applicable Contech Filterra manuals and this Ecology Decision.
2. The minimum size filter surface-area for use in Washington is determined by using the design water quality flow rate (as determined in this Ecology Decision, Item 3, above) and the Infiltration Rate from the table above (use the lowest applicable Infiltration Rate depending on the level of treatment required). Calculate the required area by dividing the water quality design flow rate (cu-ft/sec) by the Infiltration Rate (converted to ft/sec) to obtain required surface area (sq-ft) of the Filterra unit.
3. Each site plan must undergo Contech Filterra review before Ecology can approve the unit for site installation. This will ensure that design parameters including site grading and slope are appropriate for use of a Filterra unit.
4. Filterra media shall conform to the specifications submitted to and approved by Ecology and shall be sourced from Contech Engineered Solutions, LLC with no substitutions.
5. Maintenance includes removing trash, degraded mulch, and accumulated debris from the filter surface and replacing the mulch layer. Use inspections to determine the site-specific maintenance schedules and requirements. Follow maintenance procedures given in the most recent version of the Filterra Operation and Maintenance Manual.
6. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured treatment device.
    - Contech designs Filterra systems for a target maintenance interval of 6 months in the Pacific Northwest. Maintenance includes removing and replacing the mulch layer above the media along with accumulated sediment, trash, and captured organic materials therein, evaluating plant health, and pruning the plant if deemed necessary.
    - Conduct maintenance following manufacturer's guidelines.
7. Filterra systems come in standard sizes.
8. Install the Filterra in such a manner that flows exceeding the maximum Filterra operating rate are conveyed around the Filterra mulch and media and will not resuspend captured sediment.
9. Discharges from the Filterra units shall not cause or contribute to water quality standards violations in receiving waters.

Approved Alternate Configurations

Filterra Internal Bypass - Pipe (FTIB-P)

1. The Filterra® Internal Bypass – Pipe allows for piped-in flow from area drains, grated inlets, trench drains, and/or roof drains. Design capture flows and peak flows enter the structure through an internal slotted pipe. Filterra® inverted the slotted pipe to allow design flows to drop through to a series of splash plates that then disperse the design flows over the top surface of the Filterra® planter area. Higher flows continue to bypass the slotted pipe and convey out the structure.
2. To select a FTIB-P unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra Internal Bypass – Curb (FTIB-C)

1. The Filterra® Internal Bypass –Curb model (FTIB-C) incorporates a curb inlet, biofiltration treatment chamber, and internal high flow bypass in one single structure. Filterra® designed the FTIB-C model for use in a "Sag" or "Sump" condition and will accept flows from both directions along a gutter line. An internal flume tray weir component directs treatment flows entering the unit through the curb inlet to the biofiltration treatment chamber. Flows in excess of the water quality treatment flow rise above the flume tray weir and discharge through a standpipe orifice; providing bypass of untreated peak flows. Americast manufactures the FTIB-C model in a variety of sizes and configurations and you may use the unit on a continuous grade when a single structure providing both treatment and high flow bypass is preferred. The FTIB-C model can also incorporate a separate junction box chamber to allow larger diameter discharge pipe connections to the structure.
2. To select a FTIB-C unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra® Shallow

1. The Filterra Shallow provides additional flexibility for design engineers and designers in situations where various elevation constraints prevent application of a standard Filterra configuration. Engineers can design this system up to six inches shallower than any of the previous Filterra unit configurations noted above.
2. Ecology requires that the Filterra Shallow provide a media contact time equivalent to that of the standard unit. This means that with a smaller depth of media, the surface area must increase.
3. To select a Filterra Shallow System unit, the designer must first identify the size of the standard unit using the modeling guidance described above.
4. Once the size of the standard Filterra unit is established using the sizing technique described above, use information from the following table to select the appropriate size Filterra Shallow System unit.

Shallow Unit Basic, Enhanced, and Oil Treatment Sizing

Standard Depth	Equivalent Shallow Depth
4x4	4x6 or 6x4
4x6 or 6x4	6x6
4x8 or 8x4	6x8 or 8x6
6x6	6x10 or 10x6
6x8 or 8x6	6x12 or 12x6
6x10 or 10x6	13x7

Notes:
1. Shallow Depth Boxes are less than the standard depth of 3.5 feet but no less than 3.0 feet deep (TC to INV).

Applicant: Contech Engineered Solutions, LLC.

Applicant's Address: 11815 NE Glenn Widing Drive
Portland, OR 97220

Application Documents:

- State of Washington Department of Ecology Application for Conditional Use Designation, Americast (September 2006)
- Quality Assurance Project Plan Filterra® Bioretention Filtration System Performance Monitoring, Americast (April 2008)
- Quality Assurance Project Plan Addendum Filterra® Bioretention Filtration System Performance Monitoring, Americast (June 2008)
- Draft Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (August 2009)
- Final Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (December 2009)
- Technical Evaluation Report Appendices Filterra® Bioretention Filtration System Performance Monitoring, Americast, (August 2009)
- Memorandum to Department of Ecology Dated October 9, 2009 from Americast, Inc. and Herrera Environmental Consultants
- Quality Assurance Project Plan Filterra® Bioretention System Phosphorus treatment and Supplemental Basic and Enhanced Treatment Performance Monitoring, Americast (November 2011)
- Filterra® letter August 24, 2012 regarding sizing for the Filterra® Shallow System.
- University of Virginia Engineering Department Memo by Joanna Crowe Curran, Ph. D dated March 16, 2013 concerning capacity analysis of Filterra® internal weir inlet tray.
- Terraphase Engineering letter to Jodi Mills, P.E. dated April 2, 2013 regarding Terraflume Hydraulic Test, Filterra® Bioretention System and attachments.
- Technical Evaluation Report, Filterra® System Phosphorus Treatment and Supplemental Basic Treatment Performance Monitoring. March 27th, 2014.
- State of Washington Department of Ecology Application for Conditional Use Level Designation, Contech Engineered Solutions (May 2015)

- Quality Assurance Project Plan Filterra® Bioretention System, Contech Engineered Solutions (May 2015)
- Filterra Bioretention System Armco Avenue General Use Level Designation Technical Evaluation Report, Contech Engineered Solutions (August 2019)

Applicant's Use Level Request:

General Level Use Designation for Basic (175 in/hr), Enhanced (175 in/hr), Phosphorus (100 in/hr), and Oil Treatment (50 in/hr).

Applicant's Performance Claims:

Field-testing and laboratory testing show that the Filterra® unit is promising as a stormwater treatment best management practice and can meet Ecology's performance goals for basic, enhanced, phosphorus, and oil treatment.

Findings of Fact:

Field Testing 2015-2019

1. Contech completed field testing of a 4 ft. x 4 ft. Filterra® unit at one site in Hillsboro, Oregon from September 2015 to July 2019. Throughout the monitoring period a total of 24 individual storm events were sampled, of which 23 qualified for TAPE sampling criteria.
2. Contech encountered several unanticipated events and challenges that prevented them from collecting continuous flow and rainfall data. An analysis of the flow data from the sampled events, including both the qualifying and non-qualifying events, demonstrated the system treated over 99 % of the influent flows. Peak flows during these events ranged from 25 % to 250 % of the design flow rate of 29 gallons per minute.
3. Of the 23 TAPE qualified sample events, 13 met requirements for TSS analysis. Influent concentrations ranged from 20.8 mg/L to 83 mg/L, with a mean concentration of 46.3 mg/L. The UCL95 mean effluent concentration was 15.9 mg/L, meeting the 20 mg/L performance goal for Basic Treatment.
4. All 23 TAPE qualified sample events met requirements for dissolved zinc analysis. Influent concentrations range from 0.0384 mg/L to 0.2680 mg/L, with a mean concentration of 0.0807 mg/L. The LCL 95 mean percent removal was 62.9 %, meeting the 60 % performance goal for Enhanced Treatment.
5. Thirteen of the 23 TAPE qualified sample events met requirements for dissolved copper analysis. Influent concentrations ranged from 0.00543 mg/L to 0.01660 mg/L, with a mean concentration of 0.0103 mg/L. The LCL 95 mean percent removal was 41.2 %, meeting the 30 % performance goal for Enhanced Treatment.
6. Total zinc concentrations were analyzed for all 24 sample events. Influent EMCs for total zinc ranged from 0.048 mg/L to 5.290 mg/L with a median of 0.162 mg/L. Corresponding effluent EMCs for total zinc ranged from 0.015 mg/L to 0.067 mg/L with a median of

0.029 mg/L. Total event loadings for the study for total zinc were 316.85 g at the influent and 12.92 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 95.9 %.

7. Total copper concentrations were analyzed for all 24 sample events. Influent EMCs for total copper ranged from 0.003 mg/L to 35.600 mg/L with a median value of 0.043 mg/L. Corresponding effluent EMCs for total copper ranged from 0.002 mg/L to 0.015 mg/L with a median of 0.004 mg/L. Total event loadings for total copper for the study were 1,810.06 g at the influent and 1.90 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 99.9 %.

Field Testing 2013

1. Filterra completed field-testing of a 6.5 ft x 4 ft. unit at one site in Bellingham, Washington. Continuous flow and rainfall data collected from January 1, 2013 through July 23, 2013 indicated that 59 storm events occurred. Water quality data was obtained from 22 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. The system treated 98.9 % of the total 8-month runoff volume during the testing period. Consequently, the system achieved the goal of treating 91 % of the volume from the site. Stormwater runoff bypassed Filterra treatment during four of the 59 storm events.
3. Of the 22 sampled events, 18 qualified for TSS analysis (influent TSS concentrations ranged from 25 to 138 mg/L). The data were segregated into sample pairs with influent concentration greater than and less than 100 mg/L. The UCL95 mean effluent concentration for the data with influent less than 100 mg/L was 5.2 mg/L, below the 20-mg/L threshold. Although the TAPE guidelines do not require an evaluation of TSS removal efficiency for influent concentrations below 100 mg/L, the mean TSS removal for these samples was 90.1 %. Average removal of influent TSS concentrations greater than 100 mg/L (three events) was 85 %. In addition, the system consistently exhibited TSS removal greater than 80 % at flow rates equivalent to a 100 in/hr infiltration rate and was observed at 150 in/hr.
4. Ten of the 22 sampled events qualified for TP analysis. Americast augmented the dataset using two sample pairs from previous monitoring at the site. Influent TP concentrations ranged from 0.11 to 0.52 mg/L. The mean TP removal for these twelve events was 72.6 %. The LCL95 mean percent removal was 66.0, well above the TAPE requirement of 50 %. Treatment above 50 % was evident at 100 in/hr infiltration rate and as high as 150 in/hr. Consequently, the Filterra test system met the TAPE Phosphorus Treatment goal at 100 in/hr. Influent ortho-P concentrations ranged from 0.005 to 0.012 mg/L; effluent ortho-P concentrations ranged from 0.005 to 0.013 mg/L. The reporting limit/resolution for the ortho-P test method is 0.01 mg/L, therefore the influent and effluent ortho-P concentrations were both at and near non-detect concentrations.

Field Testing 2008-2009

1. Filterra completed field-testing at two sites at the Port of Tacoma. Continuous flow and rainfall data collected during the 2008-2009 monitoring period indicated that 89 storm events occurred. The monitoring obtained water quality data from 27 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. During the testing at the Port of Tacoma, 98.96 to 99.89 % of the annual influent runoff volume passed through the POT1 and POT2 test systems respectively. Stormwater runoff bypassed the POT1 test system during nine storm events and bypassed the POT2 test system during one storm event. Bypass volumes ranged from 0.13 % to 15.3% of the influent storm volume. Both test systems achieved the 91 % water quality treatment-goal over the 1-year monitoring period.
3. Consultants observed infiltration rates as high as 133 in/hr during the various storms. Filterra did not provide any paired data that identified percent removal of TSS, metals, oil, or phosphorus at an instantaneous observed flow rate.
4. The maximum storm average hydraulic loading rate associated with water quality data is <40 in/hr, with the majority of flow rates < 25 in/hr. The average instantaneous hydraulic loading rate ranged from 8.6 to 53 in/hr.
5. The field data showed a removal rate greater than 80 % for TSS with an influent concentration greater than 20 mg/L at an average instantaneous hydraulic loading rate up to 53 in/hr (average influent concentration of 28.8 mg/L, average effluent concentration of 4.3 mg/L).
6. The field data showed a removal rate generally greater than 54 % for dissolved zinc at an average instantaneous hydraulic loading rate up to 60 in/hr and an average influent concentration of 0.266 mg/L (average effluent concentration of 0.115 mg/L).
7. The field data showed a removal rate generally greater than 40 % for dissolved copper at an average instantaneous hydraulic loading rate up to 35 in/hr and an average influent concentration of 0.0070 mg/L (average effluent concentration of 0.0036 mg/L).
8. The field data showed an average removal rate of 93 % for total petroleum hydrocarbon (TPH) at an average instantaneous hydraulic loading rate up to 53 in/hr and an average influent concentration of 52 mg/L (average effluent concentration of 2.3 mg/L). The data also shows achievement of less than 15 mg/L TPH for grab samples. Filterra provided limited visible sheen data due to access limitations at the outlet monitoring location.
9. The field data showed low percentage removals of total phosphorus at all storm flows at an average influent concentration of 0.189 mg/L (average effluent concentration of 0.171 mg/L). We may relate the relatively poor treatment performance of the Filterra system at this location to influent characteristics for total phosphorus that are unique to the Port of Tacoma site. It appears that the Filterra system will not meet the 50 % removal performance goal when the majority of phosphorus in the runoff is expected to be in the dissolved form.

Laboratory Testing

1. Filterra performed laboratory testing on a scaled down version of the Filterra unit. The lab data showed an average removal from 83-91 % for TSS with influents ranging from 21 to 320 mg/L, 82-84 % for total copper with influents ranging from 0.94 to 2.3 mg/L, and 50-61 % for orthophosphate with influents ranging from 2.46 to 14.37 mg/L.
2. Filterra conducted permeability tests on the soil media.
3. Lab scale testing using Sil-Co-Sil 106 showed removals ranging from 70.1 % to 95.5 % with a median removal of 90.7 %, for influent concentrations ranging from 8.3 to 260 mg/L. Filterra ran these laboratory tests at an infiltration rate of 50 in/hr.
4. Supplemental lab testing conducted in September 2009 using Sil-Co-Sil 106 showed an average removal of 90.6 %. These laboratory tests were run at infiltration rates ranging from 25 to 150 in/hr for influent concentrations ranging from 41.6 to 252.5 mg/L. Regression analysis results indicate that the Filterra system's TSS removal performance is independent of influent concentration in the concentration rage evaluated at hydraulic loading rates of up to 150 in/hr.

Contact Information:

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Ecology web link: http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html

Ecology:
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Department of Ecology
Water Quality Program
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Date	Revision
December 2009	GULD for Basic, Enhanced, and Oil granted, CULD for Phosphorus
September 2011	Extended CULD for Phosphorus Treatment
September 2012	Revised design storm discussion, added Shallow System.
January 2013	Revised format to match Ecology standards, changed Filterra contact information
February 2013	Added FTIB-P system
March 2013	Added FTIB-C system
April 2013	Modified requirements for identifying appropriate size of unit

June 2013	Modified description of FTIB-C alternate configuration
March 2014	GULD awarded for Phosphorus Treatment. GULD updated for a higher flow-rate for Basic Treatment.
June 2014	Revised sizing calculation methods
March 2015	Revised Contact Information
June 2015	CULD for Basic and Enhanced at 100 in/hr infiltration rate
September 2019	GULD for Basic and Enhanced at 175 in/hr infiltration rate

CONTECH ENGINEERED SOLUTIONS

filterra Bioretention Systems

Filterra Sizing Spreadsheet
San Diego Region
Uniform Intensity Approach
Storm Intensity = 0.20 in/hr

Filterra Infiltration Rate = 175 (in/hr)
Filterra Flow per Square Foot = 0.00405 (ft3/sec/ft2)

Filterra Flow Rate, Q = 0.00405 ft3/sec x Filterra Surface Area
Rational Method, Q = C x I x A
San Diego Multiplier, M = 1.5

Site Flowrate, Q = (C x DI x DA x M x 43560) / (12 x3600)
OR DA = (12 x 3600 x Q) / (C x 43560 x DI x M)

where
Q = Flow (ft3/sec)
DA = Drainage Area (acres)
DI = Design Intensity (in/hr)
C = Runoff coefficient (dimensionless)
M = Multiplier (dimensionless)

			DI **0.2**	C 0.95	C 0.85	C 0.50
Available Filterra Box Sizes			Filterra Flow Rate, Q	100% Imperv. DA	Commercial max DA	Residential max DA
L (ft)	W (ft)	Filterra Surface Area (ft2)	(ft3/sec)	(acres)	(acres)	(acres)
4	4	16	0.0648	0.226	0.252	0.429
6	4	24	0.0972	0.338	0.378	0.643
6.5	4	26	0.1053	0.367	0.410	0.696
8	4	32	0.1296	0.451	0.504	0.857
12	4	48	0.1944	0.677	0.756	1.286
6	6	36	0.1458	0.507	0.567	0.964
8	6	48	0.1944	0.677	0.756	1.286
10	6	60	0.2431	0.846	0.945	1.607
12	6	72	0.2917	1.015	1.134	1.928
13	7	91	0.3686	1.283	1.434	2.437
12	8	96	0.3889	1.353	1.512	2.571
14	8	112	0.4537	1.579	1.765	3.000
16	8	128	0.5185	1.804	2.017	3.428
18	8	144	0.5833	2.030	2.269	3.857
20	8	160	0.6481	2.255	2.521	4.285
22	8	176	0.7130	2.481	2.773	4.714

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Attachment 2
Backup for PDP Hydromodification Control Measures

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Project Name: 32nd and Broadway

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☑ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☑ Not Performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	☑ Included ☐ Submitted as separate stand-alone document

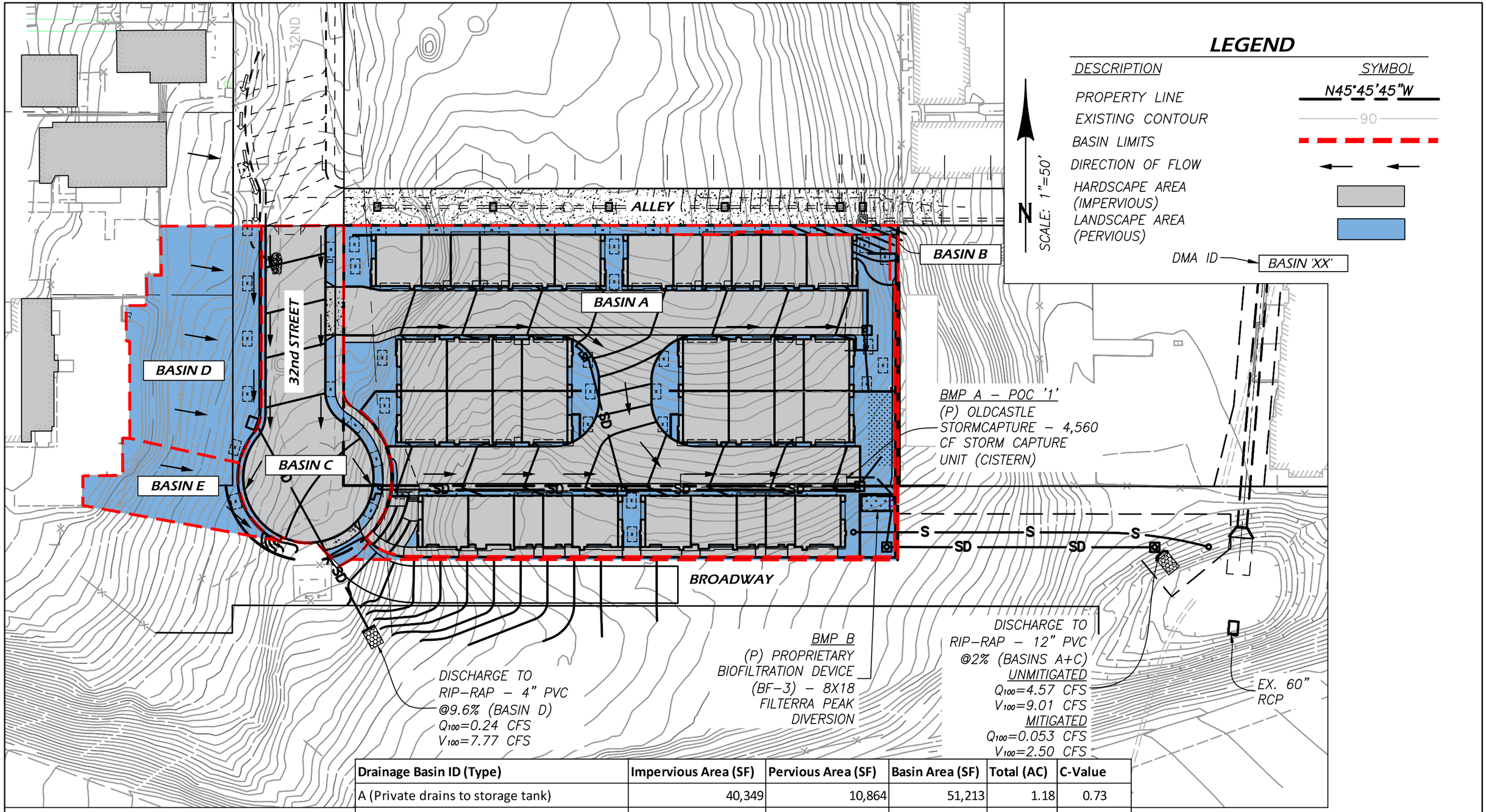
Project Name: 32nd and Broadway

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [x] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [x] Critical coarse sediment yield areas to be protected OR provide a separate map showing that the project site is outside of any critical coarse sediment yield areas
- [x] Existing topography
- [x] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [x] Proposed impervious features
- [ ] Proposed design features and surface treatments used to minimize imperviousness
- [x] Point(s) of Compliance (POC) for Hydromodification Management
  Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- [x] Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail).

Attachment 2a – Hydromodification Management Exhibit

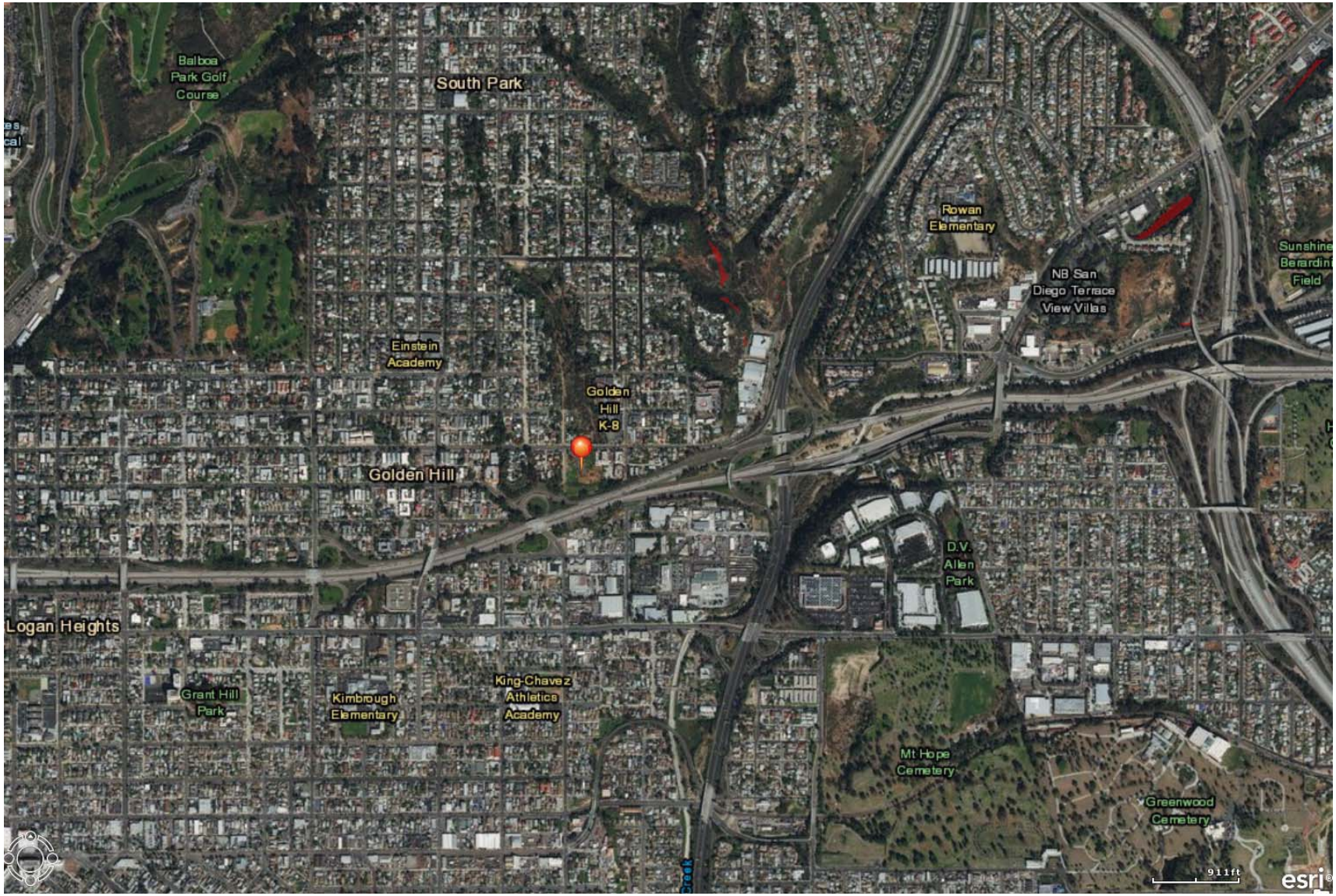


Drainage Basin ID (Type)	Impervious Area (SF)	Pervious Area (SF)	Basin Area (SF)	Total (AC)	C-Value
A (Private drains to storage tank)	40,349	10,864	51,213	1.18	0.73
B (Sheet flow to easterly hillside)	0	1,525	1,525	0.04	0.30
C (Storm drain at street to storage tank)	8,525	1,262	9,787	0.22	0.80
D (Run-on to southerly hillside rip-rap)	0	8,027	8,027	0.18	0.30
E (Run-on diverted to southerly hillside)	0	3,048	3,048	0.07	0.30
Total	**48,874**	**24,726**	**73,600**	**1.69**	

COFFEY ENGINEERING, INC.

DRAINAGE MAP B
PROPOSED CONDITIONS-SWQMP
32ND AND BROADWAY

Attachment 2b – CCSYA Exhibit



Critical Coarse Sediment Yield Areas - 32nd and Broadway

Attachment 2d – Flow Control Facility Design

BMP Sizing Spreadsheet V3.1			
Project Name:	Mildred 5555	Hydrologic Unit:	907.11
Project Applicant:	Tailored Properties MA, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	San Diego	Total Project Area:	14,964
Parcel (APN):	436-362-01-00	Low Flow Threshold:	0.1Q2
BMP Name:	BMP-A	BMP Type:	Cistern
BMP Native Soil Type:	D	BMP Infiltration Rate (in/hr):	NA

Areas Draining to BMP						HMP Sizing Factors	Minimum BMP Size
DMA Name	Area (sf)	Pre Project Soil Type	Pre-Project Slope	Post Project Surface Type	Area Weighted Runoff Factor (Table G.2-1)[1]	Volume	Volume (CF)
A	23,422	D	Steep	Roofs	1.0	0.09	2108
A	16,927	D	Steep	Concrete	1.0	0.09	1523
A	10,864	D	Steep	Landscape	0.1	0.09	98
C	8,525	D	Steep	Concrete	1.0	0.09	767
C	1,262	D	Steep	Landscape	0.1	0.09	11
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
						0	0
BMP Tributary Area	61,000					Minimum BMP Size	4508
						Proposed BMP Size*	4560

* Assumes standard configuration

Standard Cistern Depth (Overflow Elevation)	3.5	ft
Provided Cistern Depth (Overflow Elevation)	7.0	ft
Minimum Required Cistern Footprint)	644	CF

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manu

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, May 2018. For questions or concerns please contact the jurisdiction in which your project is located.

BMP Sizing Spreadsheet V3.1			
Project Name:	Mildred 5555	Hydrologic Unit:	907.11
Project Applicant:	Tailored Properties MA, LLC	Rain Gauge:	Lindbergh
Jurisdiction:	San Diego	Total Project Area:	14,964
Parcel (APN):	436-362-01-00	Low Flow Threshold:	0.1Q2
BMP Name	BMP-A	BMP Type:	Cistern

DMA Name	Rain Gauge	Pre-developed Condition		Unit Runoff Ratio (cfs/ac)	DMA Area (ac)	Orifice Flow - $\%Q_2$ (cfs)	Orifice Area (in^2)
		Soil Type	Slope				
A	Lindbergh	D	Steep	0.439	0.538	0.024	**0.25**
A	Lindbergh	D	Steep	0.439	0.389	0.017	**0.18**
A	Lindbergh	D	Steep	0.439	0.249	0.011	**0.11**
C	Lindbergh	D	Steep	0.439	0.196	0.009	**0.09**
C	Lindbergh	D	Steep	0.439	0.029	0.001	**0.01**

7.00	**0.061**	**0.64**	**0.90**
Max Orifice Head (feet)	**Max Tot. Allowable Orifice Flow (cfs)**	**Max Tot. Allowable Orifice Area (in^2)**	**Max Orifice Diameter (in)**

Provide Hand Calc.	**0.040**	**0.42**	**0.730**
Average outflow during surface drawdown (cfs)	Max Orifice Outflow (cfs)	Actual Orifice Area (in^2)	Selected Orifice Diameter (in)

Drawdown (Hrs)	Provide Hand Calculation

Drawdown Time - Oldcastle Stormcapture - BMP A

Orifice Dia. (ft)	Orifice Dia. (in)	Surface Area			Drawdown Time (hours)
0.060	0.73	644			39.15

Depth of Water in Vault Area	Q (ft^3/sec)	∆Vol (ft^3)	∆Time (sec)	∆Time (min)	∆Time (hours)
7.0000	0.060868886	0			
6.9167	0.060505487	53.67	884.31	14.73	0.24
6.8333	0.060139891	53.67	889.65	14.82	0.24
6.7500	0.05977206	53.67	895.10	14.91	0.24
6.6667	0.059401951	53.67	900.64	15.01	0.25
6.5833	0.059029521	53.67	906.29	15.1	0.25
6.5000	0.058654727	53.67	912.04	15.2	0.25
6.4167	0.058277522	53.67	917.91	15.29	0.25
6.3333	0.05789786	53.67	923.89	15.39	0.25
6.2500	0.057515691	53.67	929.98	15.49	0.25
6.1667	0.057130967	53.67	936.20	15.6	0.26
6.0833	0.056743634	53.67	942.55	15.7	0.26
6.0000	0.056353638	53.67	949.03	15.81	0.26
5.9167	0.055960925	53.67	955.64	15.92	0.26
5.8333	0.055565437	53.67	962.40	16.04	0.26
5.7500	0.055167113	53.67	969.30	16.15	0.26
5.6667	0.054765892	53.67	976.35	16.27	0.27
5.5833	0.054361711	53.67	983.55	16.39	0.27
5.5000	0.053954501	53.67	990.92	16.51	0.27
5.4167	0.053544195	53.67	998.46	16.64	0.27
5.3333	0.05313072	53.67	1006.17	16.76	0.27
5.2500	0.052714002	53.67	1014.06	16.9	0.28
5.1667	0.052293963	53.67	1022.14	17.03	0.28
5.0833	0.051870523	53.67	1030.42	17.17	0.28
5.0000	0.051443598	53.67	1038.90	17.31	0.28
4.9167	0.0510131	53.67	1047.59	17.45	0.29
4.8333	0.050578938	53.67	1056.51	17.6	0.29
4.7500	0.050141017	53.67	1065.66	17.76	0.29
4.6667	0.049699238	53.67	1075.05	17.91	0.29
4.5833	0.049253496	53.67	1084.69	18.07	0.3
4.5000	0.048803682	53.67	1094.59	18.24	0.3
4.4167	0.048349685	53.67	1104.78	18.41	0.3
4.3333	0.047891384	53.67	1115.25	18.58	0.3
4.2500	0.047428654	53.67	1126.03	18.76	0.31
4.1667	0.046961365	53.67	1137.12	18.95	0.31
4.0833	0.04648938	53.67	1148.55	19.14	0.31
4.0000	0.046012553	53.67	1160.33	19.33	0.32
3.9167	0.045530733	53.67	1172.48	19.54	0.32

3.8333	0.045043759	53.67	1185.02	19.75	0.32
3.7500	0.044551463	53.67	1197.98	19.96	0.33
3.6667	0.044053666	53.67	1211.36	20.18	0.33
3.5833	0.043550179	53.67	1225.21	20.42	0.34
3.5000	0.043040802	53.67	1239.54	20.65	0.34
3.4167	0.042525325	53.67	1254.39	20.9	0.34
3.3333	0.042003522	53.67	1269.78	21.16	0.35
3.2500	0.041475155	53.67	1285.75	21.42	0.35
3.1667	0.040939969	53.67	1302.34	21.7	0.36
3.0833	0.040397694	53.67	1319.60	21.99	0.36
3.0000	0.03984804	53.67	1337.55	22.29	0.37
2.9167	0.039290697	53.67	1356.26	22.6	0.37
2.8333	0.038725334	53.67	1375.78	22.92	0.38
2.7500	0.038151594	53.67	1396.17	23.26	0.38
2.6667	0.037569092	53.67	1417.49	23.62	0.39
2.5833	0.036977416	53.67	1439.81	23.99	0.39
2.5000	0.036376117	53.67	1463.23	24.38	0.4
2.4167	0.03576471	53.67	1487.83	24.79	0.41
2.3333	0.035142668	53.67	1513.71	25.22	0.42
2.2500	0.034509415	53.67	1540.99	25.68	0.42
2.1667	0.033864322	53.67	1569.80	26.16	0.43
2.0833	0.0332067	53.67	1600.29	26.67	0.44
2.0000	0.032535788	53.67	1632.63	27.21	0.45
1.9167	0.031850748	53.67	1667.01	27.78	0.46
1.8333	0.031150646	53.67	1703.66	28.39	0.47
1.7500	0.030434443	53.67	1742.84	29.04	0.48
1.6667	0.029700975	53.67	1784.86	29.74	0.49
1.5833	0.02894893	53.67	1830.06	30.5	0.5
1.5000	0.028176819	53.67	1878.89	31.31	0.52
1.4167	0.027382946	53.67	1931.85	32.19	0.53
1.3333	0.02656536	53.67	1989.55	33.15	0.55
1.2500	0.025721799	53.67	2052.76	34.21	0.57
1.1667	0.024849619	53.67	2122.41	35.37	0.58
1.0833	0.023945692	53.67	2199.66	36.66	0.61
1.0000	0.023006277	53.67	2286.02	38.1	0.63
0.9167	0.022026833	53.67	2383.43	39.72	0.66
0.8333	0.021001761	53.67	2494.46	41.57	0.69
0.7500	0.01992402	53.67	2622.63	43.71	0.72
0.6667	0.018784546	53.67	2772.85	46.21	0.77
0.5833	0.017571334	53.67	2952.29	49.2	0.82
0.5000	0.016267894	53.67	3171.86	52.86	0.88
0.4167	0.014850488	53.67	3449.19	57.48	0.95
0.3333	0.01328268	53.67	3815.18	63.58	1.05
0.2500	0.011503138	53.67	4330.43	72.17	1.2
0.1667	0.009392273	53.67	5136.69	85.61	1.42
0.0833	0.00664134	53.67	6694.26	111.57	1.85
0.0700	0.006086889	8.59	1349.23	22.48	0.37

0.0600	0.005635364	6.44	1098.76	18.31	0.3
0.0500	0.00514436	6.44	1194.83	19.91	0.33
0.0400	0.004601255	6.44	1321.62	22.02	0.36
0.0300	0.003984804	6.44	1500.10	25	0.41
0.0200	0.003253579	6.44	1779.40	29.65	0.49
0.0100	0.002300628	6.44	2318.96	38.64	0.64
	Total Vol.	**4501.56**		**Total Hours**	**39.15**

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Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Project Name: 32nd and Broadway

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3	Maintenance Agreement (Form DS-3247) (when applicable)	☑ Included ☐ Not applicable

The City of SAN DIEGO

RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO AND
WHEN RECORDED MAIL TO:
32nd and Broadway LLC
3184 Airway Avenue, Suite B
Costa Mesa, CA 92626

(THIS SPACE IS FOR RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSORS PARCEL NUMBER:	PROJECT NUMBER:
	539-563-06, -07, -10	

This agreement is made by and between the City of San Diego, a municipal corporation [City] and 32nd and Broadway LLC, the owner or duly authorized representative of the owner [Property Owner] of property located at 1000 Block, 32nd Street, San Diego, CA 92103 (PROPERTY ADDRESS) and more particularly described as: Lots 25 through 36 of Block 124 of Choate's Addition, according to MAP 167, filed November 20, 1886 (LEGAL DESCRIPTION OF PROPERTY) in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): _____.

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): _____.

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): _____.

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's SWQMP and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s) _____.

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibit(s): _____

_____
(Owner Signature)

_____
(Print Name and Title)

_____
(Company/Organization Name)

_____
(Date)

THE CITY OF SAN DIEGO

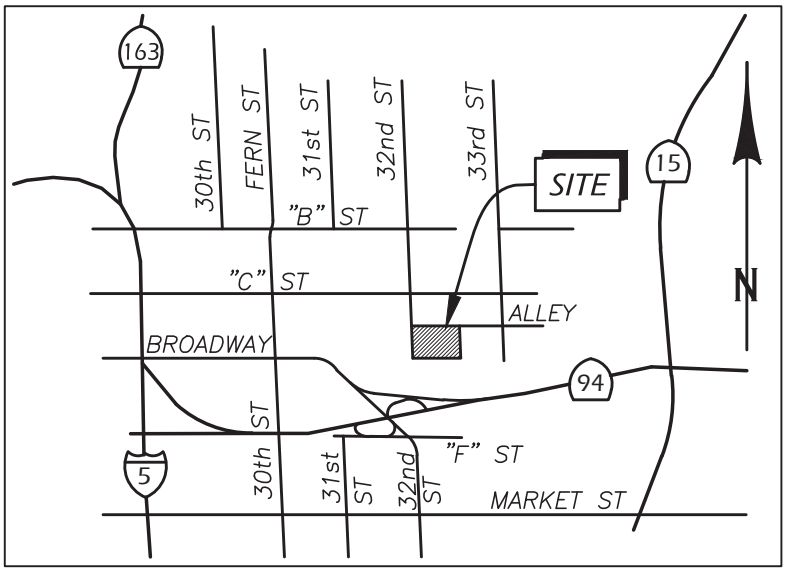
APPROVED:

_____
(City Control Engineer Signature)

_____
(Print Name)

_____
(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDGMENTS PER CIVIL CODE SEC. 1180 ET.SEQ.



VICINITY MAP

THOMAS BROS. MAP 1289–F3
NO SCALE

LEGAL DESCRIPTION:

LOTS 25 THROUGH 36 OF BLOCK 124 OF CHOATE'S ADDITION, ACCORDING TO MAP 167, FILED NOVEMBER 20, 1886, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE COUNTY RECORDER.
APN: 539–563–06, –07, –10

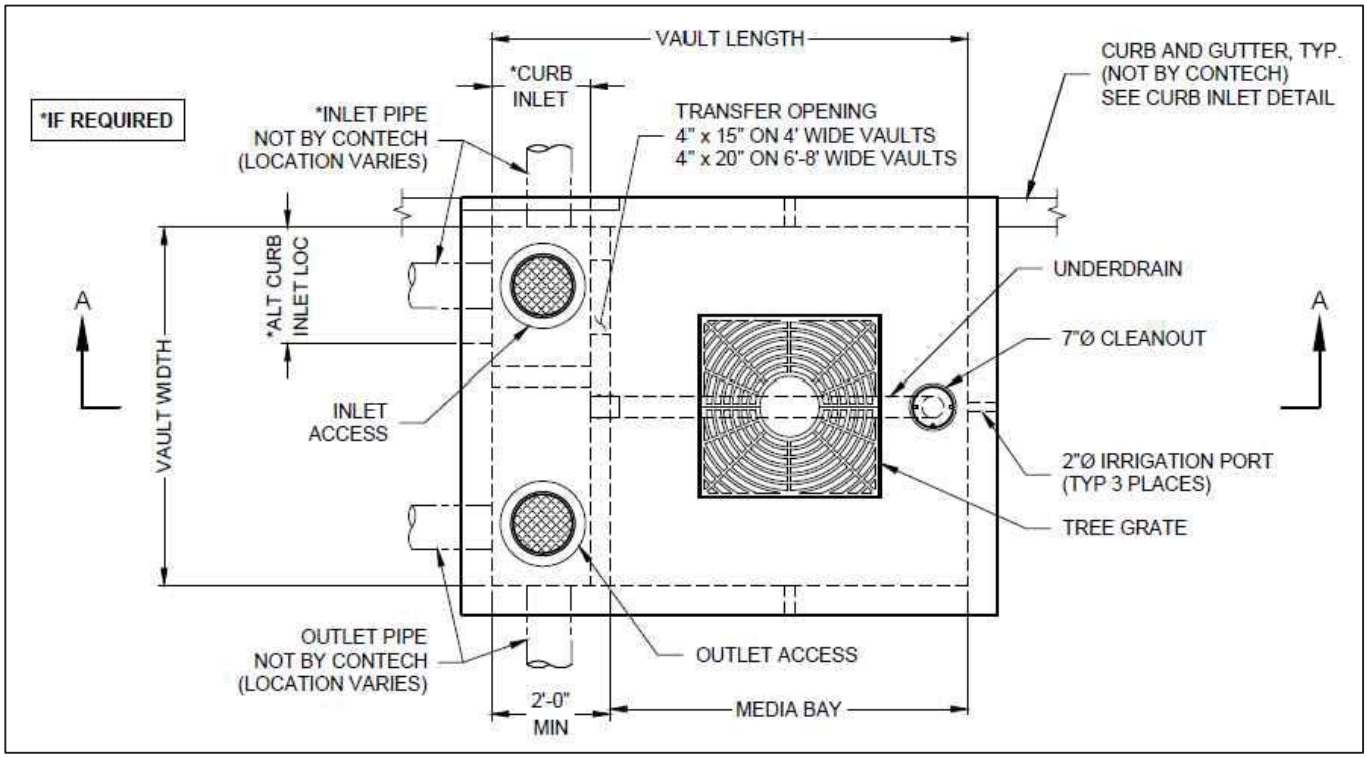
COFFEY ENGINEERING, INC.
9666 BUSINESSPARK AVENUE, SUITE 210, SAN DIEGO, CA 92131 PH (858)831-0111 FAX (858)831-0179

SWMDCMA
Vicinity Map
EXHIBIT 'A'

FILTERRA PEAK DIVERSION (FTPD0606) - 8x18 DEEP CONFIGURATION

PLAN VIEW

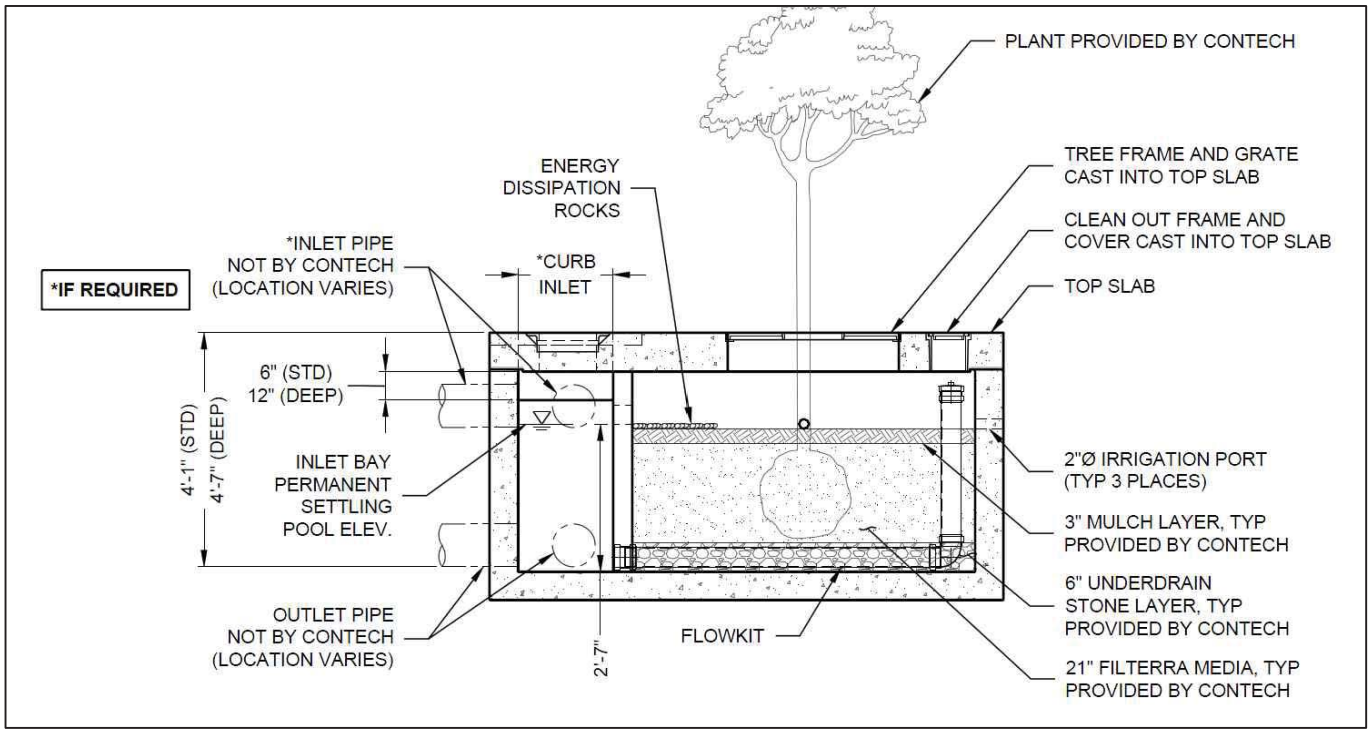
NO SCALE



FILTERRA PEAK DIVERSION (FTPD0608) - 8x18 DEEP CONFIGURATION

CROSS SECTION VIEW

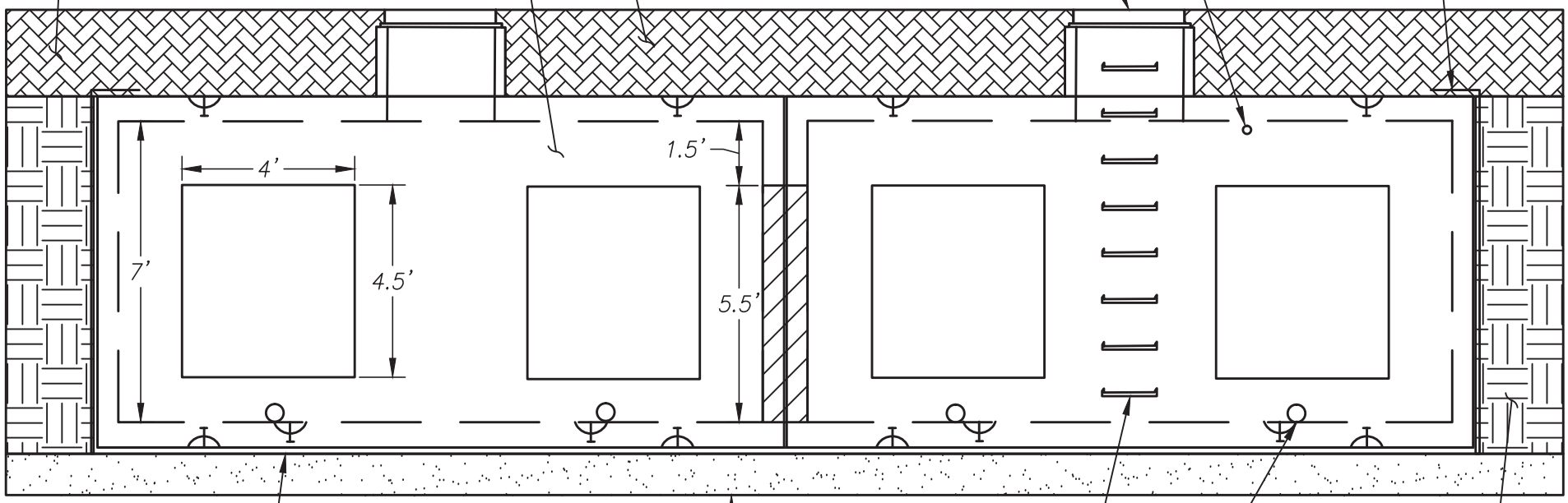
NO SCALE



COFFEY ENGINEERING, INC.

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

SWMDCMA
TREE WELL
EXHIBIT 'B'



NOTE:
TERMADUCT INSERTS TO BE KNOCKED OUT AT SPECIFIED LOCATIONS ONLY (BY OTHERS).

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

SWMDCMA
OLDCASTLE STORMCAPTURE WATER CHAMBER EXHIBIT 'C'

SITE DESIGN, SOURCE CONTROL AND POLLUTANT CONTROL BMP OPERATION + MAINTENANCE PROCEDURE

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO.:

O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNER

BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	QUANTITY	INCLUDED IN O&M MANUAL				SHEET NOS.
SITE DESIGN									
DISPERSE RUNOFF TO ADJACENT LANDSCAPING	WEEKLY	MONTHLY	CLEAR EXCESS VEGETATION/DEBRIS	12,126 S.F.		YES	X	NO	C.1
NATIVE OR DROUGHT TOLERANT VEGETATION	WEEKLY	MONTHLY	REPLACE DYING/DEAD VEGETATION	12,126 S.F.		YES	X	NO	C.1
SOURCE CONTROL									
PREVENT. ILLICIT DISCHARGES	WEEKLY	MONTHLY	REPLACE/REPAIR DAMAGED OUTLETS	1 EA.		YES	X	NO	C.1
TRASH STORAGE	WEEKLY	WEEKLY	DISPOSE OF TRASH REGULARLY	1 EA.		YES	X	NO	C.1
ON-SITE STORM DRAIN INLETS INTERIOR FLOOR DRAINS	WEEKLY	MONTHLY	REPLACE/REPAIR AS NEEDED, CLEAR OF ANY OBSTRUCTIONS	AS NEEDED		YES	X	NO	C.1
LANDSCAPE/OUTDOOR PESTICIDE USE	MONTHLY	MONTHLY	CLEAR EXCESS VEGETATION/DEBRIS	AS NEEDED		YES	X	NO	C.1
TREATMENT CONTROL									
FILTERRA BIOFILTRATION DEVICE	RAINY SEASON-WEEKLY	ANNUALLY	CLEAR EXCESS VEGETATION/DEBRIS	1 EA.	X	YES		NO	C.1,C.2
HMP FACILITY									
CONCRETE VAULT (CISTERN)	RAINY SEASON-WEEKLY	ANNUALLY	CLEAR EXCESS SEDIMENT/DEBRIS	1 EA.	X	YES		NO	C.1,C.2

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

SWMDCMA
BMP MAINTENANCE & FREQUENCY
EXHIBIT 'D'

Project Name: 32nd and Broadway

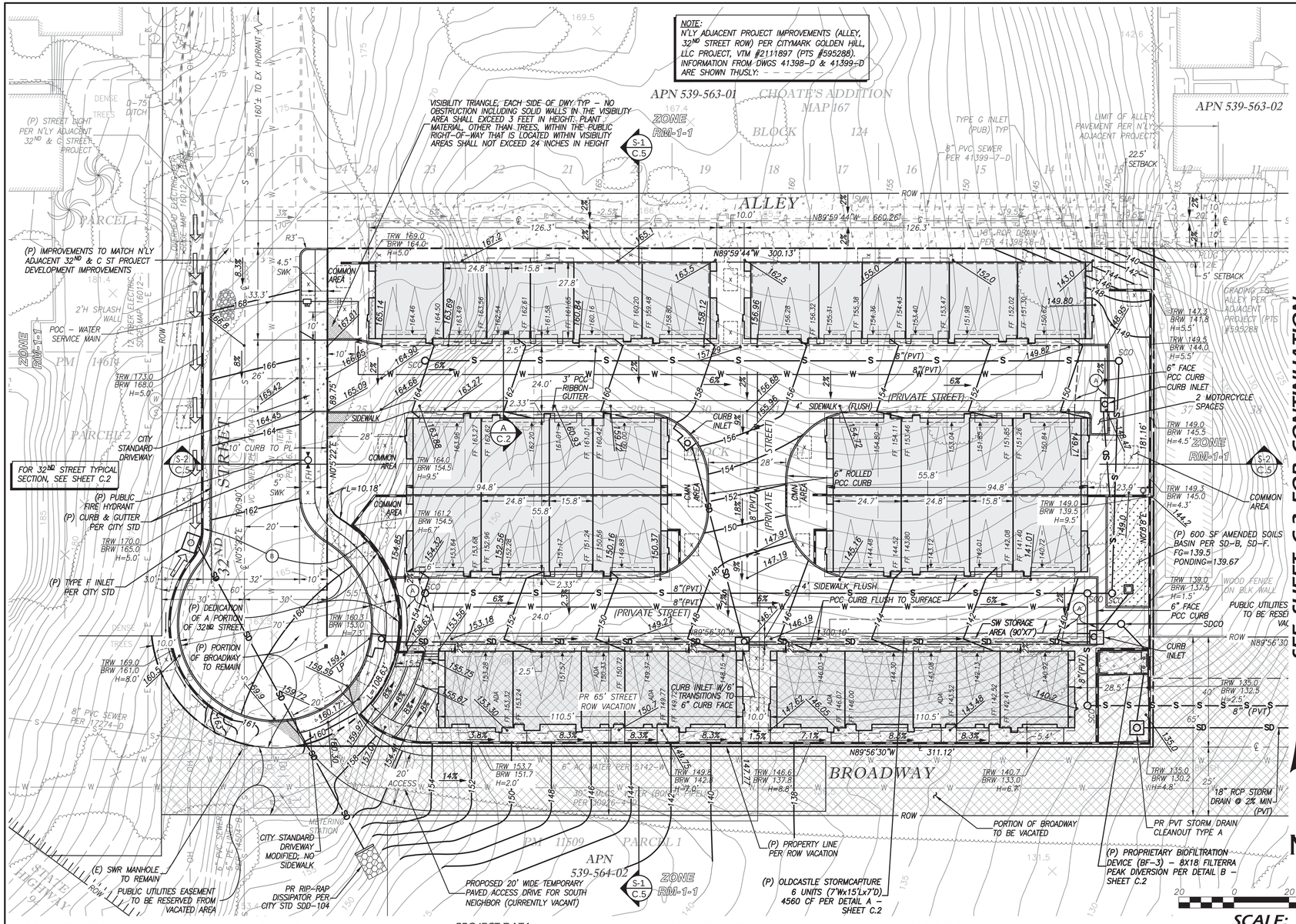
Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Attachment 3: For private entity operation and maintenance, Attachment 3 must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- ☑ Vicinity map
- ☑ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- ☑ BMP and HMP location and dimensions
- ☑ BMP and HMP specifications/cross section/model
- ☑ Maintenance recommendations and frequency
- ☑ LID features such as (permeable paver and LS location, dim, SF).

Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.



LEGEND

DESCRIPTION	STD DWG	SYMBOL
PROPERTY LINE		N45°45'45"W
STREET CENTERLINE		℄
(E) CONTOUR		90
(E) SPOT ELEVATION		+100.00
(E) WATER LINE		W
(E) SEWER LINE		S
(E) ELECTRIC CONDUIT	UNDERGROUND/OVERHEAD	E / OH
(E) WATER SERVICE		W
(E) SEWER SERVICE		S
(E) FIRE HYDRANT		FH
(E) PALM		
(E) BUILDING FOOTPRINT		
(P) CONTOUR		90
(P) SPOT ELEVATION		100.00
(P) DRAINAGE SWALE OR DIRECTION OF FLOW		
(P) PCC DRAINAGE DITCH – TYPE D	SDD–106	
(P) PVC DRAIN LINE	SDR–35 SCH 40	SD
(P) FIRE HYDRANT		
(P) LANDSCAPE DRAIN	(NDS OR EQ)	
(P) TREE ROOT ZONE (5'X8')		
(P) CURB INLET	SDD–115/SDD–116	
(P) CATCH BASIN, TYPE 'F'		
(P) RIP RAP	SDD–104	
(P) WATER SERVICE MAIN – 8" (PVT)		W
(P) BACKFLOW PREVENTER / RPDA (PVT)		
(P) SEWER MAIN – 8" (PVT)		S
(P) SEWER MAIN – 8" (PUB)		S S S
(P) SEWER MANHOLE / CLEANOUT	SDS–106 OR –107 / SC–01	SMH CO
(P) CMU STEMWALL		
(P) FREESTANDING WALL		
(P) BUILDING FOOTPRINT		
(P) BUILDING OVERHEAD		
(P) CONCRETE SIDEWALK	SDG–155	
(P) PCC DRIVEWAY	SDG–159	
(P) PCC CURB & GUTTER		
(P) PCC CURB – 6" FACE	SDG–150	
(P) PCC RIBBON GUTTER		

DRAWING INDEX

ABBREVIATIONS

LEGAL DESCRIPTION:

LOTS 25 – 36 OF CHOATE'S ADDITION BLOCK 124 PER MAP 167, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY, NOVEMBER 11, 1886.

APN: 539–563–06–00, –07–00, & –10–00

BENCHMARK:

SEBP AT CORNER OF 32ND STREET AND C STREET.
ELEV = 176.099 MSL, NGVD 29. CITY OF SAN DIEGO VERTICAL BENCHMARK BOOK.

SOURCE OF TOPOGRAPHY

COFFEY ENGINEERING, INC.
9666 BUSINESS PARK AVENUE, SUITE 210
SAN DIEGO, CA 92131
PHONE: (858) 831–0111
SURVEY DATE: 9/17/18 (JOB #2018–071)
JOHN S COFFEY, RLS 9733, EXP 12/31/20

NOTES:

(A) TURNAROUND AREA TO BE MARKED FOR "NO PARKING" (AREA IS GREATER THAN 162 FT2 IN ACCORDANCE WITH 142.0560 (d)(3))

(B) PUBLIC SIDEWALK & PUBLIC R.O.W. RETAINING WALL SHALL COMPLY WITH DESIGN MATERIAL AND SCORING PATTERN REQUIREMENTS PER COMMUNITY STANDARDS (MATCH N'LY ADJACENT PROJECT)

ZONING:

DESIGNATION: RM–1–1
PLANNED DISTRICT: (NONE)
NUMBER OF PROPOSED LOTS: 1
T.M.ACREAGE: 1.211 ACRES

OVERLAY ZONES:

- AIRPORT INFLUENCE AREA
- FIRE BRUSH ZONES 300' BUFFER
- FIRE HAZARD SEVERITY ZONE

ENVIRONMENTALLY SENSITIVE LANDS: ...YES
STEEP HILLSIDES:.....NO
HISTORIC DISTRICT: .....NO
DESIGNATED HISTORIC: .....NO
GEO. HAZARD CATEGORIES: 52
EARTHQUAKE FAULT BUFFER: .....NO
FAA PART 77 NOTIFICATION AREA: .....YES

PROJECT DATA:

SITE ADDRESS: 32ND STREET
SAN DIEGO, CA 92102
APN: 539–563–06,–07,–10
EXISTING BUILDING: NONE
CONSTRUCTION DATE: N/A
CALIFORNIA/ LAMBERT COORDINATES: 200–1731
NAD83 COORDINATES: 1840–6291

SITE DATA:

EX LOT SIZE = 42,322 SF (0.972 AC)
(P) LOT SIZE = 52,777 SF (1.211 AC)
[AFTER VACATION AND DEDICATION]
FLOOR AREA= 68,974 SF
F.A.R. (FLOOR AREA/LOT AREA)= 1.307
LANDSCAPE AREA= 12,500 SF

EXISTING USE:

VACANT LAND

PROPOSED USE:

RM1–1

CONDOMINIUM STATEMENT:

THIS IS A RESIDENTIAL CONDOMINIUM PROJECT AS DEFINED IN SECTION 4125 OF THE CIVIL CODE OF THE STATE OF CALIFORNIA AND IS FILED PURSUANT TO THE SUBDIVISION MAP ACT. TOTAL NUMBER OF RESIDENTIAL UNITS IS 38.

PROJECT DESCRIPTION:

- A TENTATIVE MAP (TM) FOR THE CREATION OF 38 RESIDENTIAL CONDOMINIUM UNIT OWNERSHIPS AND A NEIGHBORHOOD DEVELOPMENT PERMIT (NDP) TO INCREASE THE ALLOWABLE RESIDENTIAL DENSITY FROM 10–15 DWELLING UNITS PER ACRE TO 16–29 DWELLING UNITS PER ACRE AND TO ALLOW CONSTRUCTION OF A WALL EXCEEDING 3–FEET IN HEIGHT WITHIN THE PUBLIC RIGHT–OF–WAY, FOR THE DEVELOPMENT OF 38 RESIDENTIAL CONDOMINIUM UNITS IN SIX 3–STORY BUILDINGS TOTALING 69,950 SQUARE FEET ON A 1.25 ACRE VACANT SITE LOCATED AT THE NORTHEAST CORNER OF THE INTERSECTION OF 32ND STREET AND BROADWAY AVENUE IN THE RM–1–1 (RESIDENTIAL–MULTIPLE UNIT) ZONE. THE DEVELOPMENT INCLUDES AN AFFORDABLE HOUSING DENSITY BONUS AS ALLOWED BY SAN DIEGO MUNICIPAL CODE (SDMC) SECTION 143.0740.
- THE PROJECT PROPOSES THE FOLLOWING 6 DEVIATIONS: (A) SETBACKS, (B) FLOOR AREA RATIO, (C) BUILDING HEIGHT), (D) COMMON AREA, (E) CUL–DE–SAC RADIUS, (F) RETAINING WALL HEIGHT. SEE SHEET A0 FOR DETAILED DESCRIPTION OF DEVIATIONS.
- THE DEVELOPMENT INCLUDES THE PUBLIC RIGHT–OF–WAY VACATION OF BROADWAY AVENUE ADJACENT TO THE DEVELOPMENT UNDER SAN DIEGO MUNICIPAL CODE SECTION 125.0910.

UTILITY NOTES:

(SEE SHEET C.2)

PROJECT TEAM:

OWNER: 32ND AND BROADWAY, LLC
3184 AIRWAY AVENUE, SUITE B
COSTA MESA, CA, 92626
(949) 233–6700

CIVIL ENGINEER: COFFEY ENGINEERING, INC.
9666 BUSINESS PARK AVE., SUITE 210
SAN DIEGO, CA 92131
(858) 831–0111

ARCHITECT: WOODLEY ARCHITECTURE GROUP, INC.
2943 PULLMAN STREET, SUITE A
SANTA ANA, CA 92705
(949) 553–8919

LANDSCAPE ARCHITECT: ENVIRONS
1909 STATE STREET
SAN DIEGO, CA 92101
(619) 232–7007

GEOTECHNICAL ENGINEER: NOVA SERVICES
4373 VIEWRIDGE AVE., SUITE B
SAN DIEGO, CA 92123
(858) 292–7575

BIOLOGY: BRIAN F. SMITH & ASSOCIATES, INC.
41010 POWAY ROAD, SUITE A
POWAY, CA 92064
(858) 484–0915

TRAFFIC: DARNELL & ASSOCIATES, INC.
4411 MERCURY STREET, SUITE 207A
SAN DIEGO, CA 92111
(619) 233–9373

ACOUSITIC: EILAR ASSOCIATES, INC.
210 SOUTH JUNIPER STREET, SUITE 100
ESCONDIDO, CA 92025
(760) 738–5570

ARCHAEOLOGY: BRIAN F. SMITH & ASSOCIATES, INC.
41010 POWAY ROAD, SUITE A
POWAY, CA 92064
(858) 484–0915

GRADING TABULATIONS

[W/ VACATION & DEDICATION]

TOTAL AMOUNT OF SITE TO BE GRADED: 52,777 S.F.
AMOUNT OF CUT: 5,800 CUBIC YARDS
AMOUNT OF FILL: 5,800 CUBIC YARDS
MAXIMUM HEIGHT OF FILL SLOPE(S): 7.0 FEET
MAXIMUM HEIGHT OF CUT SLOPE(S): N/A FEET
AMOUNT OF IMPORT/ EXPORT SOIL: – 0 – CUBIC YARDS
RETAINING/ CRIB WALLS: LENGTH 858 FEET

% OF TOTAL SITE: 100%
MAXIMUM DEPTH OF CUT: 9.2 FEET
MAXIMUM DEPTH OF FILL: 10.0 FEET
SLOPE RATIO: 2:1 MAX
SLOPE RATIO: 2:1 MAX
MAXIMUM HEIGHT: 10.5 FEET

PRELIMINARY
REGISTERED PROFESSIONAL ENGINEER JOHN S. COFFEY No. 9733 CIVIL STATE OF CALIFORNIA

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

CITY OF SAN DIEGO, CALIFORNIA

NDP, TENTATIVE MAP

32nd and BROADWAY

32nd Street
SAN DIEGO, CA 92102

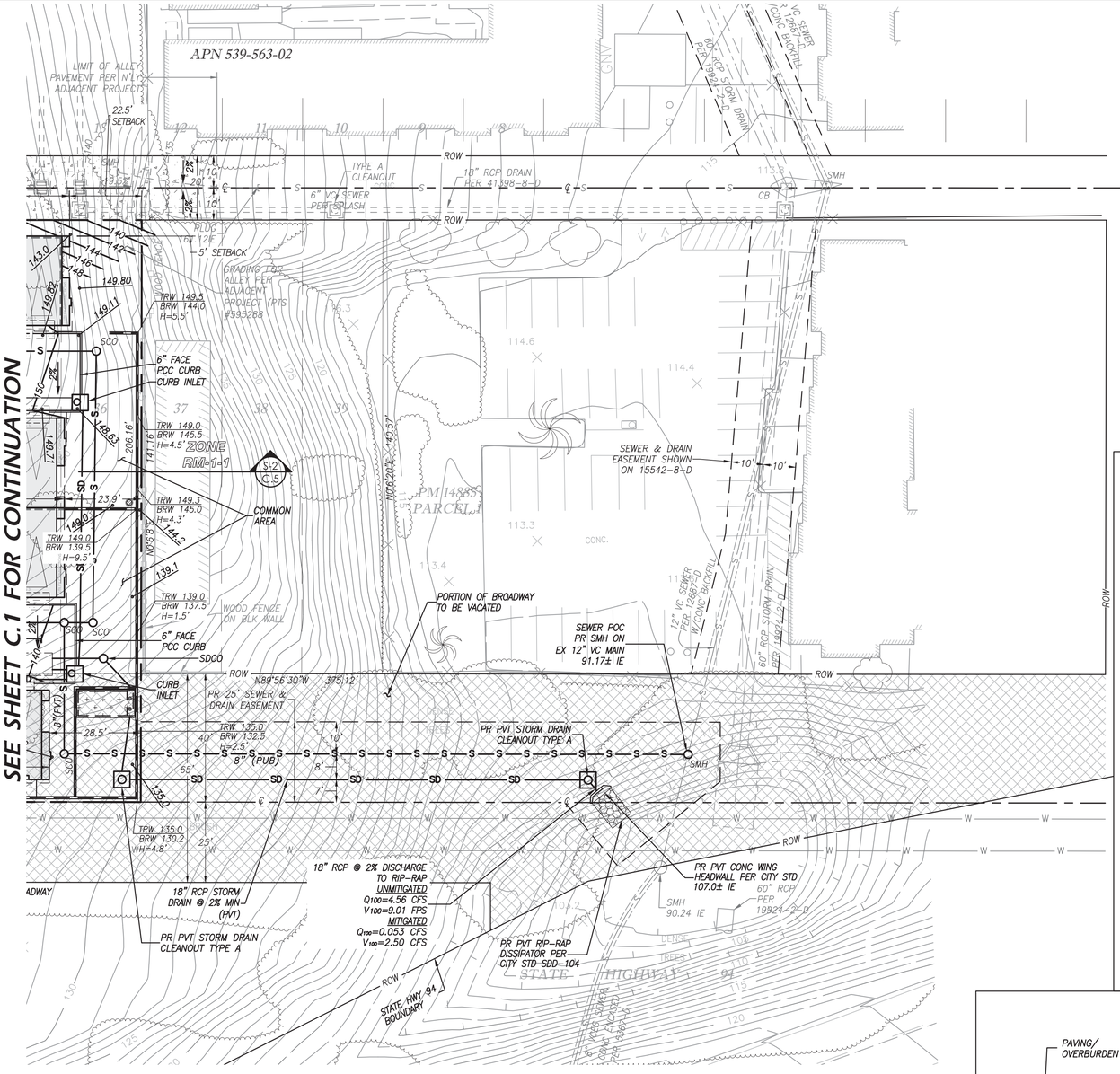
ORIGINAL 11/18/19
REVISIONS

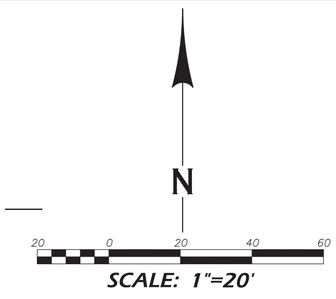
PROJECT NO. 637438
I.O. NO. 24008268
TM NO. 2324694
NDP NO. 2324693
ROW VACATION NO. 2324692

SITE PLAN / PRELIMINARY GRADING PLAN — C.1

DRAWN BY: DTK
CHECKED BY: JSC

SHEET 1 OF 37

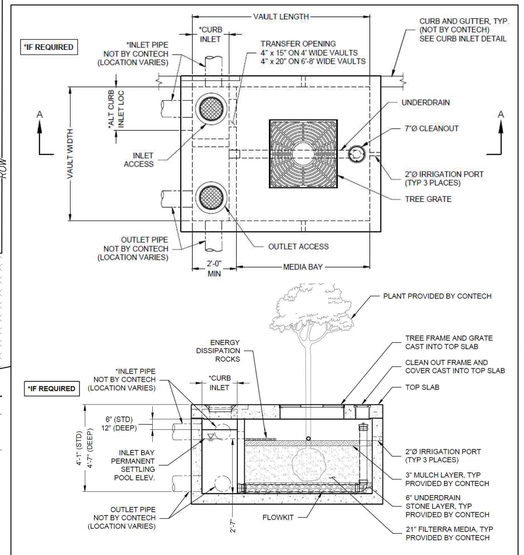




33RD STREET

UTILITY NOTES:

1. THE LOCATIONS OF UTILITIES, IF ANY, SHOWN ON THIS PLAN ARE GENERATED FROM RECORDS PROVIDED BY UTILITY/GOVERNING AGENCIES AND/OR FIELD DATA COLLECTED DURING THE SURVEY. THE PLOTTING OF UTILITIES ON THIS PLAN DOES NOT CONSTITUTE A GUARANTEE OF THEIR LOCATION, DEPTH, SIZE, OR TYPE.
2. ALL PROPOSED WATER AND SEWER FACILITIES, BOTH PUBLIC AND PRIVATE, WHICH ARE TO BE LOCATED WITHIN THE PUBLIC ROW MUST BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE CRITERIA ESTABLISHED WITHIN THE CITY OF SAN DIEGO'S CURRENT WATER AND SEWER FACILITY DESIGN GUIDELINES, REGULATIONS, STANDARDS, AND PRACTICES PERTAINING THERETO.



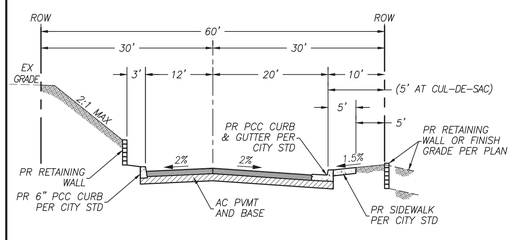
DTL 'B' - FILTERRA PEAK DIVERSION (FTPD0606) - 8x18 DEEP CONFIGURATION

LEGEND

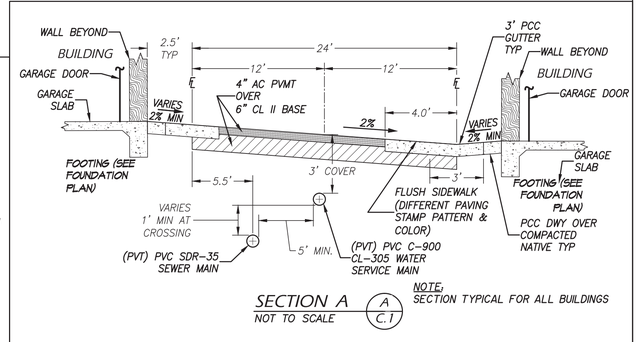
DESCRIPTION	STD DWG	SYMBOL
PROPERTY LINE		N45°45'45"W
STREET CENTERLINE		℄
(E) CONTOUR		90
(E) SPOT ELEVATION		+ 100.00
(E) WATER LINE		W
(E) SEWER LINE		S
(E) ELECTRIC CONDUIT	UNDERGROUND/OVERHEAD	E / OH
(E) WATER SERVICE		W
(E) SEWER SERVICE		S
(E) FIRE HYDRANT		FH
(E) PALM		
(E) BUILDING FOOTPRINT		
(P) CONTOUR		90
(P) SPOT ELEVATION		100.00
(P) DRAINAGE SWALE OR DIRECTION OF FLOW		
(P) PVC DRAIN LINE	SDR-35 SCH 40	SD
(P) LANDSCAPE DRAIN	(NDS OR EQ)	
(P) CURB INLET – TYPE A	SDD-115	
(P) CURB INLET – TYPE B	SDD-116	
(P) ROOF DOWNSPOUTS		
(P) WATER SERVICE MAIN – 8" (PVT)		W
(P) BACKFLOW PREVENTER / RPDA (PVT)		
(P) SEWER MAIN – 8" (PVT)		S
(P) SEWER MAIN – 8" (PUB)		S S S
(P) SEWER MANHOLE / CLEANOUT	SDS-106 OR -107 / SC-01	SMH CO
(P) CMU STEMWALL		
(P) FREESTANDING WALL		
(P) BUILDING FOOTPRINT		
(P) BUILDING OVERHEAD		
(P) CONCRETE SIDEWALK	SDG-155	
(P) PCC DRIVEWAY	SDG-159	
(P) PCC CURB & GUTTER		
(P) PCC CURB – 6" FACE	SDG-150	
(P) PCC RIBBON GUTTER		

ABBREVIATIONS

AC	ASPHALTIC CONCRETE	PUB	PUBLIC
BRW	GRADE AT BOTTOM OF RETAINING WALL	PVC	POLYVINYLCHLORIDE
CB	CATCH BASIN	PVMT	PAVEMENT
CO	CLEANOUT	PVT	PRIVATE
CONC	CONCRETE	RCP	REINFORCED CONCRETE PIPE
EL	ELEVATION	RPDA	REDUCED PRESSURE DETECTOR ASSY
(E); EX	EXISTING	SW	STORM WATER
FH	FIRE HYDRANT	SWR	SEWER
FF	FINISH FLOOR	STD	STANDARD
FL; E	FLOWLINE	SMH	SEWER MANHOLE
FS	FINISH SURFACE/SLAB	SWK	SIDEWALK
GAR	GARAGE	TC	TOP OF CURB (IF WALL EXTENDS ABOVE GRADE)
HP	HIGH POINT	TRW	GRADE AT TOP OF RETAINING WALL
IE	INVERT ELEVATION	TW	TOP OF WALL
MAX; MIN	MAXIMUM; MINIMUM	VC; VCES	VITRIFIED CLAY; VC EXTRA STRENGTH
PA	PLANTING AREA	W/; W/O	WITH; WITHOUT
PCC	PORTLAND CEMENT CONCRETE	WM	WATER METER
POC	POINT OF CONNECTION		
(P); PR	PROPOSED		

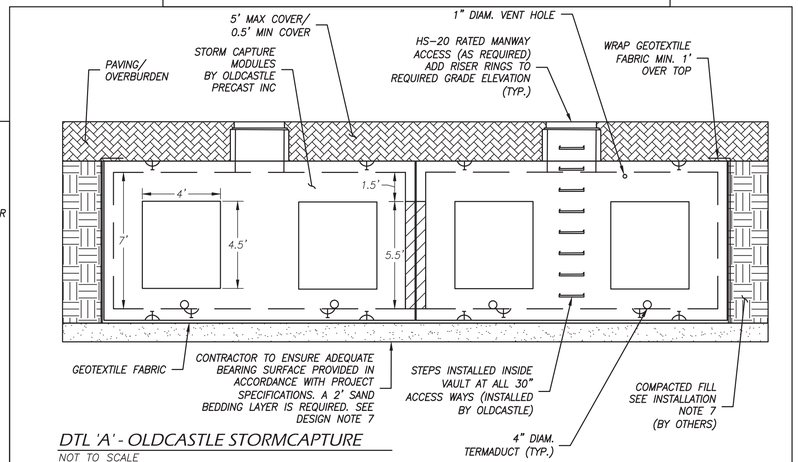


32ND STREET TYPICAL SECTION
NOT TO SCALE



SECTION A (A / C.1)
NOT TO SCALE

NOTE: SECTION TYPICAL FOR ALL BUILDINGS



DTL 'A' - OLDCASTLE STORMCAPTURE
NOT TO SCALE

COFFEY ENGINEERING, INC.
9466 BUSINESSPARK AVENUE, SUITE 210, SAN DIEGO, CA 92131 PH (858)831-0111 FAX (858)831-0179

REGISTERED PROFESSIONAL ENGINEER JOHN S. COFFEY No. 16716 CIVIL STATE OF CALIFORNIA
PRELIMINARY
09/03/19

CITY OF SAN DIEGO, CALIFORNIA

NDP, TENTATIVE MAP

32nd and BROADWAY

32nd Street
SAN DIEGO, CA 92102

ORIGINAL	9/3/19
REVISIONS	

SITE PLAN / PRELIMINARY GRADING PLAN — C.2

DRAWN BY: DTK
CHECKED BY: JSC

Project Name: 32nd and Broadway

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

- ☐ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s)
- ☐ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☐ All BMPs must be fully dimensioned on the plans
- ☐ When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

Attachment 5
Drainage Report

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

COFFEY ENGINEERING, INC.

Drainage Report

32nd and Broadway
1000 Block 32nd Street
San Diego, CA 92102
APN: 539-563-06, 07, 10

(PTS No. 637438)

Prepared for:

The City of San Diego

June 30, 2020

9666 Businesspark Avenue, Suite 210 San Diego, CA 92131 Phone: (858)831-0111 Fax: (858)831-0179

Table of Contents

1. **Existing Conditions**

The project site is located at the intersection of 32nd Street and Broadway Street (APN 539-563-06, -07, and -10). In pre-construction conditions, the site is comprised entirely of undeveloped, vegetated hillside. Approximately 0.97 acres (Basin X) will contribute runoff discharges totaling 1.92 cfs in the 100-year storm event to the hillside via sheet flow, where runoff flows east to an existing 60" RCP before ultimately reaching the San Diego Bay.

For a more complete analysis on the increase of runoff from existing to proposed conditions, an offsite basin consisting of 0.72 acres (Basin Y) of undeveloped area was created that mimics the proposed drainage area footprint. This area contributes Q100=1.42 cfs to the hillside.

See Appendix A- Drainage Map A.

2. **Proposed Project**

In post-construction conditions, the project site will be heavily developed with 42 units and driveway. All runoff from developed areas within the site (Basin A) will discharge to a proposed rip-rap within the 25' drainage easement, near the existing 60" RCP inlet. The 100-year storm event flow rate Q100 has been calculated at 3.62 cfs.

There is a small strip of vegetated hillside along the perimeter of the site that will not be required to be treated, and will sheet flow off the site (Basin B). Flows from this basin are expected to be Q_{100}=0.07 cfs.

Also proposed is an extension of the paved 32nd Street to the southerly extent of the project site. A storm drain inlet will collect street flows and ultimately discharge them to the same rip-rap at the southeast corner of the site near the 60" RCP inlet (Basin C). The flow rate was calculated to be Q_{100}=0.94 cfs.

Expected offsite run-on from the northwesterly hillside will be channeled along the top of the retaining wall and collected by a proposed Type F inlet, where it will discharge to a rip-rap along the hillside south of the proposed road extension (Basin D). The rip-rap is expected to receive Q100=0.36 cfs.

A small portion of the same westerly hillside will not be collected by the proposed Type F inlet, but instead sheet flow around the proposed development and sheet flow to the southerly hillside that Basin D discharges to. This area (Basin E) will contribute 0.14 cfs to the southerly hillside.

There is no expected run-on from the northerly adjacent property. The northerly site currently is being permitted with the City of San Diego for a condominium complex (PTS 595288), which when constructed will capture any potential run-on and discharge away from the project site.

See Appendix A- Drainage Map B.

3. **Purpose and Scope of Report**

This report will evaluate the proposed drainage pipe system and flow rate discharge to the existing 60" RCP.

4. **Method of Calculations**

The Rational Method, as defined by *City of San Diego Drainage Design Manual 2017*, will be used to calculate storm water flow rates. Where noted, the following calculations were used to determine flow properties:

Rainfall Characteristics

Q = C * I * A, where

Q = Flow rate (ft^3/sec)
C = Runoff coefficient
(Runoff coefficient per *City of San Diego Drainage Design Manual 2017* reproduced in Appendix C. Soil type D determined from the *Soil Hydrologic Groups* map from the County of San Diego Hydrology Manual reproduced in Appendix C also.)
I = Rainfall intensity (in/hr.)
A = Area (acres)

5. **Results and Conclusions:**

Based on the calculations, the site (including run-on) will feature a larger discharge to the existing 60" RCP in proposed conditions, from 3.35 cfs to 5.13 cfs. However, no mitigation measures are necessary as there are no anticipated impacts to adjacent properties as all storm water runoff from the habitable area discharges directly to the drainage easement where it is collected by the existing 60" RCP. The 60" RCP can handle 442.60 cfs (see pipe flow calculations in Appendix B). The construction will only increase the 60" RCP's capacity by 0.4%.

An analysis was performed on the tributary area to determine the total flows to the 60" RCP, in order to conclude whether or not the 0.4% capacity increase could be handled. The drainage area ultimately contributing to the flows entering the 60" RCP is 158 acres. Calculations are shown on Drainage Map 'C' – 32nd & Broadway Tributary Area. The total flows that the 60" RCP currently receives are 382.36 CFS. Therefore, the 60" is expected to handle the increased runoff from construction without negative downstream effects.

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

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

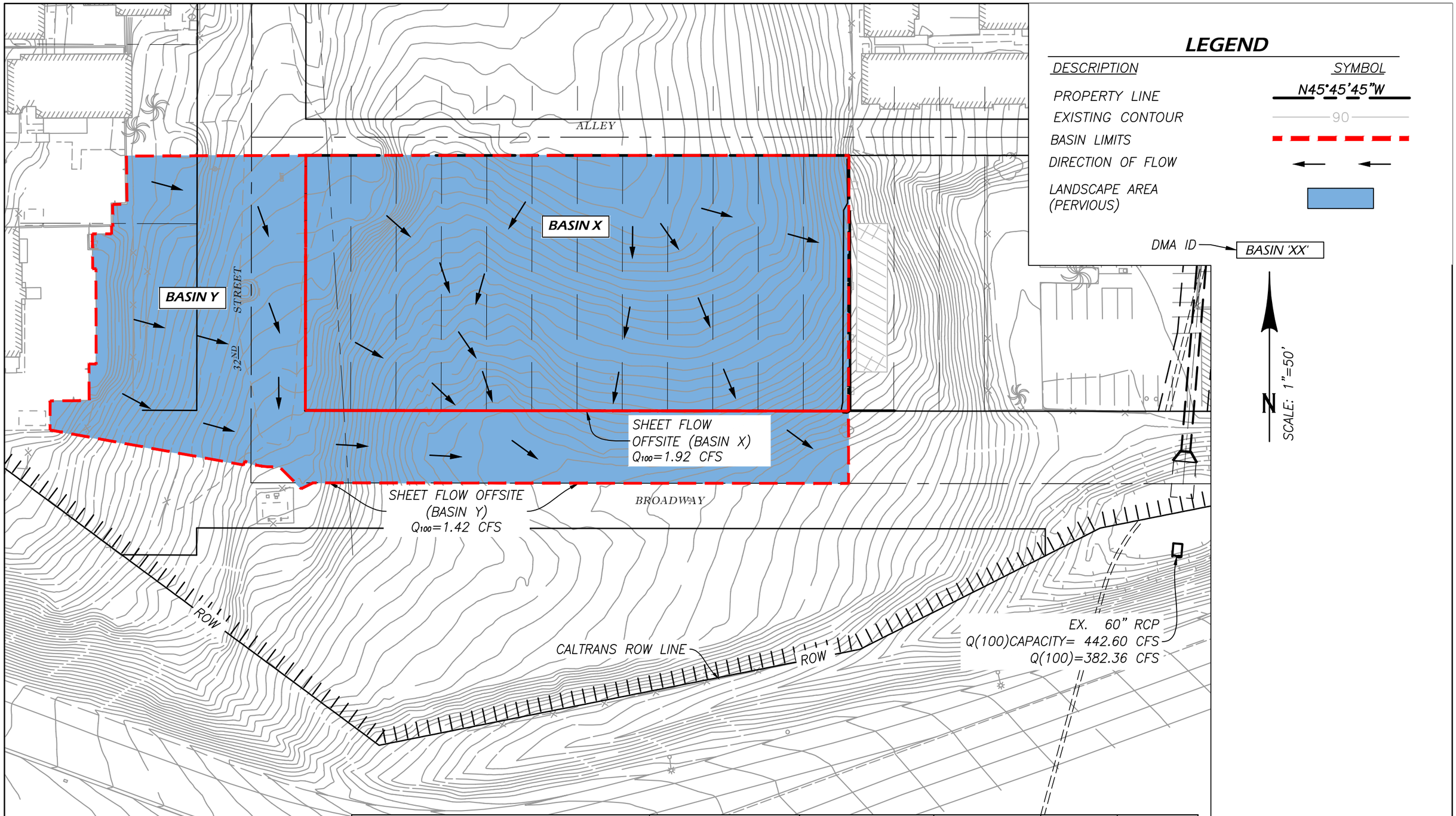
7. **Declaration of Responsible Charge**

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

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

Michael C. Kinnear Date
RCE 76785
Exp. 12-31-20

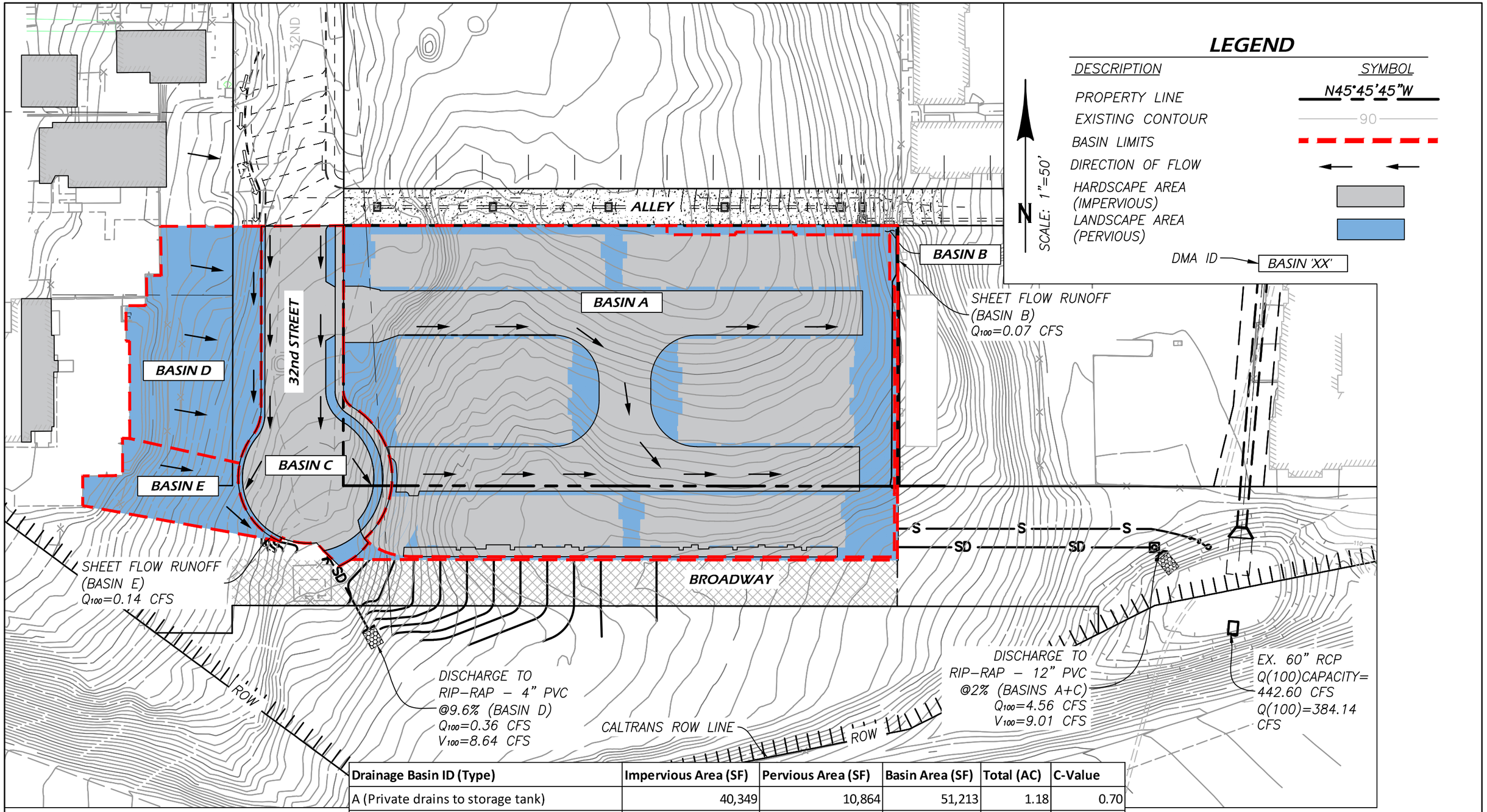
Appendix A –Drainage Map



Drainage Basin ID (Type)	Impervious Area (SF)	Pervious Area (SF)	Basin Area (SF)	Total (AC)	C-Value
X (Sheet Flows to Hillside)	0	42,322	42,322	0.97	0.45
Y (Sheet Flows to Hillside)	0	31,278	31,278	0.72	0.45
Total	**0**	**73,600**	**73,600**	**1.69**	

COFFEY ENGINEERING, INC.

DRAINAGE MAP A
EXISTING CONDITIONS
32ND AND BROADWAY



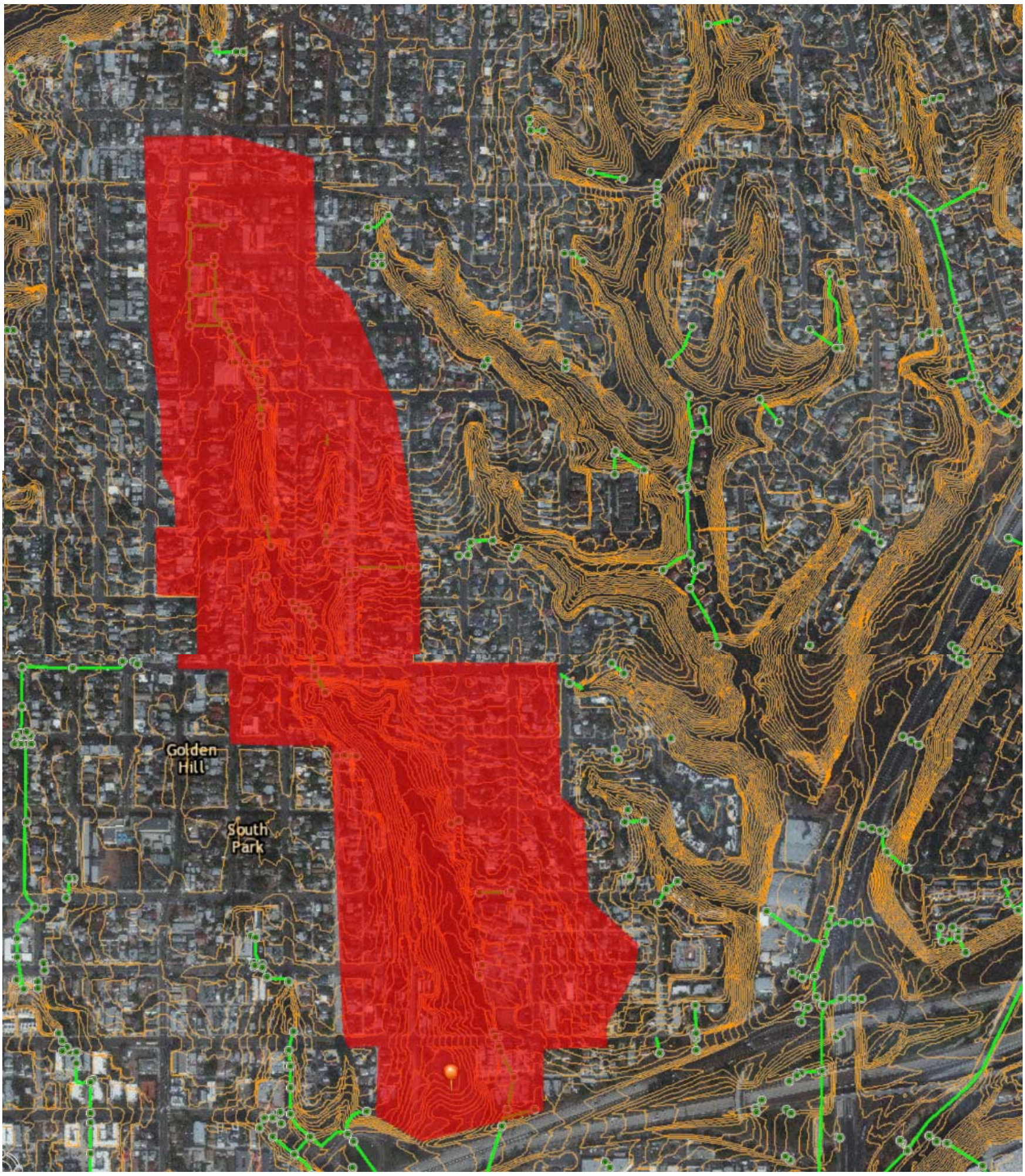
Drainage Basin ID (Type)	Impervious Area (SF)	Pervious Area (SF)	Basin Area (SF)	Total (AC)	C-Value
A (Private drains to storage tank)	40,349	10,864	51,213	1.18	0.70
B (Sheet flow to easterly hillside)	0	1,525	1,525	0.04	0.45
C (Storm drain at street to storage tank)	8,525	1,262	9,787	0.22	0.95
D (Run-on to southerly hillside rip-rap)	0	8,027	8,027	0.18	0.45
E (Run-on diverted to southerly hillside)	0	3,048	3,048	0.07	0.45
Total	**48,874**	**24,726**	**73,600**	**1.69**	

COFFEY ENGINEERING, INC.

DRAINAGE MAP B
PROPOSED CONDITIONS-SWQMP
32ND AND BROADWAY

DRAINAGE MAP 'C'

32ND AND BROADWAY - TRIBUTARY AREA



Q=CIA = 382.36 CFS

C = 0.55 (TRIBUTARY AREA IS SINGLE-FAMILY OR UNDEVELOPED)

I = 4.4 IN/HR

TRIBUTARY AREA (A) = 158 ACRES

Appendix B –Calculation/Evaluations

100 Year Storm

Table A - Pre Construction Flow Conditions

		Summary				Hydraulics of Existing Structures	
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T_c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	**Q (cfs)**	Flow ID (Basin)	Flow Description
X	0.45	5.00	4.40	0.97	**1.92**	X	Sheet flow to hillside
Y	0.45	5.00	4.40	0.72	**1.42**	Y	Sheet flow to hillside
				Sum =	**3.35**		

Table B - Post Construction Flow Conditions

		Summary				Hydraulics of Proposed Structures	
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T_c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	**Q (cfs)**	Flow ID (Basin)	Flow Description
A	0.70	5.00	4.40	1.18	**3.62**	A	A (Private drains to storage tank)
B	0.45	5.00	4.40	0.04	**0.07**	B	B (Sheet flow to easterly hillside)
C	0.95	5.00	4.40	0.22	**0.94**	C	C (Storm drain at street to storage tank)
D	0.45	5.00	4.40	0.18	**0.36**	D	D (Run-on to southerly hillside rip-rap)
E	0.45	5.00	4.40	0.07	**0.14**	E	E (Run-on diverted to southerly hillside)
				Sum =	**5.13**		

Runoff Coefficients					
Pre-Construction Conditions					
Drainage Basin ID (Type)	**Impervious Area (SF)**	**Pervious Area (SF)**	**Basin Area (SF)**	**Total (AC)**	**C-Value**
X (Sheet Flows to Hillside)	0	42,322	42,322	0.97	0.45
Y (Sheet Flows to Hillside)	0	31,278	31,278	0.72	0.45
Total	**0**	**73,600**	**73,600**	**1.69**	
Post-Construction Conditions					
Drainage Basin ID (Type)	**Impervious Area (SF)**	**Pervious Area (SF)**	**Basin Area (SF)**	**Total (AC)**	**C-Value**
A (Private drains to storage tank)	40,349	10,864	51,213	1.18	0.70
B (Sheet flow to easterly hillside)	0	1,525	1,525	0.04	0.45
C (Storm drain at street to storage tank)	8,525	1,262	9,787	0.22	0.95
D (Run-on to southerly hillside rip-rap)	0	8,027	8,027	0.18	0.45
E (Run-on diverted to southerly hillside)	0	3,048	3,048	0.07	0.45
Total	**48,874**	**24,726**	**73,600**	**1.69**	

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C)
	Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[1] Type D soil to be used for all areas.
[2] Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%
Tabulated imperviousness = 80%
Revised C = (50/80) x 0.85 = 0.53

Pipe Flow Calculations

12” PVC @ 2% Discharging to Rip-Rap (Basins A+C)

```
                        PIPE FLOW PROGRAM              DATE: 04-12-2019
                                                       TIME: 20:13:59

(1)  Diameter (inches) ...  12.          (2)  Mannings n .......      .010
(3)  slope (ft/ft) .......   .0200       (4)  Q (cfs) ..........     4.56
(5)  depth (ft) ..........  0.61         (6)  depth/Diameter ...     0.61
     Velocity (fps) ......  9.01              Velocity Head ....     1.26
     Area (Sq. Ft.) ......  0.51
     Critical Depth ......  0.89              Critical Slope ...     0.0086
     Critical Velocity ...  6.17              Froude Number ....     2.20
```

4” PVC @ 9.6% Discharging to Rip-Rap (Basin D)

```
                        PIPE FLOW PROGRAM              DATE: 09-06-2019
                                                       TIME: 13:02:17

(1)  Diameter (inches) ...  4.           (2)  Mannings n .......      .010
(3)  slope (ft/ft) .......   .0960       (4)  Q (cfs) ..........     0.36
(5)  depth (ft) ..........  0.16         (6)  depth/Diameter ...     0.48
     Velocity (fps) ......  8.64              Velocity Head ....     1.16
     Area (Sq. Ft.) ......  0.04
     Critical Depth ......  0.31              Critical Slope ...     0.0183
     Critical Velocity ...  4.22              Froude Number ....     4.31
```

Capacity of 60” PVC @ 2.89% Under I-94

```
                        PIPE FLOW PROGRAM              DATE: 09-10-2019
                                                       TIME: 13:29:01

(1)  Diameter (inches) ...  60.          (2)  Mannings n .......      .013
(3)  slope (ft/ft) .......   .0289       (4)  Q (cfs) ..........   442.60
(5)  depth (ft) ..........  5.00         (6)  depth/Diameter ...     1.00
     Velocity (fps) ......  22.54             Velocity Head ....     7.89
     Area (Sq. Ft.) ......  19.63
     Critical Depth ......  4.92              Critical Slope ...     0.0261
     Critical Velocity ...  22.61             Froude Number ....      N/A
```

Flows from site (Pre-construction) to 60” PVC @ 2.89% Under I-94

```
                        PIPE FLOW PROGRAM              DATE: 09-10-2019
                                                       TIME: 13:31:55

(1)  Diameter (inches) ...  60.          (2)  Mannings n .......      .013
(3)  slope (ft/ft) .......    .0289      (4)  Q (cfs) ..........     3.35
(5)  depth (ft) ..........   0.31        (6)  depth/Diameter ...     0.06
     Velocity (fps) ......   6.65             Velocity Head ....     0.69
     Area (Sq. Ft.) ......   0.50
     Critical Depth ......   0.50             Critical Slope ...     0.0039
     Critical Velocity ...   3.30             Froude Number ....     2.56
```

Flows from site (Post-construction) to 60” PVC @ 2.89% Under I-94

```
                        PIPE FLOW PROGRAM              DATE: 09-10-2019
                                                       TIME: 13:32:56

(1)  Diameter (inches) ...  60.          (2)  Mannings n .......      .013
(3)  slope (ft/ft) .......    .0289      (4)  Q (cfs) ..........     5.13
(5)  depth (ft) ..........   0.38        (6)  depth/Diameter ...     0.08
     Velocity (fps) ......   7.56             Velocity Head ....     0.89
     Area (Sq. Ft.) ......   0.68
     Critical Depth ......   0.62             Critical Slope ...     0.0037
     Critical Velocity ...   3.69             Froude Number ....     2.63
```

Appendix C –Reference Tables & Figures (City of San Diego Drainage Manual 2017)

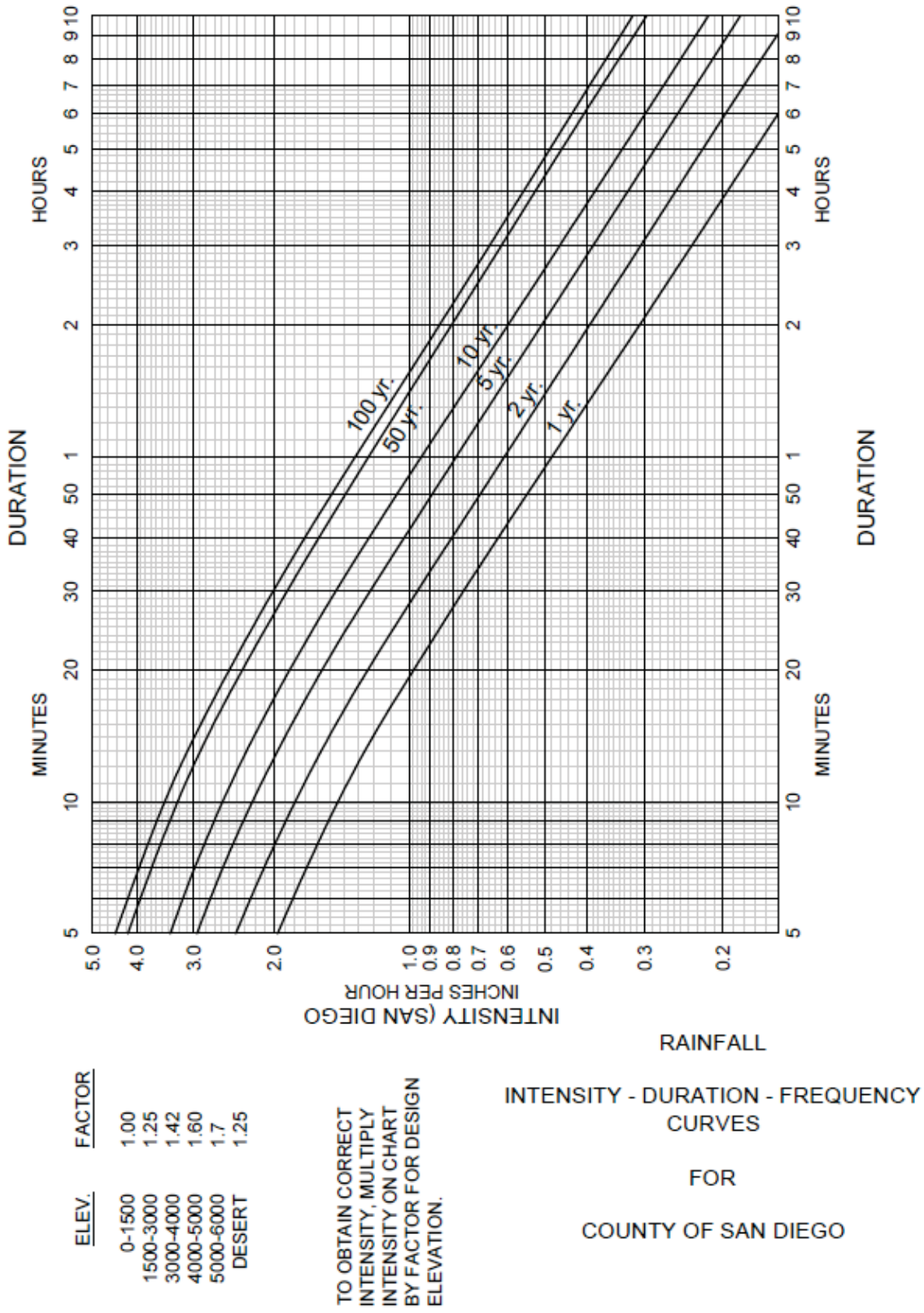
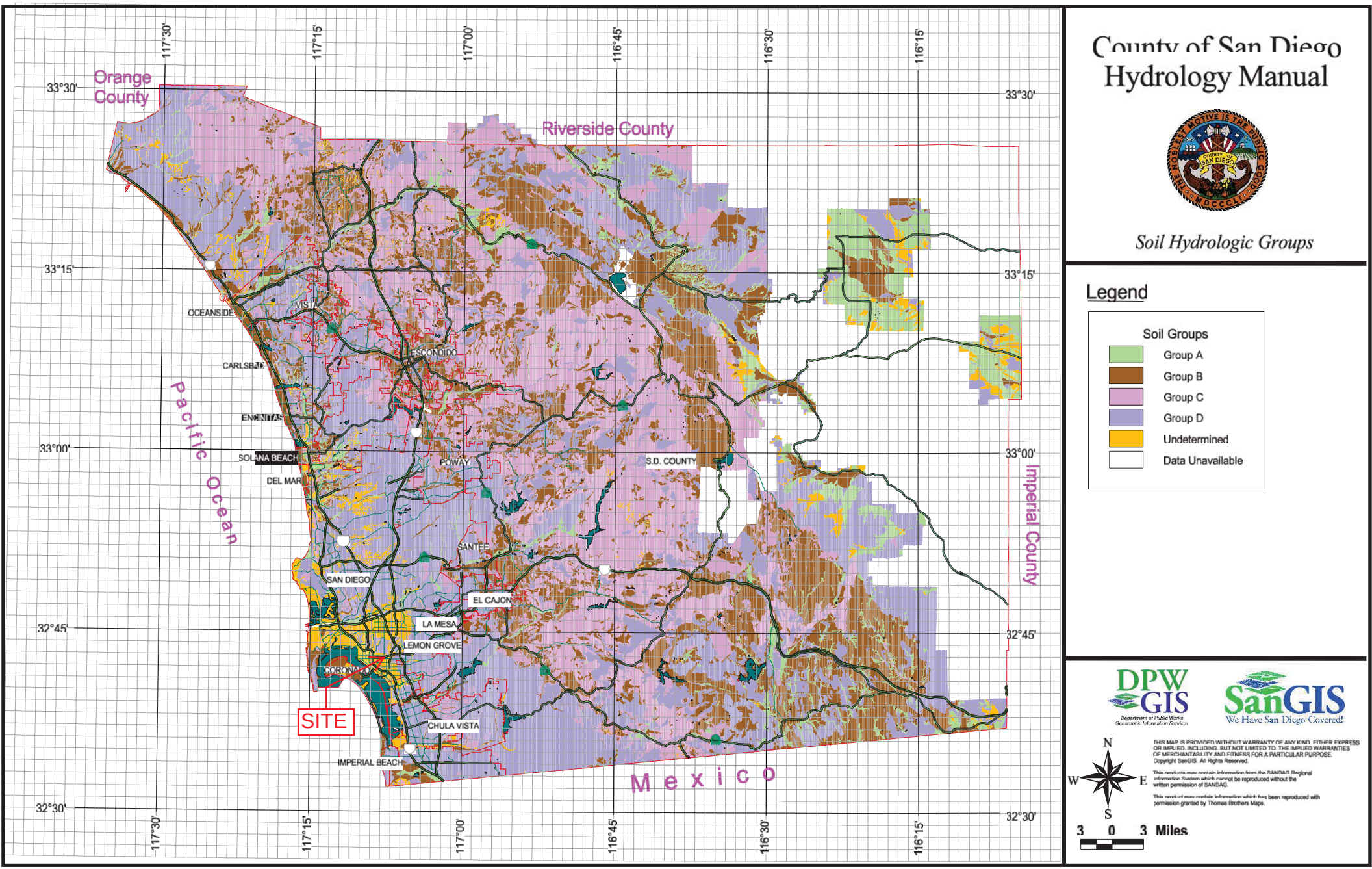


Figure A-1. Intensity-Duration-Frequency Design Chart



County of San Diego Hydrology Manual

Soil Hydrologic Groups

Legend

Soil Groups

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

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
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Attachment 6
Geotechnical and Groundwater Investigation Report

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

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PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED 28 ROW HOMES
NORTHEAST CORNER OF 32ND STREET AND BROADWAY (PROPOSED)
SAN DIEGO, CALIFORNIA

PREPARED FOR:

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CTE JOB NO. 10-8520G

AUGUST 29, 2006

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EXECUTIVE SUMMARY

Our investigation was performed to provide site-specific geotechnical information for the proposed 28 row homes on the northeast corner of 32nd Street and the proposed extension of Broadway in San Diego, California. It is our understanding that the proposed development will consist of the construction of 28 row homes, and associated utilities, parking/drive, and landscaping improvements.

From our investigation and review of previous reports (Pacific Soils Engineering, Inc., 2003) soils at the site consist of minor topsoils/alluvium and variable Undocumented Fills, underlain by units of the Quaternary Lindavista Formation (Qln) and the Tertiary San Diego Sandstone/Conglomerate (Tsd). The Undocumented Fill varied across the site due to small (truck-load size) piles of construction site waste that has been dumped on top of the, probably locally derived, sandy fill that was placed in association with the construction of SR 94 (2003). Generally, the Undocumented Fill is a silty to clayey sand with gravel and cobbles. Both units found to underlay the fill are clayey sands with pebble- to gravel-size inclusions. However, it is anticipated that standard excavation equipment can be used to excavate these units.

Groundwater was not encountered in any of the excavated test pits. Although perched groundwater levels may develop and fluctuate during periods of precipitation, groundwater is not expected to affect the proposed development if proper site drainage is maintained and subdrains are installed during rough grading, as recommended herein.

With respect to geologic and seismic hazards, the site is considered as safe as any within San Diego County (an area of high seismic risk). In general, the results of our review indicate that the proposed project can be constructed as planned, provided the recommendations presented in this report are followed.

1.0 INTRODUCTION AND SCOPE OF SERVICES

1.1 Introduction

This report presents the results of Construction Testing and Engineering, Inc.'s ("CTE") preliminary soil investigation and provides conclusions and geotechnical engineering criteria for the proposed improvements at the referenced site. The investigation for this report included reference review, field exploration, laboratory testing, geologic hazard evaluation and engineering analysis. Appendix A contains a list of references used in the preparation of this report.

1.2 Scope of Services

The scope of services provided included:

- Review of readily available geologic and soils reports pertinent to the site and adjacent areas. Sources referenced in Appendix A.
- Exploration of subsurface conditions to the depths influenced by the proposed construction.
- Laboratory testing of representative soil samples to provide data to evaluate the geotechnical design characteristics of the soils.
- Definition of the general geology at the site.
- Soil engineering design criteria for the proposed improvements.
- Preparation of this summary report of the investigations performed including geotechnical design and construction recommendations.

2.0 SITE DESCRIPTION AND BACKGROUND

2.1 Site Location and Description

The site is comprised of rectangular-shaped parcels (APN: 539-563-07 & -10) that are currently undeveloped and located south of C Street and east of 32nd Street. The approximate location of the site is shown on Figure 1. The northern part of these parcels is relatively flat, as Undocumented Fill was placed and roughly graded over 60 years ago (Pacific Soils Engineering, Inc., 2003). To the south, the property becomes increasingly rich with topography, with two main slope faces that together create a south-flowing natural drainage channel through the middle of the southern portion of the property. Land use in the surrounding area is predominantly residential and commercial, with multi-family residential units immediately adjacent to the east. The development proposes the construction of 28 row homes and associated improvements. The approximate locations of the proposed improvements at the site are shown on Figure 2.

2.2 Previous Site Work

Pacific Soils Engineering, Inc. was hired to conduct a geotechnical feasibility report on the subject property in 2003. Their findings relative to the Undocumented Fill (referred to as "Artificial Fill") are consistent with our observations with regard to location and soil description. Their research found that the most recent work to the site was generally conducted in association with the construction of SR 94. Unfortunately, the site has also had a history of being used as a surface dump site, mostly for construction site waste (i.e., waste soil, landscape debris, etc.). No drums or

potentially hazardous material were observed. However, evaluation for hazardous materials was beyond our agreed scope of services. If such unforeseen material is encountered during site preparation, CTE can recommend the appropriate actions with regard to testing and/or removal.

3.0 FIELD AND LABORATORY INVESTIGATIONS

3.1 Field Investigation

Field exploration, conducted on July 25, 2006 included site reconnaissance and the excavation of five exploratory test pits to assess the condition of the subsurface soil materials across the site. Test pits were excavated using a conventional rubber-tired backhoe to the maximum explored depth of approximately 9.0 feet below grade (fbg). Soils were logged in the field by a Geologist and visually classified using the Unified Soil Classification System. The field descriptions have been modified, where appropriate, to reflect laboratory test results. Boring logs including descriptions of the soil, field-testing data, and supplementary laboratory data are included in Appendix B. Approximate test pit locations are shown on Figure 2.

Bulk soil samples were collected from the test pits for geotechnical laboratory analysis. Samples collected in this manner were placed in sealed plastic bags and transported to the CTE geotechnical laboratory for analysis.

3.2 Laboratory Investigation

Laboratory tests were conducted on representative soil samples for classification purposes and to evaluate physical properties and engineering characteristics. Tests conducted on select soil samples include: particle-size analysis, maximum dry density and optimum moisture content (Modified Proctor analysis), chemical analysis, Gradation/Sieve Analysis, R-value and expansion index. Test method descriptions and laboratory results are included in Appendix C.

4.0 GEOLOGY

4.1 General Setting

San Diego is located within the Peninsular Ranges physiographic province that is characterized by its northwest-trending mountain ranges, intervening valleys, and predominantly northwest trending active regional faults. The San Diego Region can be further subdivided into the coastal plain area, a central mountain–valley area and the eastern mountain valley area. The project site lies within the coastal plain area of low relief that slopes gently toward San Diego Bay.

The coastal plain is characterized by geomorphic landforms known as marine terraces, which are erosion surfaces or abrasion platforms cut by ocean –wave processes along past coastlines. These surfaces are recognized today as the relatively flat-lying mesas and terraces that range in elevation across the coastal plain of San Diego. The elevation differences of these marine terraces are the result of sea level changes that are associated with glacial retreat and advance throughout the Pleistocene, and uplift associated with activity on the Rose Canyon Fault Zone over the past two million years.

The mesas or terraces have been incised by westward flowing drainages that have adjusted to the relative sea level changes in elevation. The combined effect of these processes is that older marine terraces are found at progressively higher elevations. Several distinct marine terraces present in the San Diego area include the Linda Vista Mesa (cut approximately 1.3 million years ago), the Nestor Terrace (cut approximately 120,000 years ago), and the Bird Rock Terrace (cut approximately 80,000 years ago). The marine terraces are typically covered with marine sediments covered with non-marine terrestrial deposits.

4.2 Geologic Conditions

Based on mapping by Kennedy and Tan (1975), the underlying site materials consist of units of the Quaternary Alluvium (Qal), Quaternary Lindavista Formation (Qln), as well as Tertiary San Diego Formation (Tsd). Our investigations found that surface and near surface soils at the site consist of Undocumented Fills and alluvium underlain by the Quaternary Lindavista and Tertiary San Diego formations, respectively.

4.2.1 Undocumented Fill

Undocumented Fill (Mapped in Figure 2 as Quaternary Artificial Fill (Qaf)) material was encountered at the surface of all of our test pits. This material was found to be ranging in thickness from two to nine feet. Undocumented Fill materials consisted generally of hard, dry to moist, mottled orange/brown, silty to clayey, fine- to coarse-grained SAND (SM-SC) with gravels, cobbles, construction site debris, infiltration of roots, and seams of dark brown clay. For the purposes of this report, any natural topsoil that has formed on the top of the Undocumented Fill is being called Undocumented Fill, as well. Topsoil is a loose, reddish

brown, silty fine SAND (SM) with gravel and cobbles. These soils will need to be overexcavated to a depth of competent native materials. However, they are suitable for reuse as engineered fill if screened of significant organics and cobbles larger than 3", properly moisture conditioned, and compacted as recommended herein.

4.2.2 Quaternary Alluvium (Qal)

Alluvium was found in the natural south draining channel. It consists of dense to very dense, dry to slightly moist, mottled gray, orange, red, brown, clayey, fine to coarse SAND (SC) with gravels and grain size increasing with depth.

4.2.3 Quaternary Lindavista Formation (Qln)

Units of the Lindavista Formation were found in two of the test pits, both at topographic highs, in the proposed building area. Formational materials were observed to a maximum explored depth of approximately 10 fbg and are anticipated to underlie the remainder of the site below to the contact with the Tertiary San Diego Formation (Tsd). The observed Lindavista deposits consists of massive, dense, dry to slightly moist, mottled orange to red-brown, clayey to silty, fine- to coarse-grained SAND (SC-SM) with pebbles and gravels. Grain size of sand tends to increase with depth. These deposits were underlain by a thin seam of stiff clay at the contact with the Tsd. These soils are considered suitable for support of the proposed improvements if prepared according to our recommendations.

4.2.4 Tertiary San Diego Sandstone/Conglomerate (Tsd)

Two distinct units of the Tertiary San Diego Formation have been recognized at the site. These units consist of an interlayered sequence of sandstone and conglomerates. For the

purpose of this report we have combined the sandstone and conglomerate as one map unit (Tsd) due to the interbedded/interfingered nature. This formation is very dense, dry to moist, mottled orange to red-brown, fine- to coarse-grained SAND (SC-SM) with dark clay filling small fractures and lenses of sand to clayey sand. Interbedded conglomerate layers tend to be less than half of a foot in thickness with pebbles and gravels; clasts tending to be siliceous and volcanoclastic. Roots are dense through these layers. These soils are considered suitable for support of the proposed improvements if prepared according to our recommendations.

4.3 Groundwater Conditions

Groundwater was not encountered in any of our test pits explored to a maximum depth of 10 fbg. Perched groundwater levels will likely fluctuate during periods of precipitation but are not expected to affect the proposed development if recommendations regarding drainage are carried out during project design and construction. Nevertheless, the installation of a typical subdrain is recommended during rough grading. The approximate location of the subdrain shall be shown on the grading plans, as shown on figure 2 herein. The subdrain shall be sized and detailed in general accordance with appendix D. However, the actual subdrain shall be field determined, surveyed, and added to the as-built grading plan during construction.

4.4 Geologic Hazards

4.4.1 General Geologic Hazards Observation

The site is located within the City of San Diego Seismic Safety Study Geologic Hazards and Faults Category 52. Areas designated as Category 52 are considered to have favorable geologic structure and to be of low geologic risk. From our investigation it appears that geologic hazards at the site are primarily limited to those caused by violent shaking from earthquake generated ground motion waves and expansive soils. The geologic hazards considered in our evaluation are discussed below.

4.4.2 Local and Regional Faulting

Based on our site reconnaissance, evidence from exploratory borings, and a review of appropriate geologic literature, it is our opinion that the site is not underlain or transected by active faults. The Rose Canyon Fault Zone is the closest zoned active fault (Trieman 1993) and is located approximately five km northwest of the site. Other principal active regional faults include the Coronado Banks, San Clemente, Elsinore, San Jacinto, and San Andreas faults. According to the California Division of Mines and Geology, a fault is zoned active if it displays evidence of activity in the last 11,000 years (Hart and Bryant, revised 1997). In addition, the Texas Street fault is approximately 0.75 km west of the site. This fault has long been considered to be potentially active, and therefore has not been included as a state designated Alquist-Priolo Earthquake Zone. However, recent studies indicate that portions of the Texas Street fault may be active. Given its distance from the site, however, the potential for surface rupture damage from displacement or fault movement from the Texas Street fault and other well-documented active faults mentioned should be considered low.

4.4.3 Liquefaction Evaluation

Liquefaction occurs when saturated fine-grained sands or silts lose their physical strengths during earthquake induced shaking and behave as a liquid. This is due to loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with water level, soil type, material gradation, relative density, and probable intensity and duration of ground shaking.

It is our opinion that the liquefaction potential in all areas of the project is negligible. This is based on the lack of a permanent shallow groundwater table and the very dense condition of underlying site soils. Furthermore the site is not mapped within a geologic hazard zone, as defined by the City of San Diego, for liquefaction potential.

4.4.4 Seismic Settlement Evaluation

Seismic settlement occurs when loose to medium dense granular soils densify during seismic events. The underlying site soils consist of materials that are generally dense to very dense at depth. Remedial grading as recommended herein will mitigate loose undocumented fill soils prior to construction of the proposed improvements. Therefore, based on the planned construction and recommended earthwork, we expect that the potential for significant damage due to seismic induced settlement should be considered negligible.

4.4.5 Tsunamis and Seiche Evaluation

Based on the considerable distance from the ocean and the elevation of the site (approximately 150 feet above msl), potential for tsunami damage is very low. Damage caused by oscillatory waves (seiche) is also considered unlikely, also based on the site's

relative distance to a significant body of water.

4.4.6 Landsliding

Active landslides or rocksliding were not encountered and have not been mapped in the immediate area. The site is mapped as generally susceptible. However, based on the site topography and the presence of very dense underlying units of the Quaternary Lindavista Formation and Tertiary San Diego Formation, the site is generally considered to be resistant to landsliding. All proposed grading will be performed as recommended herein. Therefore, the potential for landsliding to affect the site is considered negligible.

4.4.7 Compressible and Expansive Soils

Based on our geologic observations, the underlying formational soil materials exhibit low compressibility and expansion potential. The Undocumented Fill will require overexcavation and proper recompaction due to the expansion characteristics of local clay layers and general compressibility. Within the fills the clay layers have a medium to very high expansion potential (EI = 46 to 130). The formational soil materials are considered suitable for support of the proposed improvements provided our recommendations for preparations are implemented during project design and construction. Undocumented Fill soils will be completely overexcavated and, if reconditioned and blended as recommended herein, may be placed as recompacted fill during site grading. Proper blending and recompacting of clay materials is anticipated to produce finish grade soils that have a low to medium expansion potential. As an alternative, expansive clay soils may be recompacted wet of optimum and at depths greater than four feet below proposed grades.

4.4.8 Potentially Corrosive Soils

Based on laboratory testing of soils at the subject site, it appears that materials on-site possess low soil corrosivity potential for Portland cement concrete. It appears that materials may have a moderate potential to corrode buried ferrous metals due to their electrical resistivity.

CTE does not practice corrosion engineering; therefore, a qualified corrosion specialist may be consulted to provide additional recommendations for protection, if deemed necessary. A summary of the laboratory chemical testing is presented in Appendix C

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

We conclude that the proposed improvements are feasible from a geotechnical standpoint, provided the recommendations in this report are incorporated into the design and construction of the project. Recommendations for the design and construction of the proposed improvements are included below. However, these recommendations may require modifications based on the conditions encountered during construction.

5.2 Grading and Earthwork

Upon commencement of construction, personnel from CTE should continuously observe the grading and earthwork operations for this project. Such observations are essential to identify field conditions that differ from those predicted by this investigation, to adjust designs to actual field conditions, and to ensure that the grading is in overall accordance with the recommendations of this report. Our

personnel should perform adequate observation and sufficient testing of fills during grading to support the Geotechnical Consultant's professional opinion regarding compliance with compaction requirements and specifications contained herein.

5.3 Site Preparation

Prior to grading, the site should be cleared of any remaining debris and other deleterious materials. Unsuitable debris from stockpiled site materials shall be removed from the site. Topsoils, surficial eroded, desiccated, burrowed, or otherwise disturbed soils should be removed to the depth of competent native materials and a minimum 24 inches below proposed improvements, including footings, in order to mitigate potentially expansive soils. If areas of deep fill differentials are created beneath a single structure, the shallow fill area shall be overexcavated to a minimum depth of one third the thickness of the deep fill area beneath the same structure.

Overexcavation and recompaction should extend a minimum of five feet laterally beyond the proposed building limits, where feasible. Organic or degradable materials not suitable for structural backfill should be disposed of off-site. Removals to a minimum 24 inches below foundations is anticipated to be adequate in most areas. However, due to Undocumented Fills present along the north limits of the site, these removals are anticipated to extend on the order of 10 feet below existing grades. Other areas of Undocumented Fills may also require deeper overexcavations.

Upon these removals, subgrades should be scarified, moisture conditioned, and recompacted as recommended herein. The geotechnical consultant should verify that remedial excavations have

been satisfactorily accomplished. Based on our recommendations we anticipate all footings will bear upon a minimum 24 inches of engineered fill.

We anticipate that the off-site grading will be required and performed along the northern property line in the alley area. This off-site grading will be required in order to accomplish the recommended structure overexcavations. If off-site is not feasible, temporary construction shoring may be an option.

5.4 Excavations

Based on our observations, removal and recompaction of the overlying disturbed, non-competent, Undocumented Fill materials to the depth of competent, formational materials will be required prior to the placement of additional fill or improvements. Excavations in site materials are considered feasible with standard heavy-duty construction equipment under normal conditions. If encountered during excavation, irreducible materials greater than three inches in diameter should not be used in shallow fills on the site. However, such materials may be place at depth as per the recommendations in Appendix D and as directed by CTE during construction. The geotechnical consultant should evaluate the exposed subgrade to verify that mitigative measures (removal of inadequate soils) have been properly implemented.

5.5 Fill Placement and Compaction

The geotechnical consultant should verify that the proper site preparation has occurred before fill placement begins. Following recommended removal of loose, disturbed, or organic containing soils, areas to receive fills should be scarified, moisture conditioned as recommended, and properly

recompacted. Fill and backfill should be compacted to a minimum relative compaction of 90 percent as evaluated by ASTM D1557 at moisture contents a minimum two percent above optimum. The optimum lift thickness for backfill soil will depend on the type of compaction equipment used. Generally, backfill should be placed in uniform lifts not exceeding eight inches in loose thickness. Backfill placement and compaction should be done in overall conformance with geotechnical recommendations and local ordinances.

5.6 Fill Materials

Low-to-medium expansion potential soils derived from the onsite materials are generally considered suitable for reuse on the site as compacted fill. If used, these materials should be screened of significant organic materials and materials greater than three inches in diameter. Adverse effects of moderately to highly expansive clay soils, such as within the Undocumented Fill materials, should be mitigated by blending these soils with granular materials and compacting at moisture contents above optimum, or by placing all highly expansive clays at a minimum depth of four feet below proposed grades.

Imported fill placed beneath structures, pavements and walks should have an expansion index less than or equal to 30 (per UBC 18-I-B). Additionally, less than 35 percent of this fill should pass a No. 200 sieve. Imported fill soils for use in structural or slope areas should be evaluated by the soils engineer to determine strength characteristics before placement on the site.

5.7 Temporary Construction Slopes

Sloping recommendations for unshored temporary excavations are provided. The recommended slopes should be relatively stable against deep-seated failure, but may experience localized sloughing. Onsite soils are considered Type B and C soils with recommended slope ratios as set forth in Table 1.

TABLE 1
RECOMMENDED TEMPORARY SLOPE RATIOS

SOILS TYPE	SLOPE RATIO (Horizontal: vertical)	MAXIMUM HEIGHT
B (Quaternary Lindavista Fm and Tertiary San Diego Fm)	1 :1 (MAXIMUM)	10 Feet
C (Undocumented/Disturbed Soils)	1.5 :1 (MAXIMUM)	5 Feet

Actual field conditions and soil type designations must be verified by a "competent person" while excavations exist according to Cal-OSHA regulations. Also, the above sloping recommendations do not allow for surcharge loading at the top of slopes by vehicular traffic, equipment or materials. Appropriate surcharge setbacks must be maintained from the top of all unshored slopes.

We do not anticipate temporary construction shoring will be necessary for this project. However, should shoring become necessary, CTE will provide additional design and construction recommendations, upon request.

5.8 Foundations and Slab Recommendations

The following recommendations are for preliminary planning purposes only. These foundation recommendations should be reviewed after completion of earthwork and testing of surface soils. These recommendations assume subgrade soils in the upper four feet have expansion indexes less than 50.

5.8.1 Foundations

Continuous and isolated spread footings are suitable for use at this site; however, footings should not straddle cut/fill interfaces. We anticipate all footings will be founded upon a minimum 24-inch thick blanket of properly engineered fill. Therefore, transitional conditions (changes from cut to fill) are not anticipated.

Foundation dimensions and reinforcement should be based on allowable bearing values of 2,500 pounds per square foot (psf) for footings founded entirely in competent engineered fill materials. Footings should be embedded at least 24 inches below the lowest adjacent subgrade elevation. The allowable bearing value may be increased by one third for short duration loading which includes the effects of wind or seismic forces.

For continuous and isolated spread footings, the minimum width should be at least 12, 15, and 18 inches, for one-, two-, and three-story structures, respectively. Footing reinforcement for continuous footings should consist at a minimum of four #4 reinforcing bars; two placed near the top and two placed near the bottom. The structural engineer should design isolated footing reinforcement.

Due to the anticipated low to moderately expansive site materials, all foundation and slab-on-grade areas shall be confirmed at a minimum 120% of the optimum moisture content just prior to concrete placement.

5.8.2 Foundation Settlement

In general, for the anticipated construction, the maximum total post-construction static settlement is expected to be less than 1.2 inch. Maximum differential settlement of continuous footings across the buildings is expected to be less than 0.6 inch. The potential for foundation settlement may be analyzed once actual foundation loads and as-graded conditions are known. As previously stated, due to the absence of shallow ground water and the generally dense to very dense nature of underlying formational materials, dynamic settlement is not expected to adversely effect the proposed improvements.

5.8.3 Foundation Setback

Footings for structures should be designed such that the horizontal distance from the face of adjacent slopes to the outer edge of the footing is a minimum of 10 feet. If these setbacks cannot be maintained, the footings should be deepened until a minimum of 10 feet horizontal distance is achieved between the face of slope and the bottom outer edge of the footing. Structure footings shall also be deepened (as necessary) to bear entirely below an imaginary 1:1 plane extended up off of the base of any adjacent standard retaining walls.

5.8.4 Interior Concrete Slabs

Lightly loaded concrete slabs should be designed for the anticipated loading, but be a minimum of 4.5 inches thick. Minimum slab reinforcement should consist of either # 3 rebar on 18-inch centers, or #4 rebar placed on 24-inch centers, each way at mid-slab height. If elastic slab design is utilized, a modulus of subgrade reaction of 160 pounds per cubic inch is appropriate for properly recompacted fill materials.

A vapor barrier of minimum ten-mil visqueen overlying a maximum two-inch layer of aggregate base material (SE greater than 30) shall be installed beneath moisture sensitive slab areas. At a maximum, a two-inch layer of similar material may be placed above the visqueen to protect the membrane during steel and concrete placement. Slab areas subject to heavy loads or vehicular traffic may require increased thickness and reinforcement. This office should be contacted to provide additional recommendations.

5.9 Lateral Resistance and Earth Pressures

The following recommendations may be used for shallow footings on the site. Foundations placed in properly engineered fill materials may be designed using a coefficient of friction of 0.30 (total frictional resistance equals the coefficient of friction times the dead load). A design passive resistance value of 250 pounds per square foot per foot of depth (with a maximum value of 1250 pounds per square foot) may be used. The allowable lateral resistance can be taken as the sum of the frictional resistance and the passive resistance, provided the passive resistance does not exceed two-thirds of the total allowable resistance.

If proposed, for the design of walls below grade, where the surface of the backfill is level, it may be assumed that the soils will exert a lateral pressure equal to that developed by a fluid with a density of 38 pcf. The active pressure should be used for walls free to yield at the top at least 0.2 percent of the wall height. For walls restrained so that such movement is not permitted, an equivalent fluid pressure of 58 pcf should be used, based on at-rest soil conditions. The recommended equivalent fluid pressures should be increased by 30 pcf for walls retaining soils inclined at 2:1 (horizontal: vertical). Walls below the water level are not anticipated for the subject site and the recommended pressures do not account for any surcharging resulting from adjacent loads.

Walls below grade should be constructed with appropriate perforated pipe and gravel drains. Consideration should be given to waterproofing of any walls below grade to reduce moisture infiltration. We recommend that all walls be backfilled with soil having an expansion index of 20 or less. The backfill area should include the zone defined by a 1:1 sloping plane, extended back from the base of the wall. Retaining wall backfill should be compacted to between 90 and 93 percent relative compaction, based on ASTM D1557-91, at above optimum moisture contents. Backfill should not be placed until walls have achieved adequate structural strength. Heavy compaction equipment, which could cause distress to walls, should not be used.

5.10 Seismic Loading Parameters

In accordance with the 2001 California Building Code Volume 2, the site is located within Seismic Zone 4 and therefore has a zone factor Z = 0.40. The closest known active fault, The Rose Canyon Fault is considered to be a Class B seismic source and is located approximately 5.0 kilometers from

the site. Based on the distance from the Rose Canyon Fault, near source factors of $N_v = 1.2$ and $N_a = 1.0$ are appropriate. Based on our field investigation and geologic reference review, the site subsurface soils have a soil profile type of S_C, and seismic coefficients of $C_V = 0.67$ and $C_a = 0.40$.

5.11 Asphalt Pavement Areas

Recommended pavement sections for driveways and parking areas are presented. Pavement sections presented below are based on the conditions observed during our investigations, the traffic indices indicated, an assumed resistance "R"- Value of materials at the site, and the assumption that the upper 12 inches of subgrade materials and all base materials are compacted to 95% relative compaction. Recommendations for full depth concrete pavements are also included. Sampling and testing of finish subgrade areas shall be performed after grading and the proposed pavement sections modified, as necessary.

TABLE 2
RECOMMENDED PAVEMENT THICKNESS

Traffic Area	Assumed Traffic Index	Assumed Subgrade "R"-Value	AC Thickness (inches)	Class II Aggregate Base Thickness (inches)	Full Depth Concrete (inches)
Auto Parking Areas	4.5	40+	3.0	4.0	5.5
Auto and Light Truck Driveway Areas	5.5	40+	3.0	6.0	6.5

Pavements shall be constructed in accordance with industry standards. If/where public improvements are required, additional evaluation will be necessary per City of San Diego Guidelines.

5.12 Exterior Flatwork

We recommend that flatwork be installed with crack-control joints at appropriate spacing as designed by the project architect. Flatwork, which should be installed with crack control joints, includes driveways, sidewalks, and architectural features. All subgrade should be prepared according to the earthwork recommendations previously given before placing concrete. Positive drainage should be established and maintained next to all flatwork. Doweling flatwork to adjacent improvements at critical pathways is also recommended.

Due to the anticipated low to moderately expansive site materials, all foundation and slab-on-grade areas shall be confirmed at a minimum 120% of the optimum moisture content just prior to concrete placement.

5.13 Drainage

Surface runoff should be collected and directed away from improvements by means of appropriate erosion reducing devices and positive drainage should be established around the proposed improvements. Positive drainage should be directed away from improvements at a gradient of at least two percent for a distance of at least five feet. The project civil engineer should evaluate the on-site drainage and arrange to keep surface water from affecting the site.

5.14 Construction Observation

The recommendations provided in this report are based on preliminary design information for the proposed construction and the subsurface conditions found in the exploratory boring locations. The interpolated subsurface conditions should be checked in the field during construction to verify that conditions are as anticipated.

Recommendations provided in this report are based on the understanding and assumption that CTE will provide the observation and testing services for the project. All earthwork should be observed and tested to verify that grading activity has been performed according to the recommendations contained within this report. All footing trenches should be evaluated by the project engineer before reinforcing steel placement.

5.15 Plan Review

CTE should review the final grading and foundation plans before commencement of earthwork to identify potential conflicts with the recommendations contained in this report.

6.0 LIMITATIONS OF INVESTIGATION

The field evaluation, laboratory testing and geotechnical analysis presented in this report have been conducted according to current engineering practice and the standard of care exercised by reputable geotechnical consultants performing similar tasks in this area. No other warranty, expressed or implied, is made regarding the conclusions, recommendations and opinions expressed in this report.

Variations may exist and conditions not observed or described in this report may be encountered during construction.

Our conclusions and recommendations are based on an analysis of the observed conditions. If conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if required, will be provided upon request. We appreciate this opportunity to be of service on this project.

Respectfully submitted,

CONSTRUCTION TESTING & ENGINEERING, INC.

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Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
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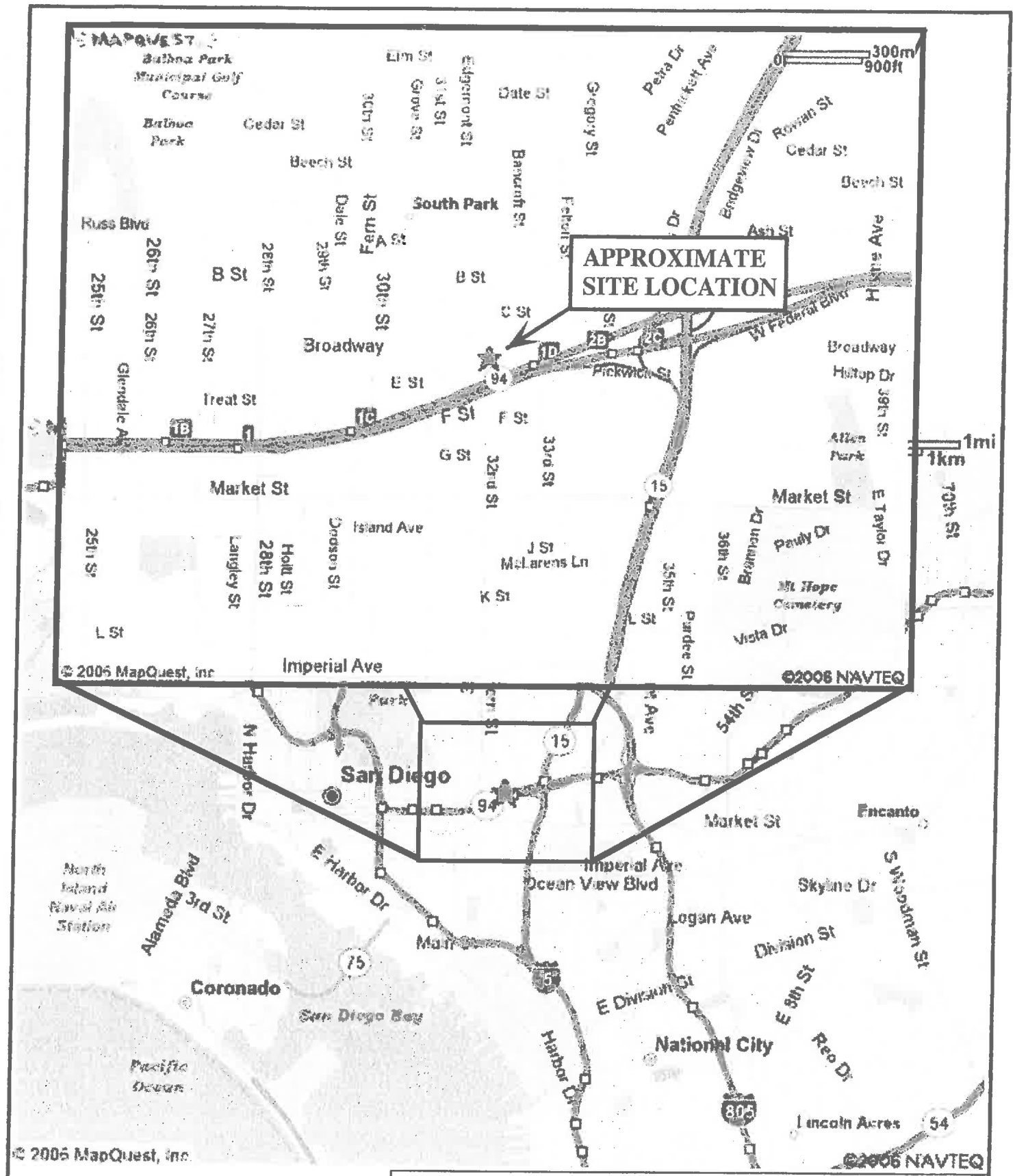
PROFESSIONAL GEOLOGIST
MARTIN E. SIEM
No. 2311
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Shane M. Chambers
Staff Geologist



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1441 MONTIEL ROAD, STE 115 ESCONDIDO CA. 92026 (760) 746-4955

SITE INDEX MAP

PROPOSED 28 ROW HOMES
32nd AND C STREET (APN: 539-563-07 & -10)
SAN DIEGO, CALIFORNIA

CTE JOB NO:	10-8520G
SCALE:	AS SHOWN
DATE:	08/06
FIGURE:	1

APPENDIX A

REFERENCES CITED

REFERENCES CITED

1. California Department of Conservation, Division of Mines and Geology, "Maps of Known Active Fault Near-Source Zones", International Conference of Building Officials, 1988.

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3. Hart, Earl W. and Bryant, W.A., Revised 1997, "Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps," California Division of Mines and Geology, Special Publication 42.

4. Kennedy, M.P. and Tan, S. S., 1975, "Geology of the Point Loma Quadrangle San Diego County, California", *in*: Geology of the San Diego Metropolitan Area, California, California Division of Mines and Geology, Bulletin 200.

5. Pacific Soils Engineering, Inc., 2003, "Geotechnical Feasibility Report", Work Order 400956, 32ND and Broadway Project, San Diego, California, October 13, 2003. (Attached as Appendix E).

6. Tan, S. S. 1995, "Landslide Hazards in the Southern Part of the San Diego Metropolitan Area, San Diego County, California: Landslide Hazard Identification Map No. 33", California Division of Mines and Geology, Open-File Report 95-03.

7. Treiman, J.A., 1993, "The Rose Canyon Fault Zone, Southern California", State of California, Division of Mines and Geology, Open File Report 93-02.

APPENDIX B

EXPLORATION LOGS

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DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS < 5% FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS OR GRAVEL SAND MIXTURES, LITTLE OF NO FINES
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS < 5% FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, SLIGHTLY PLASTIC CLAYEY SILTS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTS OR LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTY CLAYS
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILTS AND CLAYS
		COARSE	FINE	COARSE	MEDIUM	FINE	

12" 3" 3/4" 4 10 40 200

CLEAR SQUARE SIEVE OPENING — U.S. STANDARD SIEVE SIZE

ADDITIONAL TESTS

(OTHER THAN TEST PIT AND BORING LOG COLUMN HEADINGS)

MAX- Maximum Dry Density
GS- Grain Size Distribution
SE- Sand Equivalent
EI- Expansion Index
CHM- Sulfate and Chloride Content , pH, Resistivity
COR - Corrosivity
SD- Sample Disturbed
PM- Permeability
SG- Specific Gravity
HA- Hydrometer Analysis
AL- Atterberg Limits
RV- R-Value
CN- Consolidation
CP- Collapse Potential
HC- Hydrocollapse
REM- Remolded
PP- Pocket Penetrometer
WA- Wash Analysis
DS- Direct Shear
UC- Unconfined Compression
MD- Moisture/Density
M- Moisture
SC- Swell Compression
OI- Organic Impurities

FIGURE: BL1

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1441 MONTIEL ROAD, SUITE 115 | ESCONDIDO, CA 92026 | 760.746.4955

PROJECT:	DRILLER:	SHEET: of
CTE JOB NO:	DRILL METHOD:	DRILLING DATE:
LOGGED BY:	SAMPLE METHOD:	ELEVATION:

BORING LEGEND

Depth (Feet) | Bulk Sample | Driven Type | Blows/Foot | Dry Density (pcf) | Moisture (%) | U.S.C.S. Symbol | Graphic Log

DESCRIPTION

Laboratory Tests

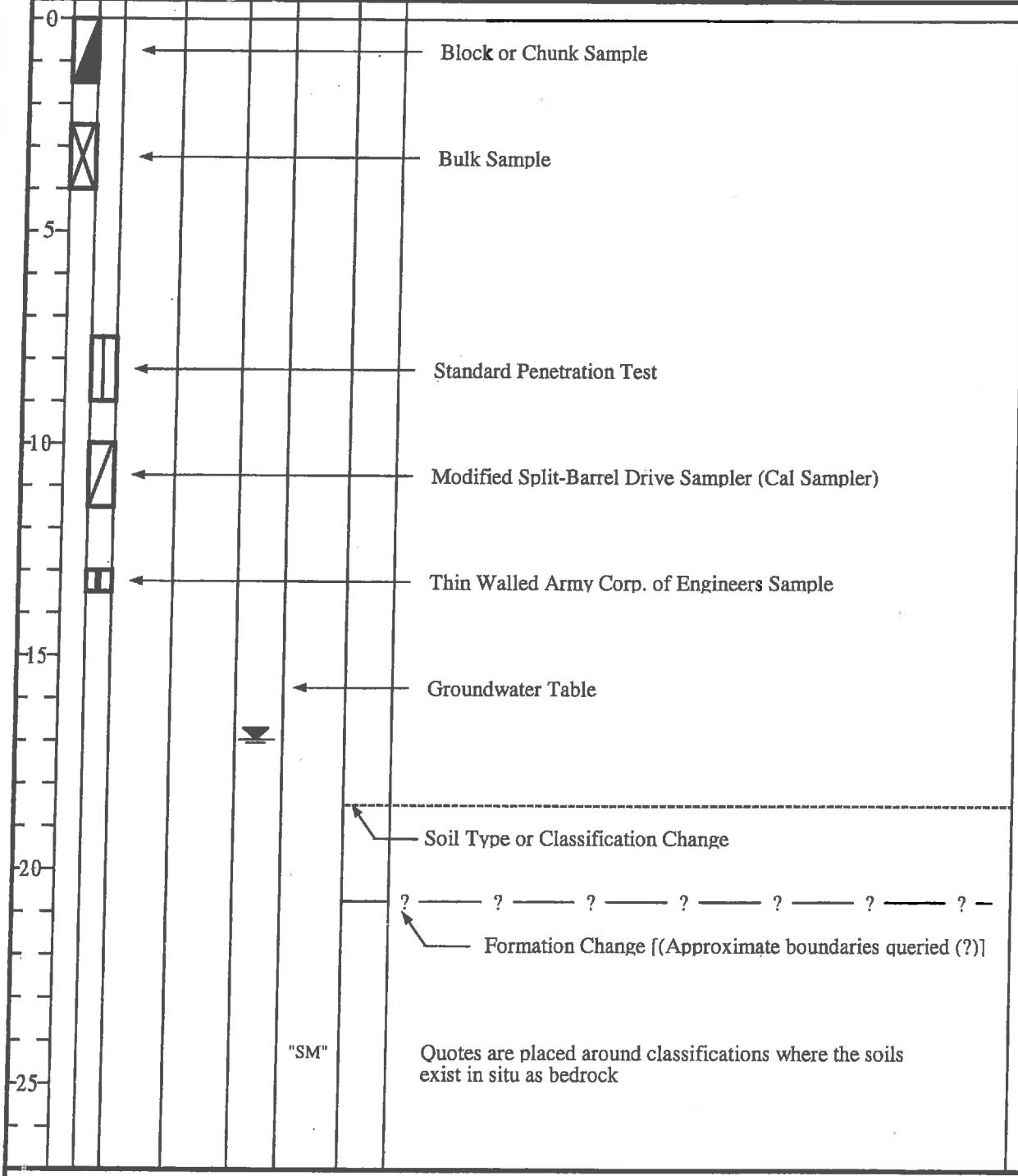

FIGURE: BL2

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PROJECT:	28 ROW HOMES	EXCAVATOR:	BOBBY SIMPSON
CTE JOB NO:	10-8520G	EXCAVATION METHOD:	BACKHOE
LOGGED BY:	SC	SAMPLING METHOD:	DISTURBED BULK
		EXCAVATION DATE:	7/25/2006
		ELEVATION:	152 Ft.

TEST PIT LOG: TP-1

Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	Depth (Feet)	Sample Type: Bulk	Sample Type: Driven	DESCRIPTION	Laboratory Tests
				0			0-1' TOPSOIL: Reddish brown, silty fine SAND (SM) with gravel to cobbles.	
							1'-4' UNDOCUMENTED FILL: Excavates hard, slightly moist, mottled orange/brown silty to clayey, fine to coarse grained SAND (SM-SC) with gravel and cobbles, wood debris.	
				5			4'-9' Excavates hard, moist, mottled orange/brown silty to clayey, fine to coarse grained SAND (SM-SC) with gravel and cobbles, wood debris.	
				10			@ 9' QUATERNARY LINDAVISTA FORMATION (Qln): Slightly moist, gray to orange-brown, clayey fine to medium gravel SAND (SC).	
				15				

Total Depth 10'
No Groundwater
Backfilled with Cuttings

FIGURE: TP-1

CONSTRUCTION TESTING & ENGINEERING, INC.

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1441 MONTIEL ROAD, SUITE 115 | ESCONDIDO, CA 92026 | 760.746.4955

PROJECT: 28 ROW HOMES
CTE JOB NO: 10-8520G
LOGGED BY: SC

EXCAVATOR: BOBBY SIMPSON
EXCAVATION METHOD: BACKHOE
SAMPLING METHOD: DISTURBED BULK

EXCAVATION DATE: 7/25/2006
ELEVATION: 137 Ft.

TEST PIT LOG: TP-2

Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	Depth (Feet)	Sample Type: Bulk	Sample Type: Driven	DESCRIPTION	Laboratory Tests
				0			0-1' UNDOCUMENTED FILL: Loose, dry, reddish brown, silty fine SAND (SM) with gravel to cobbles.	
							@ 1.5' TERTIARY SAN DIEGO SANDSTONE (Tsd): Excavates as very dense, dry, mottled orange/brown, fine grained SAND (SC) with hard dark brown clay filling small fractures.	
				5			Total Depth 13' No Groundwater Backfilled with Cuttings	
				10				
				15				

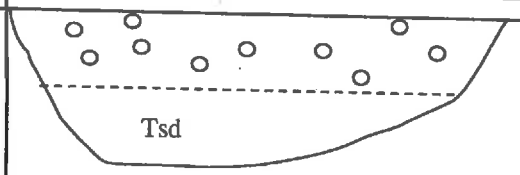

FIGURE: TP-2

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PROJECT: 28 ROW HOMES
CTE JOB NO: 10-8520G
LOGGED BY: SC

EXCAVATOR: BOBBY SIMPSON
EXCAVATION METHOD: BACKHOE
SAMPLING METHOD: DISTURBED BULK

EXCAVATION DATE: 7/25/2006
ELEVATION: 140 Ft.

TEST PIT LOG: TP-3

Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	Depth (Feet)	Sample Type: Bulk	Sample Type: Driven	DESCRIPTION	Laboratory Tests
				0			0-0.5' TOPSOIL/UNDOCUMENTED FILL: Loose, reddish brown, silty fine SAND (SM) with gravel to cobbles.	
							0.5'-5': Hard, slightly moist, dark brown to gray, (fat) CLAY (CL) roots infiltrating dark brown CLAY.	
				5			@ 5'-9' TERTIARY SAN DIEGO SANDSTONE (Tsd): Loose, slightly mosit, mottled orange gray brown, fine to coarse SAND (SM)/conglomerates (pebble-gravel) with roots throughout.	
				10			Tsd	
				15			Total Depth 19' No Groundwater Backfilled with Cuttings	

FIGURE: TP-3

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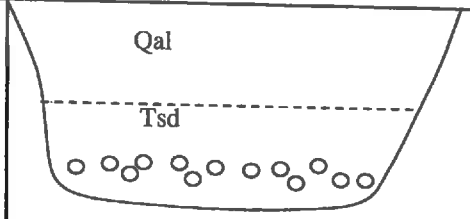
PROJECT: 28 ROW HOMES
CTE JOB NO: 10-8520G
LOGGED BY: SC

EXCAVATOR: BOBBY SIMPSON
EXCAVATION METHOD: BACKHOE
SAMPLING METHOD: DISTURBED BULK

EXCAVATION DATE: 7/25/2006
ELEVATION: 140 Ft.

TEST PIT LOG: TP-4

Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	Depth (Feet)	Sample Type: Bulk	Sample Type: Driven
				0		
				5		
				10		
				15		



Total Depth 14'
No Groundwater
Backfilled with Cuttings

DESCRIPTION

0-2' QUATERNARY ALLUVIUM (Qal):
Loose, dry, reddish brown, silty fine SAND (SM) with gravel to cobbles.

@ 2.5'-4' TERTIARY SAN DIEGO SANDSTONE (Tsd):

1/4 to 1/2" seam of dark brown fat CLAY separate fill from San Diego Formation. Dense, slightly moist, gray to yellow mottled fine to coarse SAND (SM), conglomerate interbeds, 0.25' thick with pebble-gravel size rounded clasts of a siliceous composition.

Laboratory Tests

FIGURE: TP-4

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PROJECT: 28 ROW HOMES
CTE JOB NO: 10-8520G
LOGGED BY: SC

EXCAVATOR: BOBBY SIMPSON
EXCAVATION METHOD: BACKHOE
SAMPLING METHOD: DISTURBED BULK

EXCAVATION DATE: 7/25/2006
ELEVATION: 140 Ft.

TEST PIT LOG: TP-5

Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	Depth (Feet)	Sample Type: Bulk	Sample Type: Driven	DESCRIPTION	Laboratory Tests
			Qal / Qln / Tsd	0			0-1' QUATERNARY ALLUVIUM (Qal): Loose, dry, reddish brown, silty fine SAND (SM) with gravels to cobbles.	
				5			1'-2.5' QUATERNARY LINDAVISTA FORMATION (Qln): Dense to very dense, dry, red to brown silty fine to coarse SAND (SM) with grains size increasing with depth with pebbles-gravels at approximately 1.5'.	
				10			@ 2.5'-3.5' TERTIARY SAN DIEGO SANDSTONE (Tsdss): Stiff, slightly moist, gray to red brown fine sandy CLAY (CL), with bedding plains, some pebble size sandstone concretions.	
				15				

Total Depth 13.5'
No Groundwater
Backfilled with Cuttings

FIGURE: TP-5

APPENDIX C

LABORATORY METHODS AND RESULTS

APPENDIX C
LABORATORY METHODS AND RESULTS

Laboratory tests were performed on representative soil samples to detect their relative engineering properties. Tests were performed following test methods of the American Society for Testing Materials or other accepted standards. The following presents a brief description of the various test methods used. Laboratory results are presented in the following section of this Appendix.

Classification

Soils were classified visually according to the Unified Soil Classification System. Visual classifications were supplemented by laboratory testing of selected samples according to ASTM D2487.

Expansion Index Test

Expansion Index Testing was performed on selected samples of the matrix of the onsite soils according to United Building Code Standard No. 18-2.

Particle-Size Analysis

Particle-size analyses were performed on selected representative samples according to ASTM D422.

Modified Proctor

To determine the maximum dry density and optimum moisture content, a soil sample was tested in accordance with ASTM D-1557.

Chemical Analysis

Soil materials were collected with sterile sampling equipment and tested for Sulfate and Chloride content, pH, Corrosivity, and Resistivity.

Resistance "R"-Value

The resistance "R"-value was determined by the California Materials Method No. 301 for representative subbase soils. Samples were prepared and exudation pressure and "R"-value determined. The graphically determined "R"- value at exudation pressure of 300 psi is the value used for pavement section calculation.

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200 WASH ANALYSIS

LOCATION	DEPTH (feet)	PERCENT PASSING #200 SIEVE	CLASSIFICATION
TP-3	6	5.7	SW-SM
TP-3	9	14.1	SC

EXPANSION INDEX TEST

UBC 18-2

LOCATION	DEPTH (feet)	EXPANSION INDEX	EXPANSION POTENTIAL
TP-3	0-1.5	46	LOW
TP-3	3.5-4.5	130	VERY HIGH

RESISTANCE "R"-VALUE

CALTEST 301

LOCATION	DEPTH (feet)	R-VALUE
TP-2	1.5-3	63

SULFATE

LOCATION	DEPTH (feet)	RESULTS ppm
TP-2	0-1.5	47.2

CHLORIDE

LOCATION	DEPTH (feet)	RESULTS ppm
TP-2	0-1.5	27.8

CONDUCTIVITY

CALIFORNIA TEST 424

LOCATION	DEPTH (feet)	RESULTS uS/cm
TP-2	0-1.5	88.6

RESISTIVITY

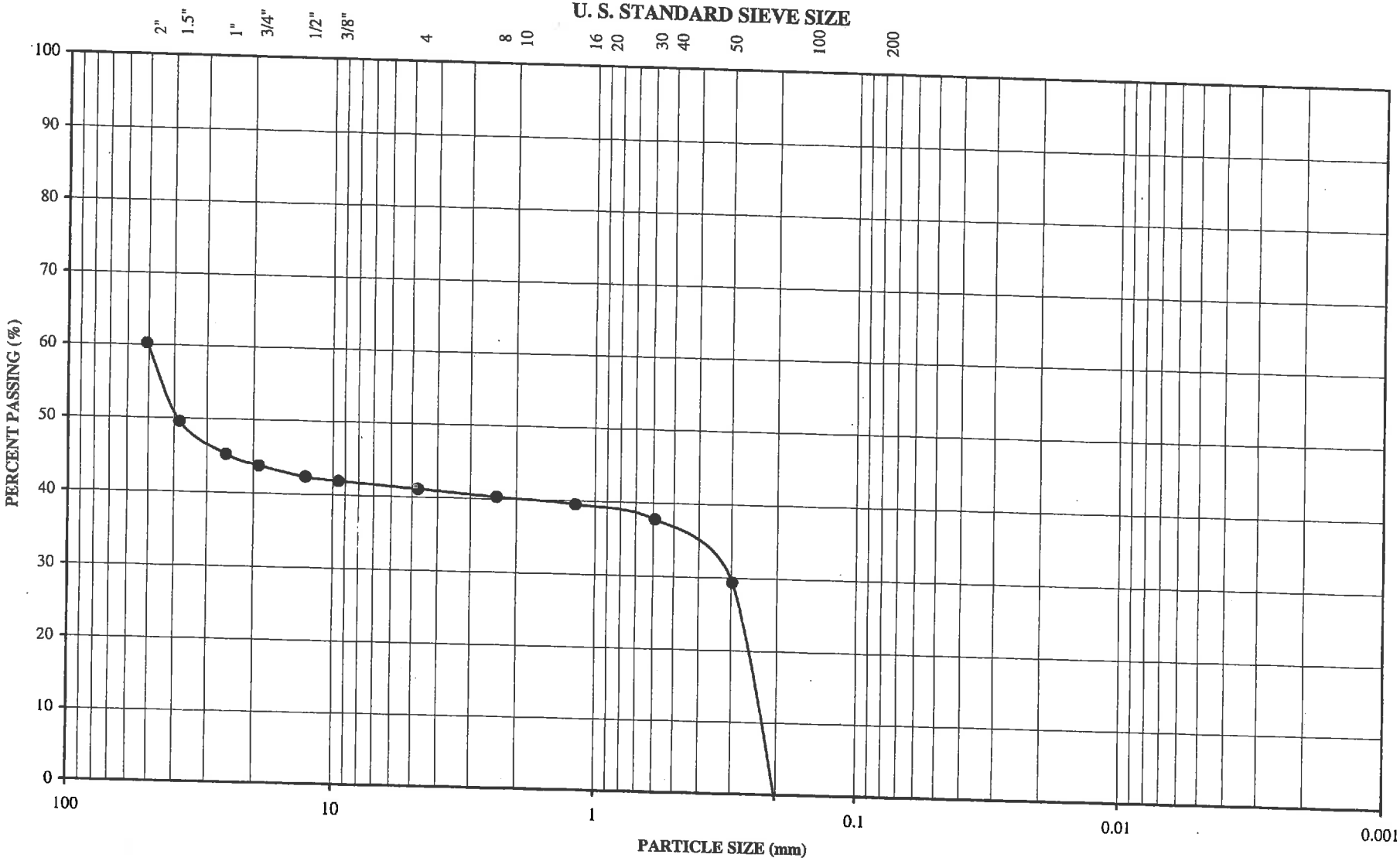
CALIFORNIA TEST 424

LOCATION	DEPTH (feet)	RESULTS ohms/cm
TP-2	0-1.5	9050

MAXIMIMUM DENSITY AND OPTIMUM MOISTURE CONTENT

(MODIFIED PROCTOR)

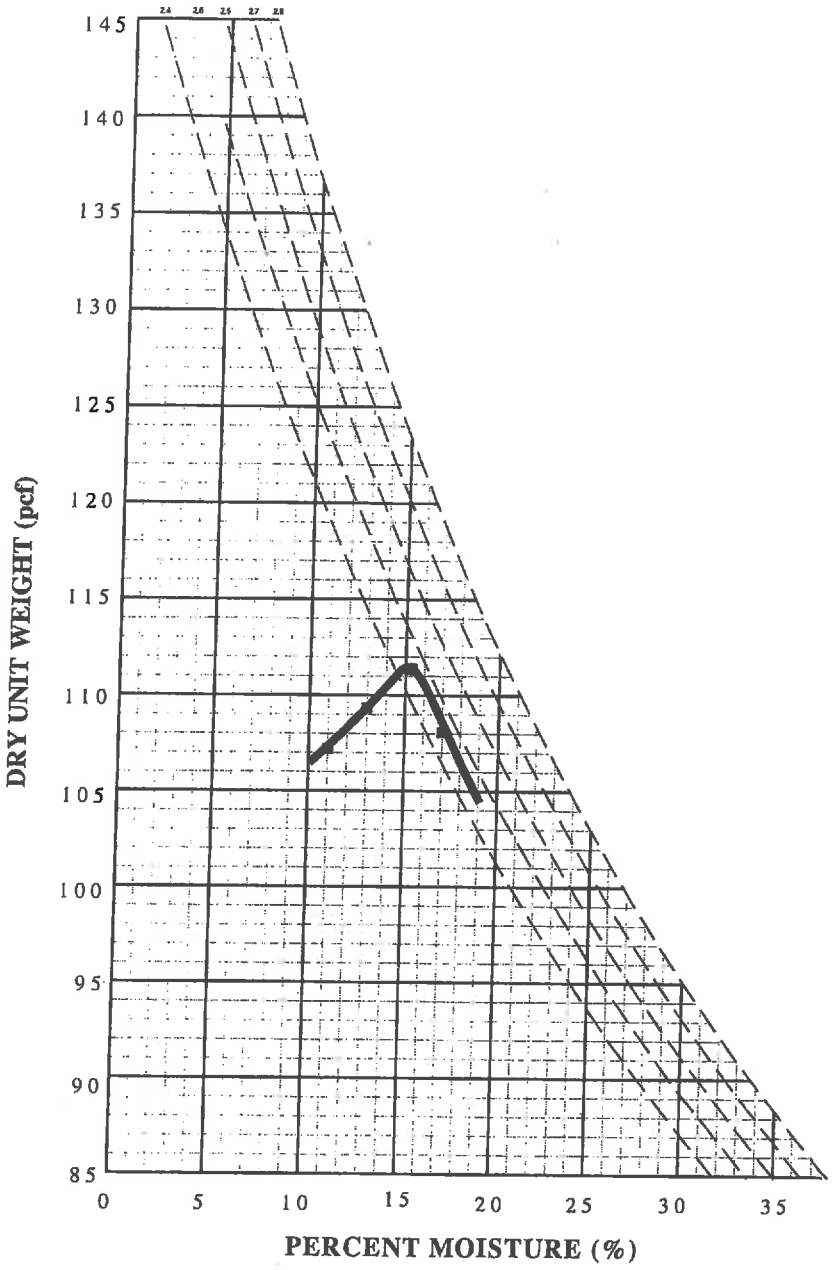
LOCATION	DEPTH (feet)	OPTIMUM MOISTURE (%)	DRY DENSITY (pcf)
TP-2	1.5-3	15.0	111.5



PARTICLE SIZE ANALYSIS

CONSTRUCTION TESTING & ENGINEERING, INC.

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
TP-2	0-1.5	●	-	-	SM
CTE JOB NUMBER:		10-8520G		FIGURE:	C-1



ASTM D1557 METHOD ☒ **A** ☐ **B** ☐ **C**

MODIFIED PROCTOR RESULTS

LAB NUMBER	SAMPLE NUMBER	DEPTH (FEET)	SOIL DESCRIPTION	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)
16538	TP-2	1.5-3	RED/LIGHT BROWN SILTY SAND	111.5	15.0

CTE JOB NO: 10-8520G	CONSTRUCTION TESTING & ENGINEERING, INC. GEOTECHNICAL AND CONSTRUCTION ENGINEERING TESTING AND INSPECTION 1441 MONTIEL ROAD, STE 115 ESCONDIDO CA. 92026 (760) 748-4955	DATE: 8/06 FIGURE: C-2

APPENDIX D

STANDARD GRADING SPECIFICATIONS

Section 1 - General

The guidelines contained herein and the standard details attached hereto represent Construction Testing & Engineering's standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications. Recommendations contained in the body of the previously presented soils report shall supersede the recommendations and or requirements as specified herein. The project geotechnical consultant shall interpret disputes arising out of interpretation of the recommendations contained in the soils report or specifications contained herein.

Section 2 - Responsibilities of Project Personnel

The geotechnical consultant should provide observation and testing services sufficient to assure that geotechnical construction is performed in general conformance with project specifications and standard grading practices. The geotechnical consultant should report any deviations to the client or his authorized representative.

The Client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the geotechnical consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

The Contractor should be responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects, including, but not limited to, earth work in accordance with the project plans, specifications and controlling agency requirements.

Section 3 - Preconstruction Meeting

A preconstruction site meeting shall be arranged by the owner and/or client and shall include the grading contractor, the design engineer, the geotechnical consultant, owner's representative and representatives of the appropriate governing authorities.

Section 4 - Site Preparation

The client or contractor should obtain the required approvals from the controlling authorities for the project prior, during and/or after demolition, site preparation and removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, root of trees and otherwise deleterious natural materials from the areas to be

graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.) and other man-made surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or rerouting pipelines at the project perimeter and cutoff and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the geotechnical consultant at the time of demolition.

Trees, plants or man-made improvements not planned to be removed or demolished should be protected by the contractor from damage or injury.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing and demolition operations should be performed under the observation of the geotechnical consultant.

Section 5 - Site Protection

Protection of the site during the period of grading should be the responsibility of the contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the geotechnical consultant, the client and the regulating agencies.

Precautions should be taken during the performance of site clearing, excavations and grading to protect the work site from flooding, ponding or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away from and off the work site. Where low areas cannot be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

Rain related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions as determined by the geotechnical consultant. Soil adversely affected should be classified as unsuitable materials and should be subject to overexcavation and replacement with compacted fill or other remedial grading as recommended by the geotechnical consultant.

The contractor should be responsible for the stability of all temporary excavations. Recommendations by the geotechnical consultant pertaining to temporary excavations (e.g., backcuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the contractor. Recommendations by the geotechnical consultant should not be considered to preclude requirements that are more restrictive by the regulating agencies. The contractor should provide during periods of extensive rainfall plastic sheeting to prevent unprotected slopes from becoming saturated and unstable.

When deemed appropriate by the geotechnical consultant or governing agencies the contractor shall install checkdams, desilting basins, sand bags or other drainage control measures.

In relatively level areas and/or slope areas, where saturated soil and/or erosion gullies exist to depths of greater than 1.0 foot; they should be overexcavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1.0 foot or less below proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be overexcavated and replaced as compacted fill in accordance with the slope repair recommendations herein. If field conditions dictate, the geotechnical consultant may recommend other slope repair procedures.

Section 6 - Excavations

6.1 Unsuitable Materials

Materials that are unsuitable should be excavated under observation and recommendations of the geotechnical consultant. Unsuitable materials include, but may not be limited to, dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock and nonengineered or otherwise deleterious fill materials.

Material identified by the geotechnical consultant as unsatisfactory due to its moisture conditions should be overexcavated; moisture conditioned as needed, to a uniform at or above optimum moisture condition before placement as compacted fill.

If during the course of grading adverse geotechnical conditions are exposed which were not anticipated in the preliminary soil report as determined by the geotechnical consultant additional exploration, analysis, and treatment of these problems may be recommended.

6.2 Cut Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal: vertical).

The geotechnical consultant should observe cut slope excavation and if these excavations expose loose cohesionless, significantly fractured or otherwise unsuitable material, the materials should be overexcavated and replaced with a compacted stabilization fill. If encountered specific cross section details should be obtained from the Geotechnical Consultant.

When extensive cut slopes are excavated or these cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top of the slope.

6.3 Pad Areas

All lot pad areas, including side yard terrace containing both cut and fill materials, transitions, located less than 3 feet deep should be overexcavated to a depth of 3 feet and replaced with a uniform compacted fill blanket of 3 feet. Actual depth of overexcavation may vary and should be delineated by the geotechnical consultant during grading.

For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm drainage swale and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

Section 7 - Compacted Fill

All fill materials should have fill quality, placement, conditioning and compaction as specified below or as approved by the geotechnical consultant.

7.1 Fill Material Quality

Excavated on-site or import materials which are acceptable to the geotechnical consultant may be utilized as compacted fill, provided trash, vegetation and other deleterious materials are removed prior to placement. All import materials anticipated for use on-site should be sampled tested and approved prior to and placement is in conformance with the requirements outlined.

Rocks 12 inches in maximum and smaller may be utilized within compacted fill provided sufficient fill material is placed and thoroughly compacted over and around all rock to effectively fill rock voids. The amount of rock should not exceed 40 percent by dry weight passing the 3/4-inch sieve. The geotechnical consultant may vary those requirements as field conditions dictate.

Where rocks greater than 12 inches but less than four feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with attached Plates and described below. Rocks greater than four feet should be broken down or disposed off-site.

7.2 Placement of Fill

Prior to placement of fill material, the geotechnical consultant should inspect the area to receive fill. After inspection and approval, the exposed ground surface should be scarified to a depth of 6 to 8 inches. The scarified material should be conditioned (i.e. moisture added or air dried by continued discing) to achieve a moisture content at or slightly above optimum moisture conditions and compacted to a minimum of 90 percent of the maximum density or as otherwise recommended in the soils report or by appropriate government agencies.

Compacted fill should then be placed in thin horizontal lifts not exceeding eight inches in loose thickness prior to compaction. Each lift should be moisture conditioned as needed,

thoroughly blended to achieve a consistent moisture content at or slightly above optimum and thoroughly compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

The contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials and weather conditions.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal: vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least six-foot wide benches and a minimum of four feet of vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill should be placed in an area after keying and benching until the geotechnical consultant has reviewed the area. Material generated by the benching operation should be moved sufficiently away from the bench area to allow for the recommended review of the horizontal bench prior to placement of fill.

Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as above described. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface or previously compacted fill should be processed by scarification, moisture conditioning as needed to at or slightly above optimum moisture content, thoroughly blended and recompacted to a minimum of 90 percent of laboratory maximum dry density. Where unsuitable materials exist to depths of greater than one foot, the unsuitable materials should be over-excavated.

Following a period of flooding, rainfall or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described herein.

Rocks 12 inch in maximum dimension and smaller may be utilized in the compacted fill provided the fill is placed and thoroughly compacted over and around all rock. No oversize material should be used within 3 feet of finished pad grade and within 1 foot of other compacted fill areas. Rocks 12 inches up to four feet maximum dimension should be placed below the upper 5 feet of any fill and should not be closer than 11 feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below areas where structures or deep utilities are proposed. Oversized material should be placed in windrows on a clean,

overexcavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversized material should be staggered so those successive strata of oversized material are not in the same vertical plane.

It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the geotechnical consultant at the time of placement.

The contractor should assist the geotechnical consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill. The contractor should provide this work at no additional cost to the owner or contractor's client.

Fill should be tested by the geotechnical consultant for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D 1556-82, D 2922-81. Tests should be conducted at a minimum of 2 vertical feet or 1,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be removed or otherwise handled as recommended by the geotechnical consultant.

7.3 Fill Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal: vertical).

Except as specifically recommended in these grading guidelines compacted fill slopes should be over-built and cut back to grade, exposing the firm, compacted fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be overexcavated and reconstructed under the guidelines of the geotechnical consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

At the discretion of the geotechnical consultant, slope face compaction may be attempted by conventional construction procedures including backrolling. The procedure must create a firmly compacted material throughout the entire depth of the slope face to the surface of the previously compacted firm fill intercore.

During grading operations, care should be taken to extend compactive effort to the outer edge of the slope. Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately established desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful

to elevate slightly the outer edge of the slope. Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not exceeding four feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly dozer trackrolled.

For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished using a berm and pad gradient of at least 2 percent.

Section 8 - Trench Backfill

Utility and/or other excavation of trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

Within slab areas, but outside the influence of foundations, trenches up to one foot wide and two feet deep may be backfilled with sand and consolidated by jetting, flooding or by mechanical means. If on-site materials are utilized, they should be wheel-rolled, tamped or otherwise compacted to a firm condition. For minor interior trenches, density testing may be deleted or spot testing may be elected if deemed necessary, based on review of backfill operations during construction.

If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, the contractor may elect the utilization of light weight mechanical compaction equipment and/or shading of the conduit with clean, granular material, which should be thoroughly jetted in-place above the conduit, prior to initiating mechanical compaction procedures. Other methods of utility trench compaction may also be appropriate, upon review of the geotechnical consultant at the time of construction.

In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the geotechnical consultant. Clean granular backfill and/or bedding are not recommended in slope areas.

Section 9 - Drainage

Where deemed appropriate by the geotechnical consultant, canyon subdrain systems should be installed in accordance.

Typical subdrains for compacted fill buttresses, slope stabilization or sidehill masses, should be installed in accordance with the specifications of the accompanying attached plates.

Roof, pad and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, and concrete swales) as shown in the attached plates.

For drainage in extensively landscaped areas near structures, (i.e., within four feet) a minimum of 5 percent gradient away from the structure should be maintained. Pad drainage of at least 2 percent should be maintained over the remainder of the site.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns could be detrimental to slope stability and foundation performance.

Section 10 - Slope Maintenance

10.1 - Landscape Plants

To enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect should be the best party to consult regarding actual types of plants and planting configuration.

10.2 - Irrigation

Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

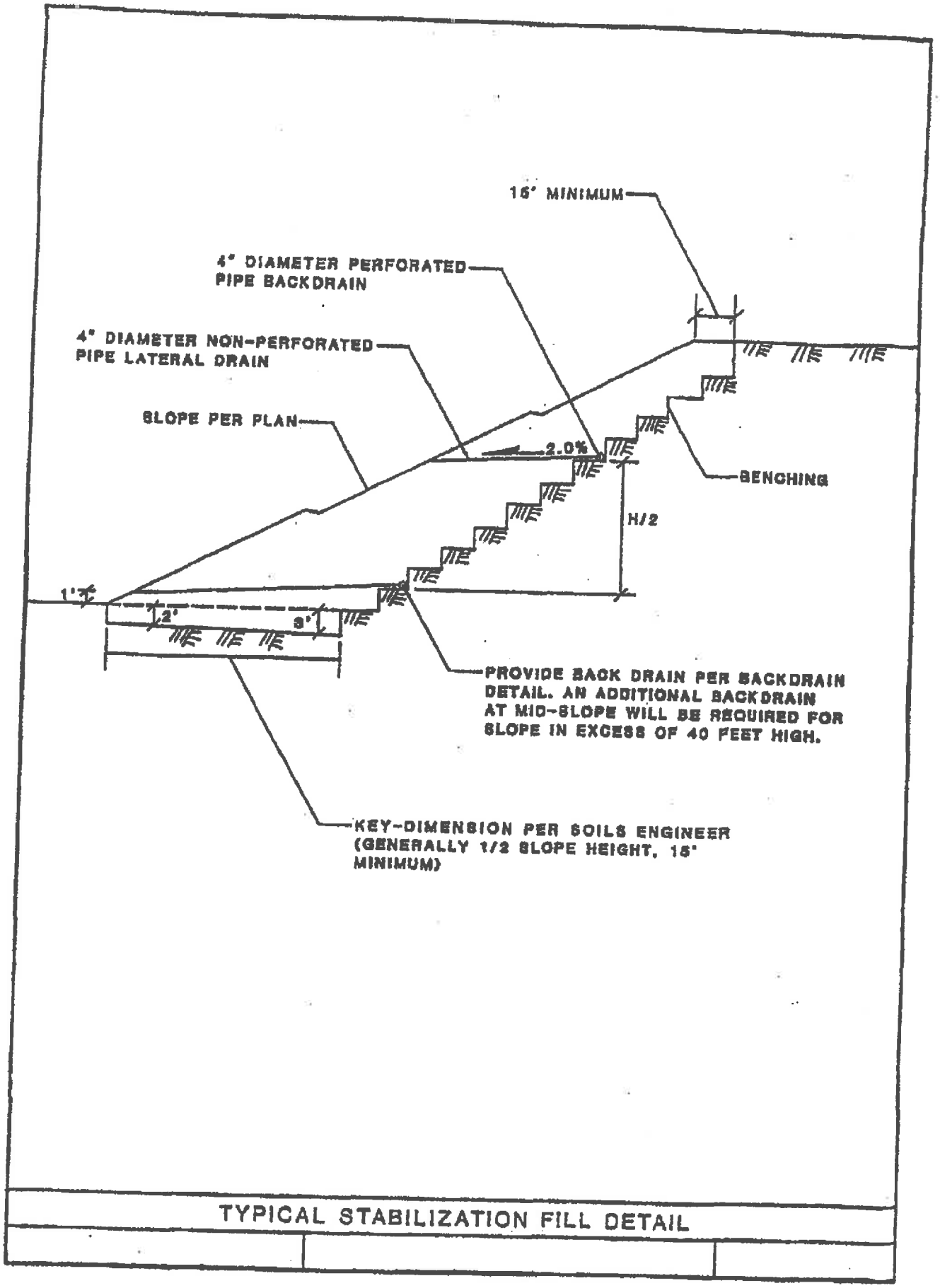
10.3 - Repair

As a precautionary measure, plastic sheeting should be readily available, or kept on hand, to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended, beginning with the period prior to landscape planting.

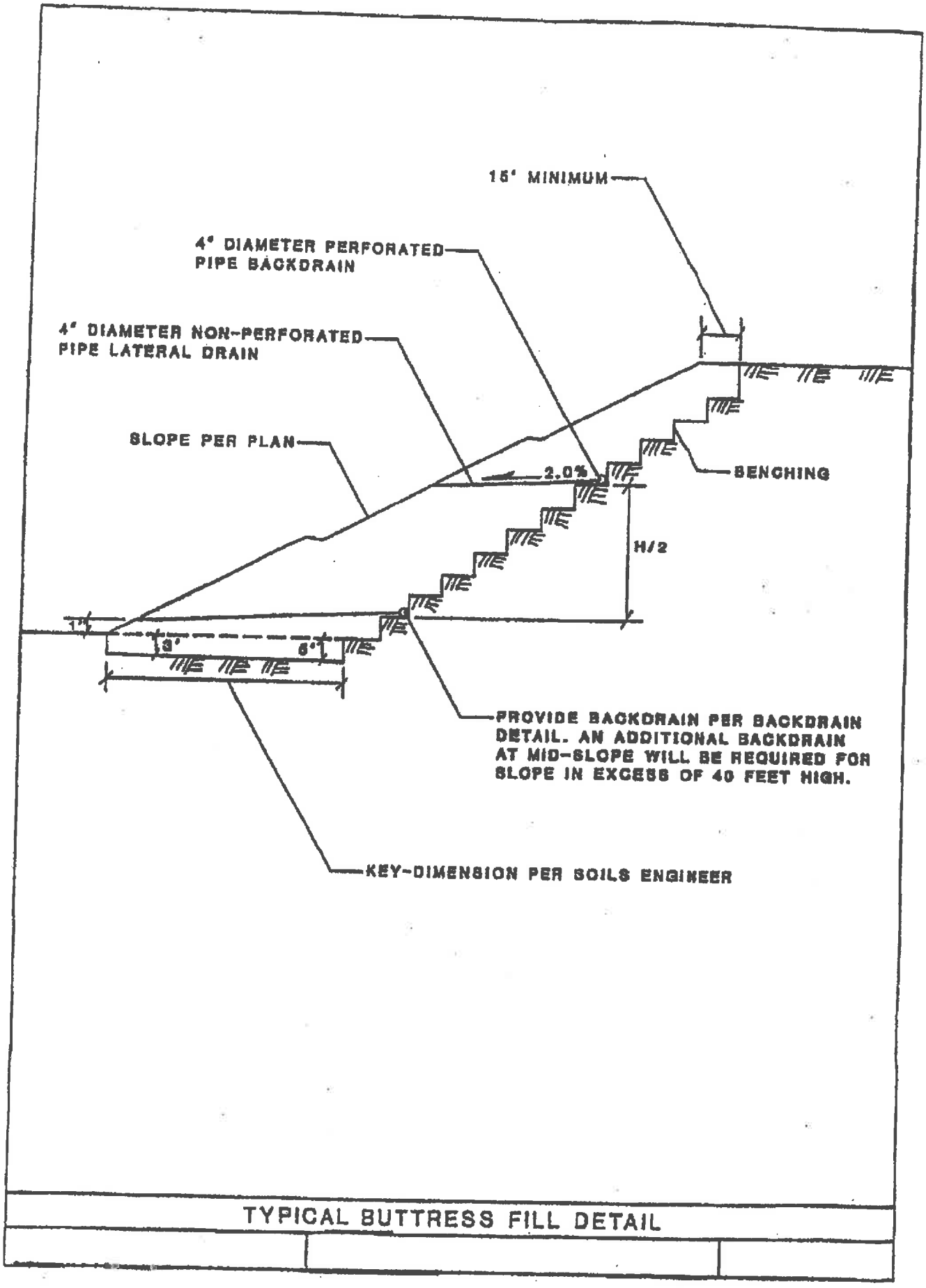
If slope failures occur, the geotechnical consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

If slope failures occur as a result of exposure to period of heavy rainfall, the failure areas and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.

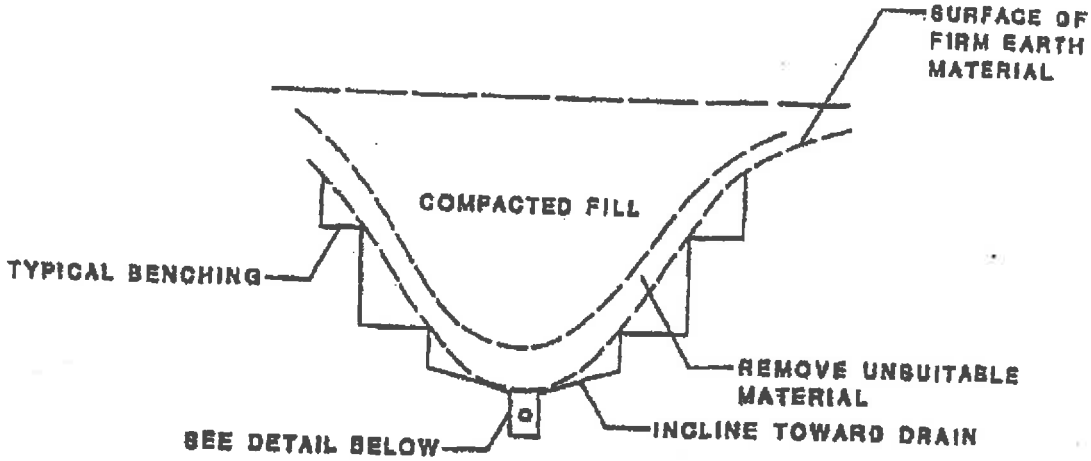
In the accompanying Standard Details, appropriate repair procedures are illustrated for superficial slope failures (i.e., occurring typically within the outer one foot to three feet of a slope face).



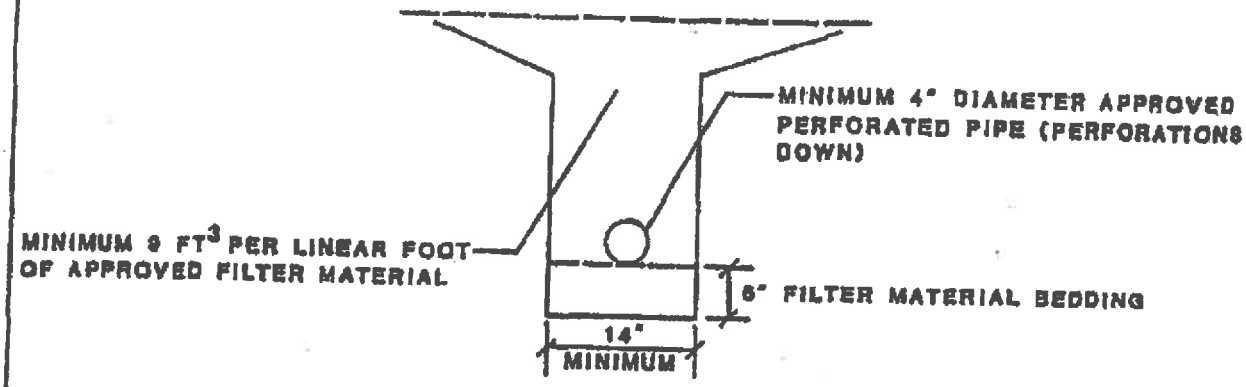
TYPICAL STABILIZATION FILL DETAIL



TYPICAL BUTTRESS FILL DETAIL



DETAIL



FILTER MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

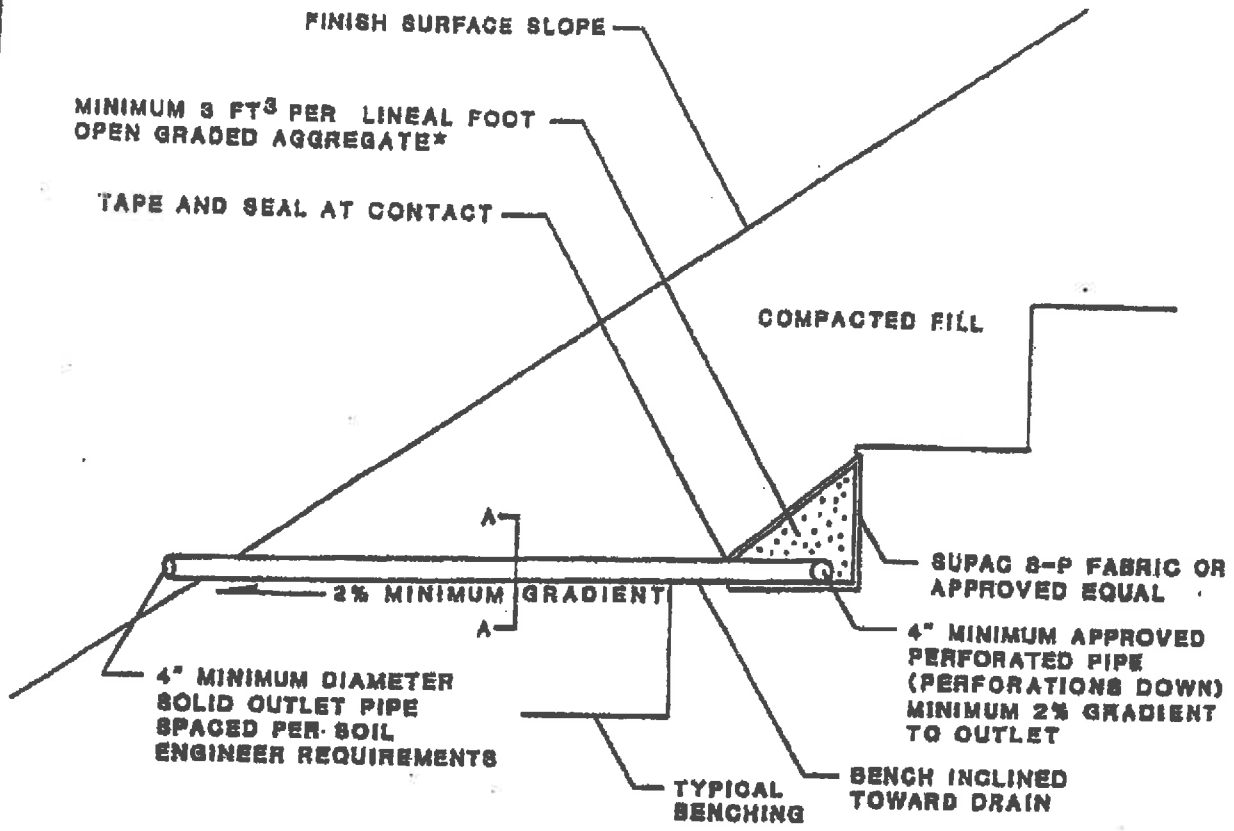
SIEVE SIZE	PERCENTAGE
1"	100
3/4"	90-100
3/8"	40-100
NO.4	25-40
NO.30	5-15
NO.50	0-7
NO.200	0-3

APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYL-CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 psi

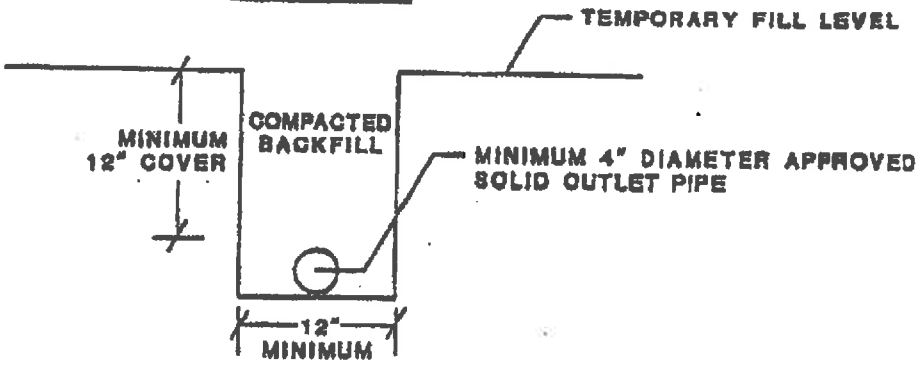
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
UPPER 500'	4"
NEXT 1000'	6"
> 1500'	8"

TYPICAL CANYON SUBDRAIN DETAIL



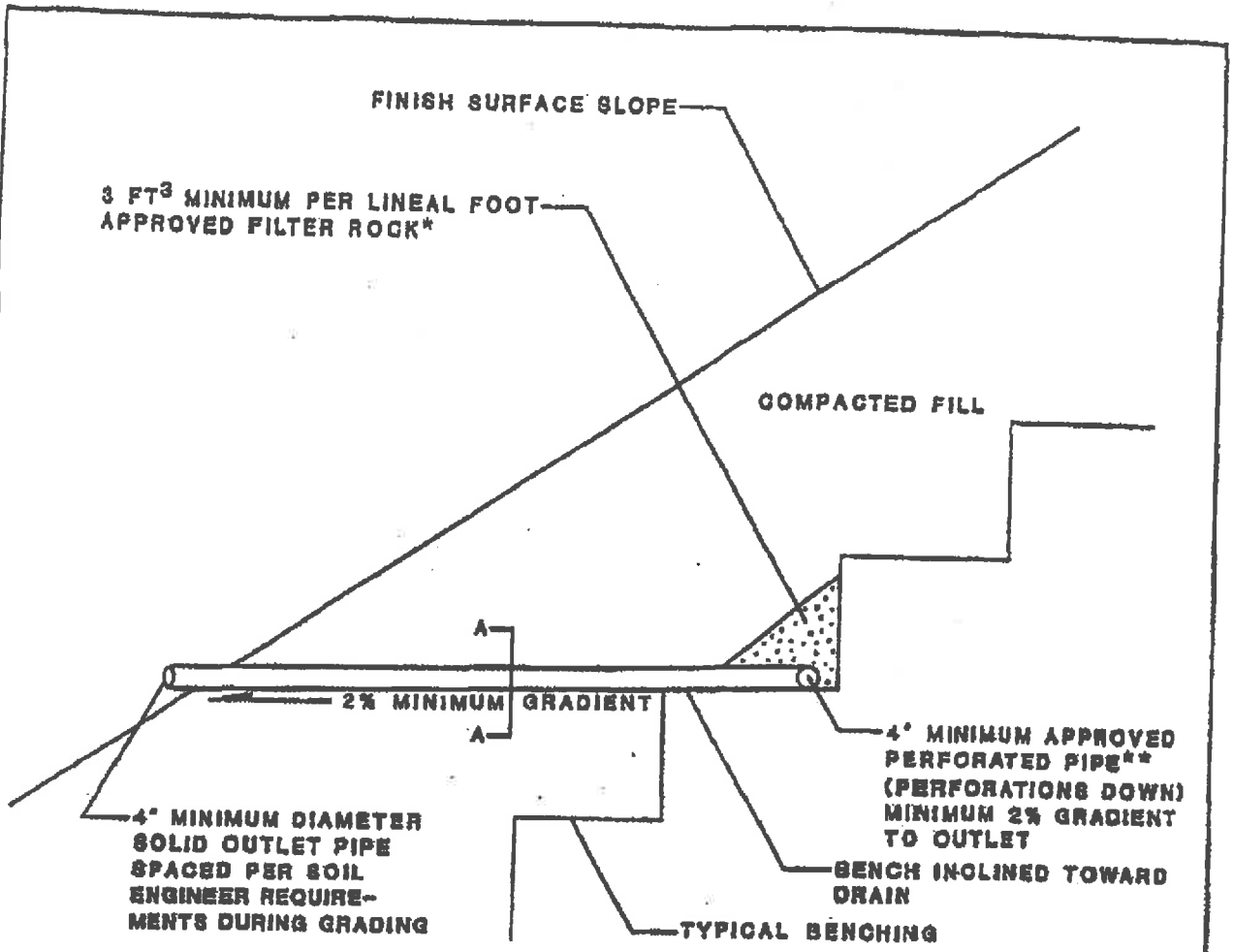
DETAIL A-A



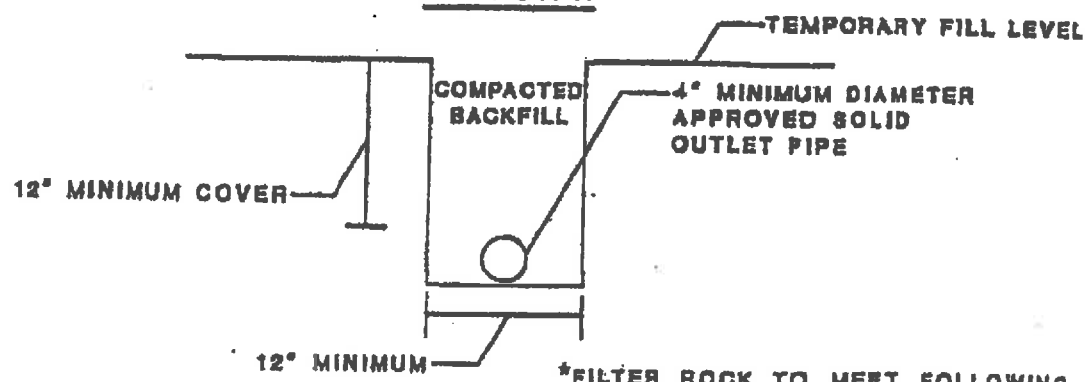
*NOTE: AGGREGATE TO MEET FOLLOWING SPECIFICATIONS OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 1/2"	100
1"	5-40
3/4"	0-17
3/8"	0-7
NO. 200	0-3

BACKDRAIN DETAIL (GEOFABRIC)



DETAIL A-A



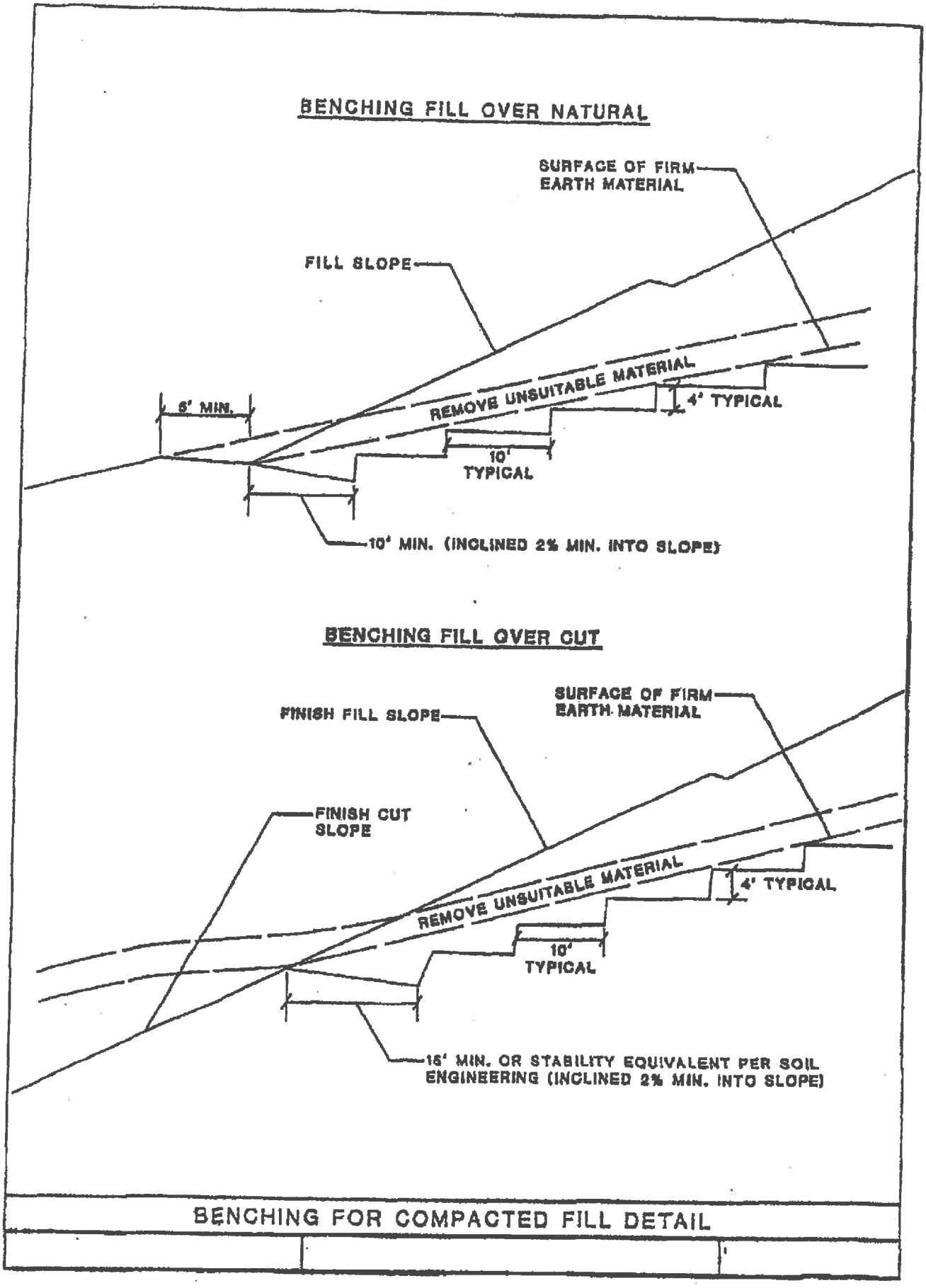
*FILTER ROCK TO MEET FOLLOWING SPECIFICATIONS OR APPROVED EQUAL:

SIEVE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO.4	25-40
NO.30	5-15
NO.50	0-7
NO.200	0-3

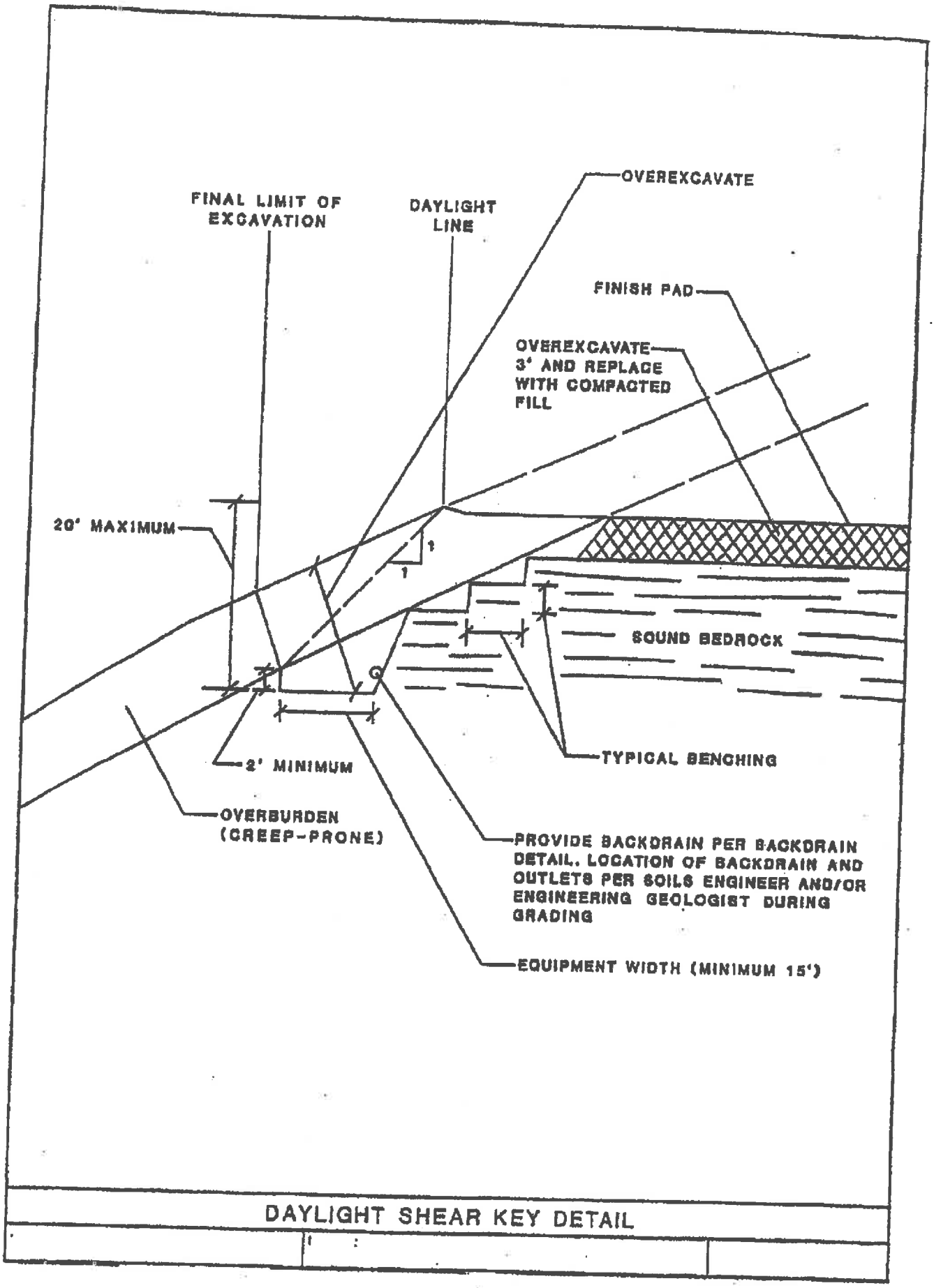
**APPROVED PIPE TYPE:

SCHEDULE 40 POLYVINYL CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 PSI.

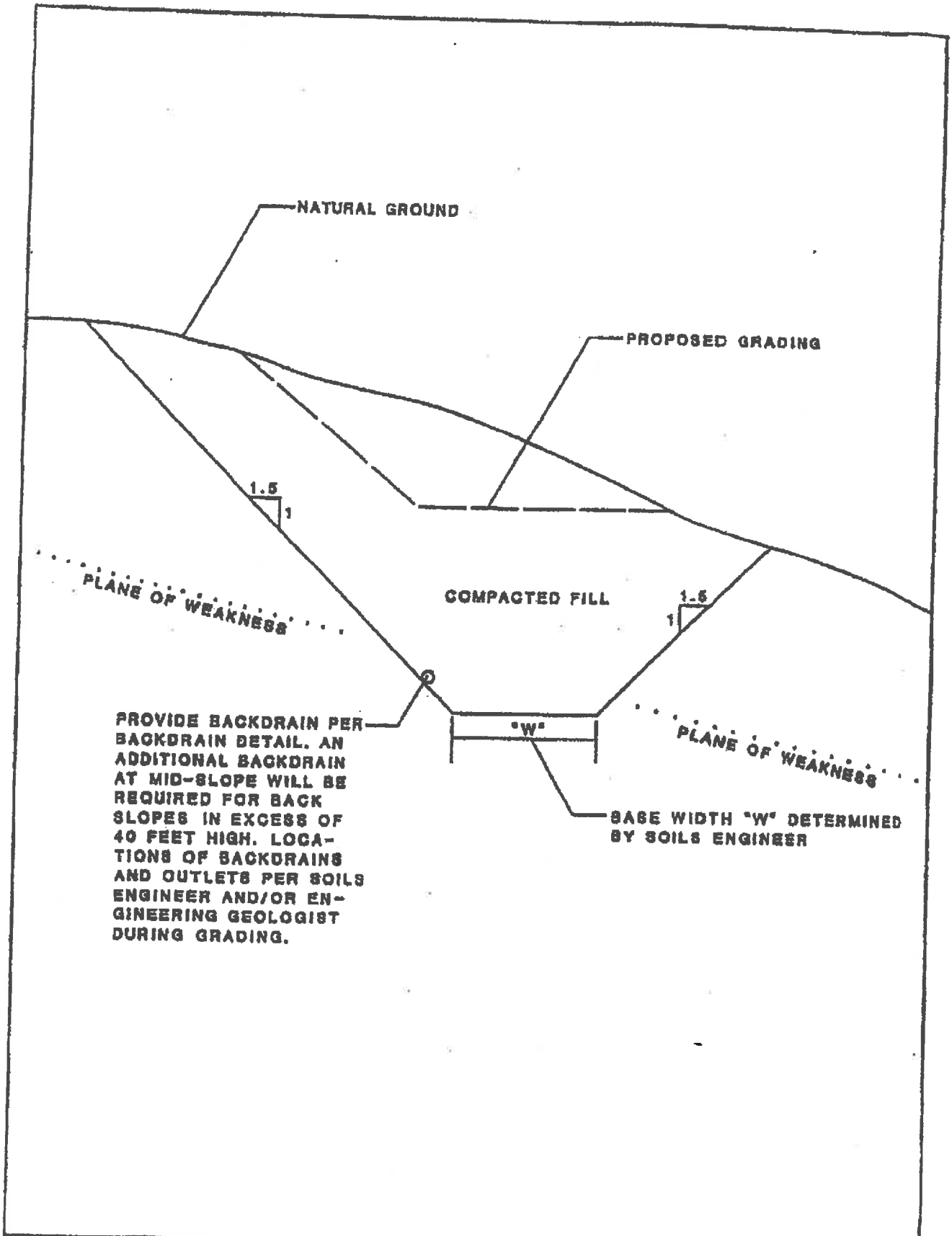
TYPICAL BACKDRAIN DETAIL



BENCHING FOR COMPACTED FILL DETAIL

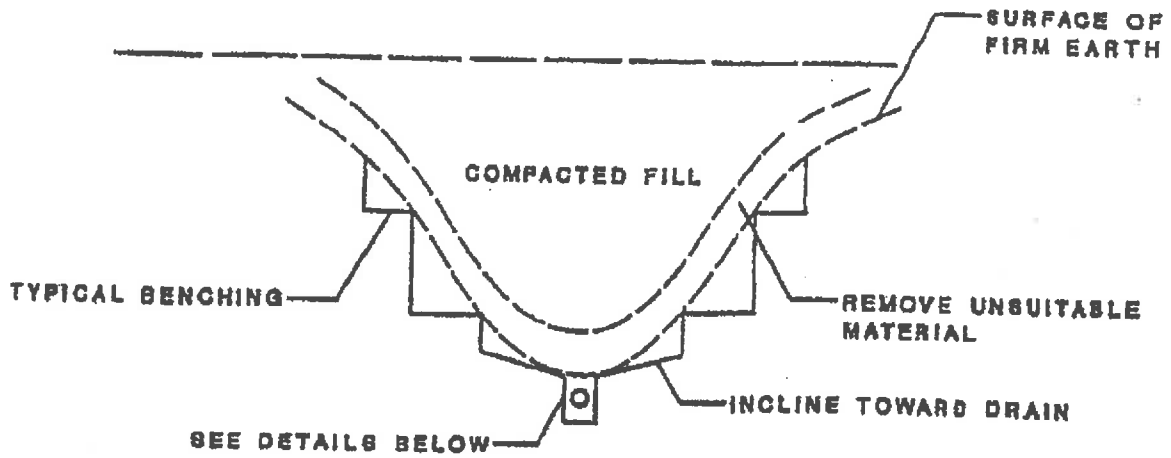


DAYLIGHT SHEAR KEY DETAIL

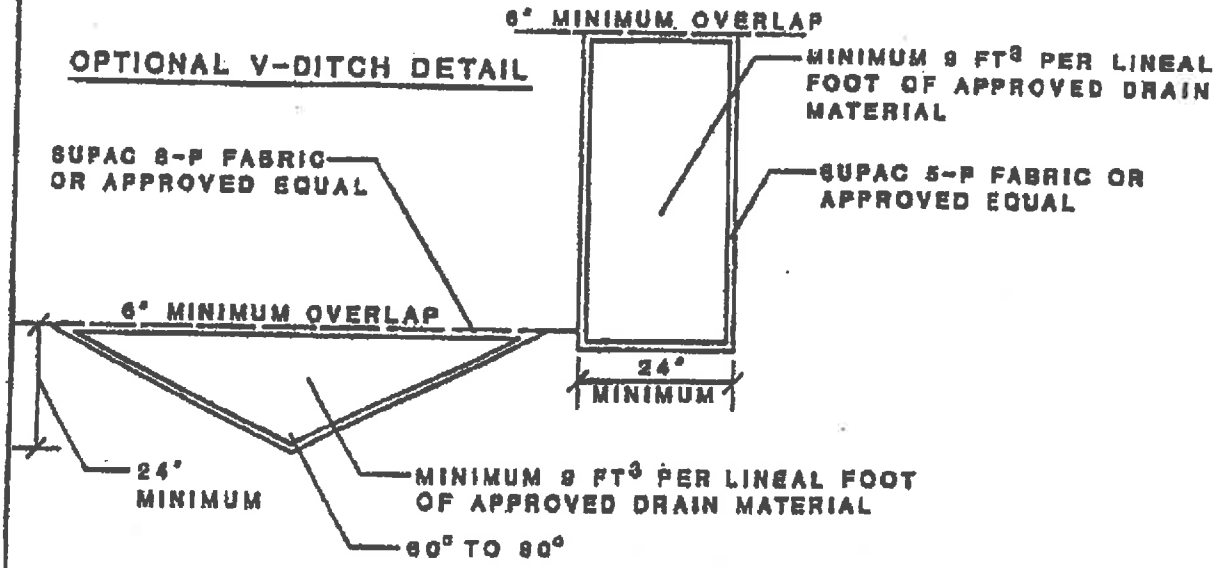


TYPICAL SHEAR KEY DETAIL

CANYON SUBDRAIN DETAILS



TRENCH DETAIL



OPTIONAL V-DITCH DETAIL

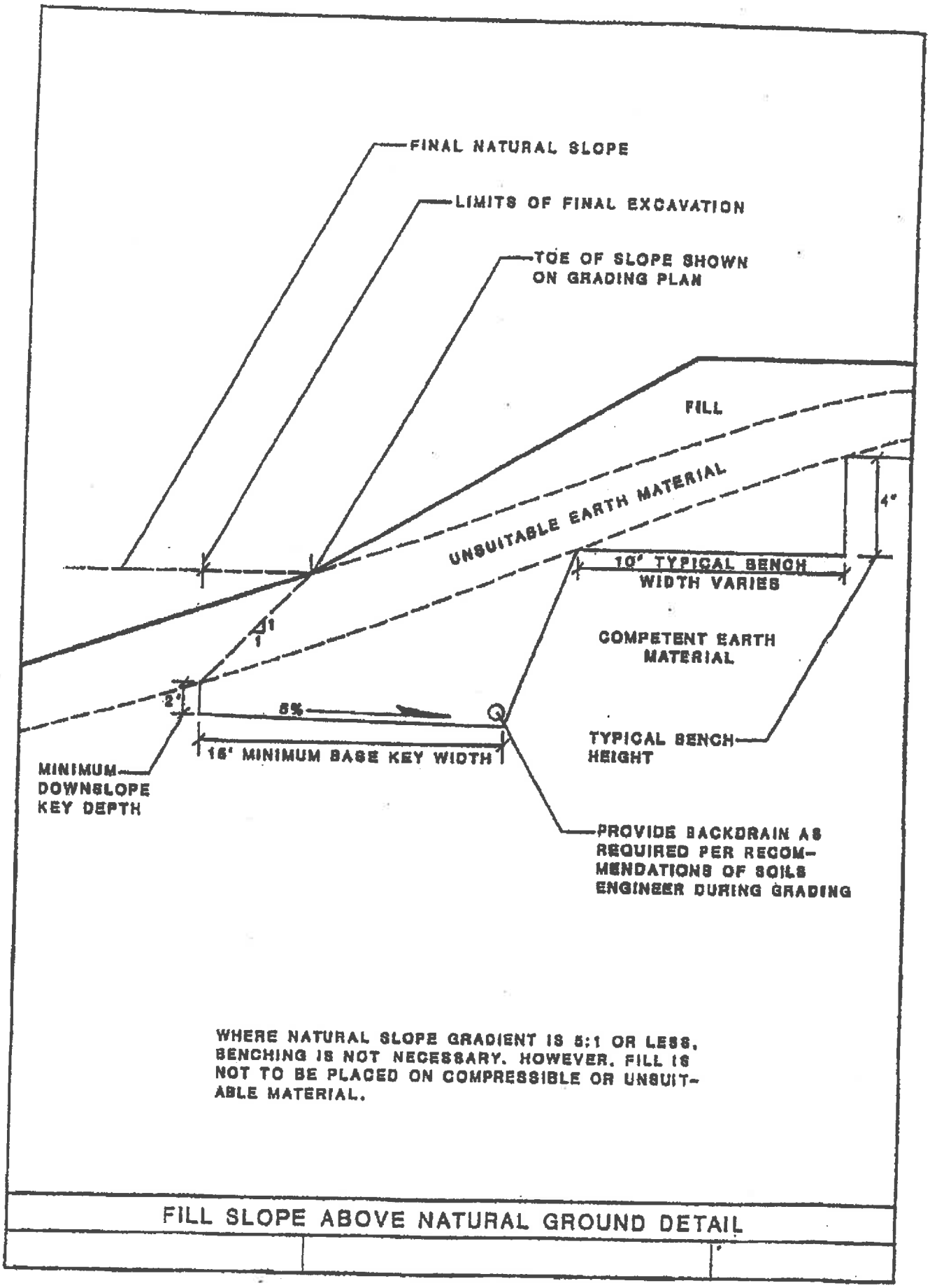
DRAIN MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 1/2"	88-100
1"	5-40
3/4"	0-17
3/8"	0-7
NO.200	0-3

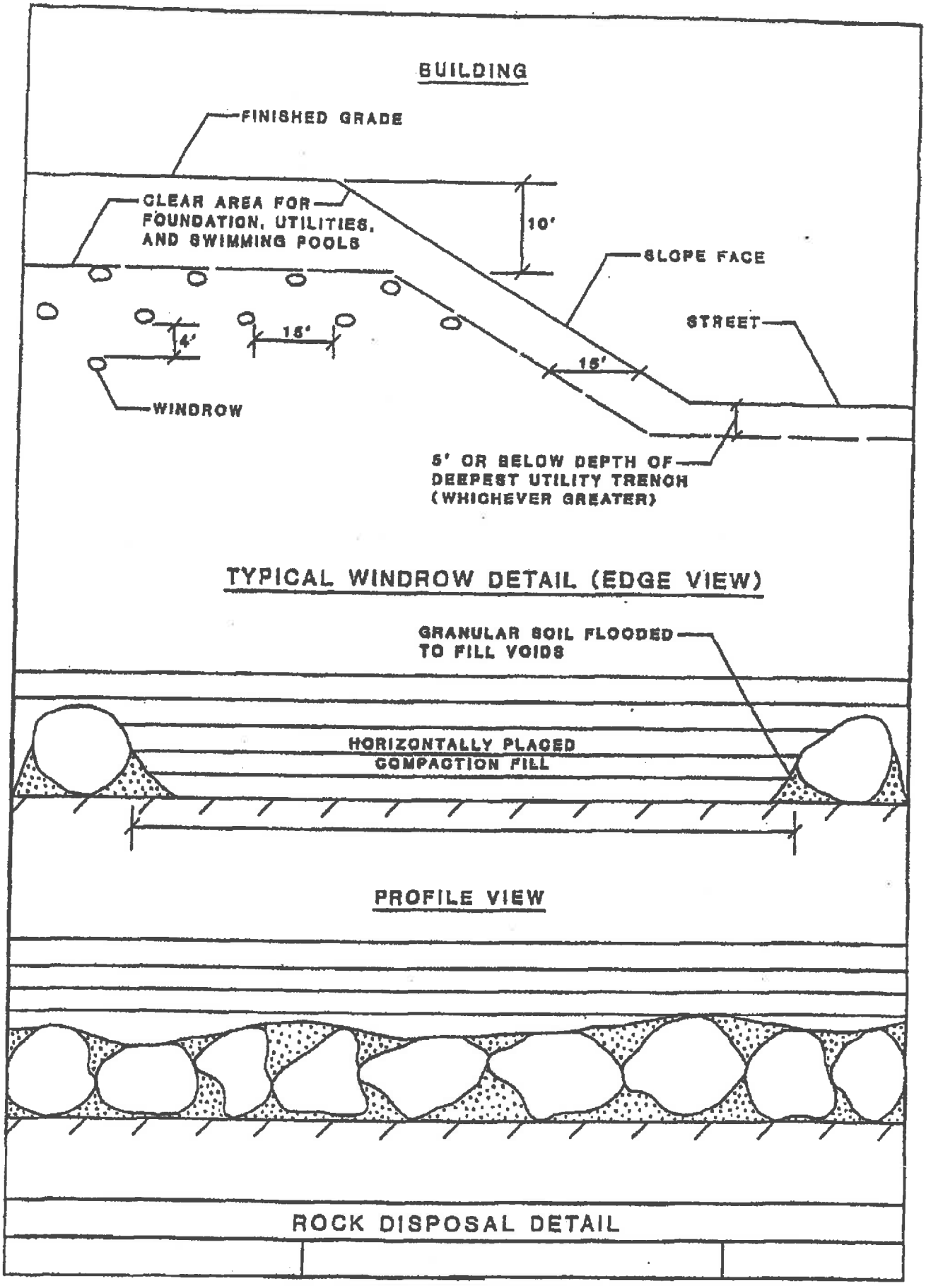
ADD MINIMUM 4" DIAMETER APPROVED PERFORATED PIPE WHEN GRADIENT IS LESS THAN 2%

APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYL-CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 psi.

GEOFABRIC SUBDRAIN

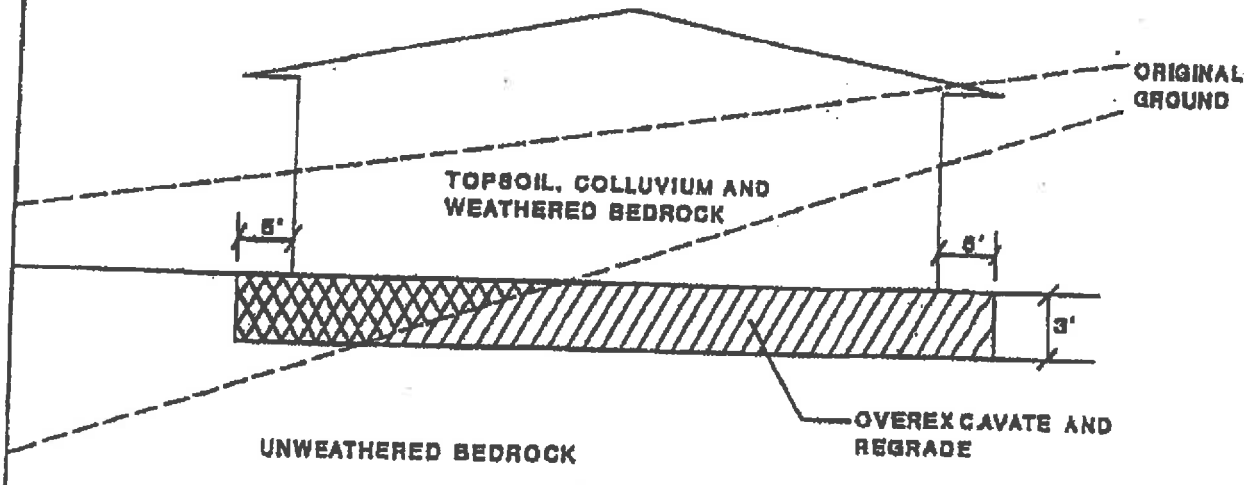


FILL SLOPE ABOVE NATURAL GROUND DETAIL

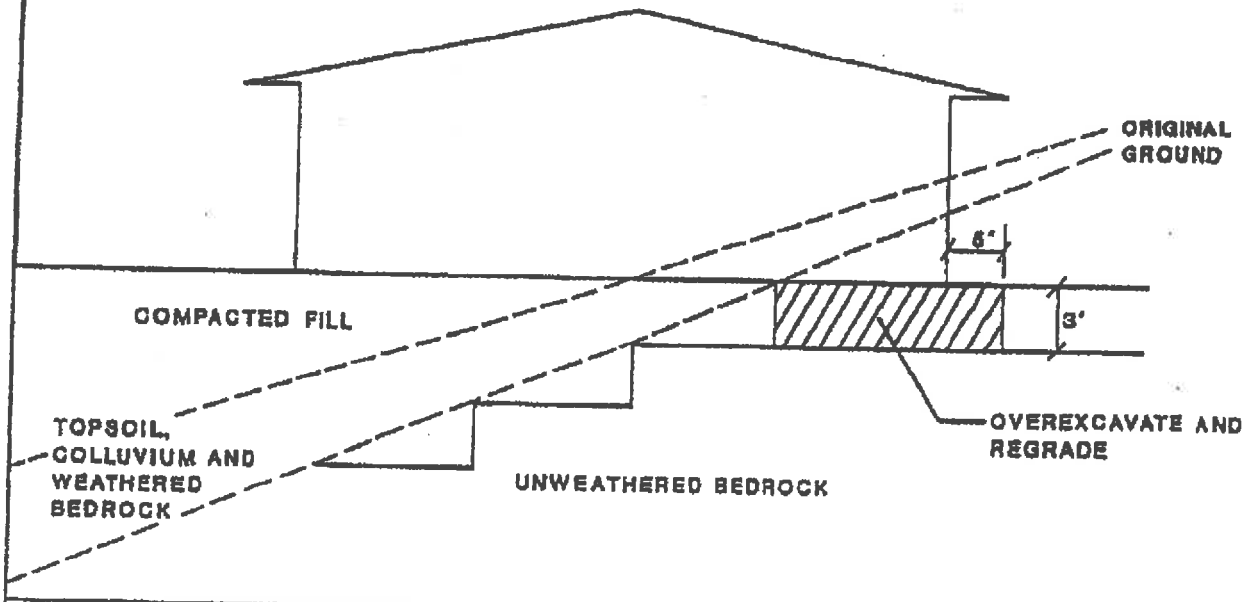

BUILDING
FINISHED GRADE
CLEAR AREA FOR FOUNDATION, UTILITIES, AND SWIMMING POOLS
10'
SLOPE FACE
STREET
4'
15'
15'
WINDROW
5' OR BELOW DEPTH OF DEEPEST UTILITY TRENCH (WHICHEVER GREATER)
TYPICAL WINDROW DETAIL (EDGE VIEW)
GRANULAR SOIL FLOODED TO FILL VOIDS
HORIZONTALLY PLACED COMPACTION FILL
PROFILE VIEW
ROCK DISPOSAL DETAIL

GENERAL GRADING RECOMMENDATIONS

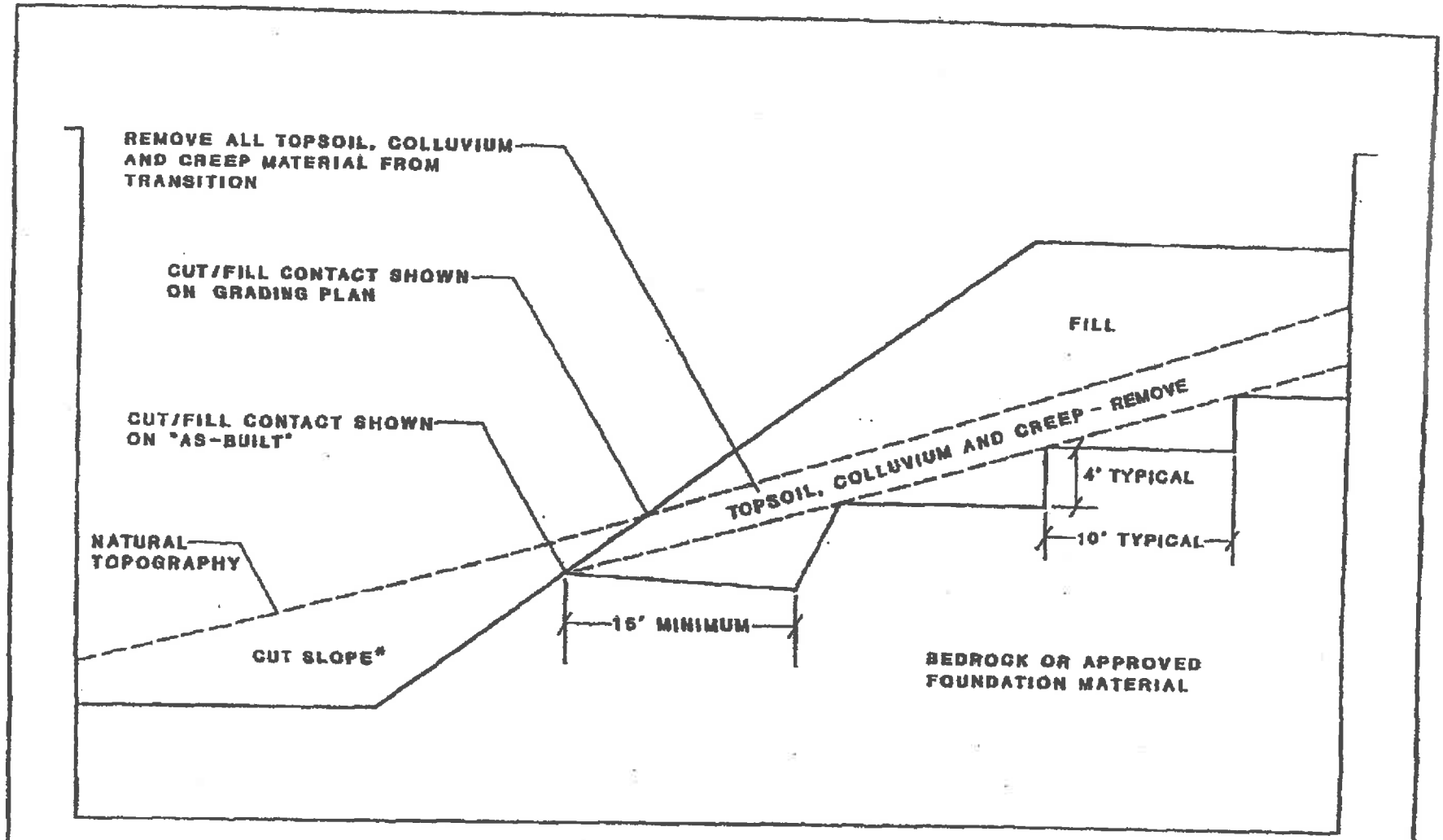
CUT LOT



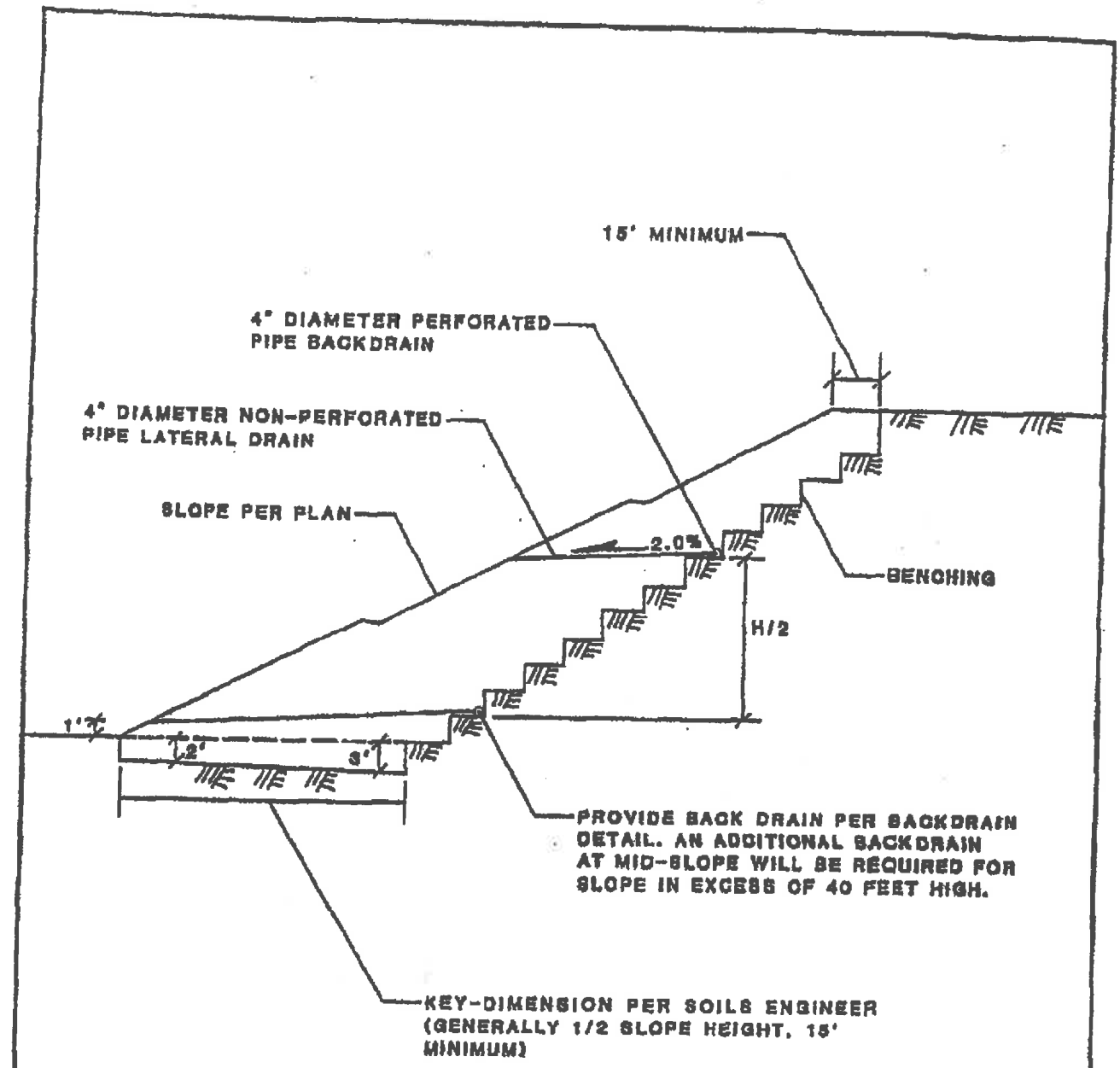
CUT/FILL LOT (TRANSITION)



TRANSITION LOT DETAIL



FILL SLOPE ABOVE CUT SLOPE DETAIL



TYPICAL STABILIZATION FILL DETAIL

APPENDIX E

PACIFIC SOILS ENGINEERING, INC. REPORT 2003

PACIFIC SOILS ENGINEERING, INC.
7715 CONVOY COURT, SAN DIEGO, CALIFORNIA 92111
TELEPHONE: (858) 560-1713, FAX: (858) 560-0380

DAVE GATZKE
1530 - 29TH Street
San Diego, CA 92102

October 13, 2003
Work Order 400956

Attention: Mr. Dave Gatzke

Subject: Geotechnical Feasibility Summary Report,
32nd and Broadway Project,
San Diego, California

Gentlemen:

Presented herein is Pacific Soils Engineering, Inc.'s (PSE) feasibility summary report for the 32nd Street and Broadway project, San Diego, California. The purpose of this study is to provide geotechnical information that can be utilized as part of the due diligence process toward acquisition of this site. It is PSE's understanding that the site is being considered to support multi-family residential structures and associated improvements. In preparing this study, PSE has: 1) reviewed the GIS topographic plot dated September 25, 2003; 2) excavated one (1) large diameter bucket auger boring; 3) performed laboratory testing; 4) reviewed air photos from 1928, 1945, 1949 and 1966; 5) reviewed pertinent geologic literature and maps; and 6) performed reconnaissance geologic mapping. This information forms the basis for our analyses and conclusions. Site geologic conditions are depicted on enclosed Plate 1 and cross sectional relationships are depicted on enclosed Plate 2.

SITE DESCRIPTION

The site consists of: 1) a rectangular-shaped, approximately 450 x 280 foot parcel located north of a proposed alignment of Broadway and east of 32nd Street; and 2) an irregular-shaped parcel located south of Broadway through the "closed" portion of 32nd Street. For the purposes of discussion the two parcels are herein termed "northern" and "southern". Adjacent, associated portions of 32nd Street and Broadway are assumed to be part of the project.

discussion the two parcels are herein termed "northern" and "southern". Adjacent, associated portions of 32nd Street and Broadway are assumed to be part of the project.

The site is underlain by the San Diego Formation, which is a moderately hard, silty sandstone bedrock unit. Thin, one- (1) to two- (2) foot thick topsoils blanket the bedrock unit.

A minor, south-flowing, natural drainage passes through the northern parcel. Based on site mapping and aerial photographic analyses, the drainage passes beneath Broadway where it broadens as it passes beneath the southern parcel. Alluvial soils partially infill the minor drainage and likely consist of moderately dense, silty to clayey sands estimated to range in thickness from three (3) to at least ten (10) feet.

Artificial fills underlie 32nd Street, the eastern portion of the northern parcel, the southern portion of Broadway and the entire southern parcel. The fills likely consist of locally derived silty sands that are slightly moist and moderately dense. The fills associated with 32nd Street and the northern parcel are relatively shallow and were probably placed over sixty years ago when unpaved 32nd Street continued south through the alignment of SR 94. The fills beneath Broadway and the southern parcel are estimated to range in depths of one (1) to at least twenty (20) feet and it appears, based upon the 1966 aerial photographs, to be placed in association with the construction of SR 94. Engineered, as-graded reports for these fills are not available or do not exist. Undisturbed alluvium probably exists below this fill. Outside of the filled areas, the site is largely in a natural state although mostly denuded.

Onsite, no landslides have been mapped or reported. Faulting or other seismic hazards such as liquefaction are not considered significant hazards at this site.

Water and sewer lines occur in center portion of 32nd Street and the southern half of Broadway as shown on Plate 1. The depths depicted in the cross sections on Plate 2 are not known to be accurate.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, it is PSE's opinion that development of the northern parcel for support of the proposed multi-family development is feasible from a geotechnical perspective. However, development of the southern parcel, for the same purposes, would likely be very costly due to the presence of the utilities and undocumented fill. There are no known geologic hazards, which would significantly impact of the project. The northern and the southern parcels are discussed separately below.

Northern Parcel

The northern parcel is typified by soils with generally favorable engineering characteristics, confirmed by the laboratory testing results attached herein (Table I, Plates B-1 and B-2). Relatively thin sections of compressible soils occur onsite and within a 1:1 structural projection outward from the parcel boundaries. As such, removals by conventional grading techniques can likely be accomplished without conflicting with existing utilities in Broadway and 32nd Street. Cut and fill slopes inclined at 2:1 are expected to be stable without significant remedial grading. This conclusion is based upon observation of the flat-lying, sandstone exposed in the excavation of boring B-1 (Plate A-1). Cut slopes may be fairly erodible and require attention shortly after grading.

Outside of the perimeter of the northern parcel the presence of existing underground utilities may be an issue for the construction of improved, full-width or half-width access on 32nd Street and/or Broadway. Significant grade changes above or perhaps even adjacent to the underground utilities may conceivably conflict with and/or adversely deflect the pipelines, especially in Broadway where the pipelines are supported by the undocumented fill. As such PSE recommends that: 1) pipeline depths and locations be well-understood; and 2) grading concepts be developed and evaluated geotechnically with respect to the pipelines, prior to the final acquisition of this property.

Southern Parcel

Southern Parcel

From a preliminary standpoint, it is unlikely that the existing fill and underlying alluvium on this parcel is suitable for support of the proposed structures. This is based upon the typical non-subdivision grading standards practiced by California highway constructors, especially in 1966, and the apparent lack of any documentation for this work. Required removal depths are anticipated to be at least thirty (30) feet. Attempts with conventional grading operations to accomplish adequate structural cleanouts would be hindered by the position of existing pipelines in Broadway and by the position of the SR 94 right-of-way.

Consideration could be given to specialized removal techniques, such as segmented, excavator trenching adjacent to the utilities, combined with deepened footings on the northern and southern portions of the buildings. Alternatively, deep foundations such as driven piles or cast-in-drilled-hole (CIDH) piers (anticipated length is approximately fifteen to forty feet) around the building perimeter with grade–beam connections across the buildings may be feasible and would minimize necessary removals. A third alternative could be to relocate the pipelines in a way that optimizes remedial grading and land usage. All of these alternatives would add considerable cost to a conventional grading operation. Accordingly, PSE recommends that these alternative foundation systems and removal techniques be carefully evaluated with respect to concept grading plans, building locations and accurately known pipeline elevations and locations.

Additionally, improvement of full- or half-width access on 32nd Street and especially Broadway may be an issue due to the presence the underground utilities. Significant grade changes above or perhaps even adjacent to the existing underground utilities may conceivably conflict with and/or adversely deflect the pipelines. As such PSE recommends that: 1) pipeline depths and locations be well-understood; and 2) grading concepts be developed and evaluated geotechnically with respect to the pipelines prior to the final acquisition of this property.

Seismic foundation design parameters should utilize code consistent values.

If you have any questions regarding this letter, please contact the undersigned.

Respectfully submitted,
PACIFIC SOILS ENGINEERING, INC.

By: _____
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STATE OF CALIFORNIA

Reviewed by:

_____
JOHN A. HANSON,
Vice President

Dist: (4) Addressee

DAM/JAC/JAH:bm:400956, October 13, 2003

GEOTECHNICAL BORING LOG

PROJECT NO.	400956	PROJECT NAME	32th & Broadway		
DATE STARTED	9/23/03	GROUND ELEV.	162.0	BORING DESIG.	BA-1
DATE FINISHED	9/23/03	GW DEPTH (FT)	N/A	LOGGED BY	PDT
DRILLER	Larive Drilling	DROP		NOTES	
TYPE OF DRILL RIG	30" Bucket Auger	DRIVE WT.			

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOW COUNT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					SM	SOIL: SILTY SAND, fine- to medium-grained, light orange brown, dry, dense; rooted.				
						SAN DIEGO FORMATION (Tsd): SILTY SANDSTONE, fine- to medium-grained, light orange brown, dry to slightly moist, hard; difficult digging; well cemented; abundant well rounded cobbles up to 8".				
	160	B	Bulk @ 3'							
						@ 4.0 ft. yellow brown, slightly moist to moist; well cemented; little to no cobble.				
5										
		B	Bulk @ 6'							
	155					@ 7.0 ft. orange brown, moist.				
10		D	3				6.8	112	36	HYDRO
						@ 11.0 ft. CLAYEY SANDSTONE, fine- to medium-grained, gray brown, moist, moderately hard; some coarse-grained sand.				
	150					@ 12.5 ft. SANDSTONE, coarse-grained, mottled white/orange/brown, moist, soft; trace rounded gravel; some fine- to medium-grained sand; trace mica; hole belled out; cohesionless; boring belled out.				
						@ 14.0 ft. SILTY SANDSTONE, fine- to medium-grained, yellow brown, moist, soft.				
15		D	2				3.6	105	16	U-SHEAR HYDRO
						@ 16.0 ft. one-foot thick coarse-grained sand lense: mottled brown/white/ orange, moist, soft; horizontal.				
	145									
						@ 18.0 ft. SILTY SANDSTONE, fine- to medium-grained, yellow brown, moist, soft; MINOR CAVING due to cohesionless sandstone.				
20		D	3				7.5	98	28	U-SHEAR HYDRO
						@ 20.0 ft. 1' layer of silty fine-grained sand: laminated/horizontal.				
						@ 21.0 ft. greenish gray.				
	140									
						@ 24.0 ft. rare cobble (8"); cohesionless.				

SAMPLE TYPES:
D DRIVE (RING) SAMPLE
S SPT (SPLIT SPOON) SAMPLE

▼ GROUNDWATER

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7715 Convoy Court, San Diego, CA 92111
(858) 560-1713

PLATE A-1

GEOTECHNICAL BORING LOG

PROJECT NO. 400956
DATE STARTED 9/23/03
DATE FINISHED 9/23/03
DRILLER Larive Drilling
TYPE OF DRILL RIG 30" Bucket Auger

PROJECT NAME 32th & Broadway
GROUND ELEV. 162.0
GW DEPTH (FT) N/A
DROP
DRIVE WT.

BORING DESIG. BA-1
LOGGED BY PDT
NOTES

DEPTH (Feet)	ELEV	SAMPLE TYPE	BLOW COUNT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
						SAN DIEGO FORMATION (Tsd): SILTY SANDSTONE continued.				
	135									
						@ 28.0 ft. orange brown; some coarse-grained sand; some rounded gravel and cobble.				
30		D	6				6.4	100	25	HYDRO
						TOTAL DEPTH 31.0 FT. NO WATER CAVING AS NOTED				
						Backfilled according to County of San Diego Department of Environmental Health, Land and Water Quality Division, permit waiver dated September 17, 2003				

SAMPLE TYPES:
D DRIVE (RING) SAMPLE
S SPT (SPLIT SPOON) SAMPLE

▼ GROUNDWATER

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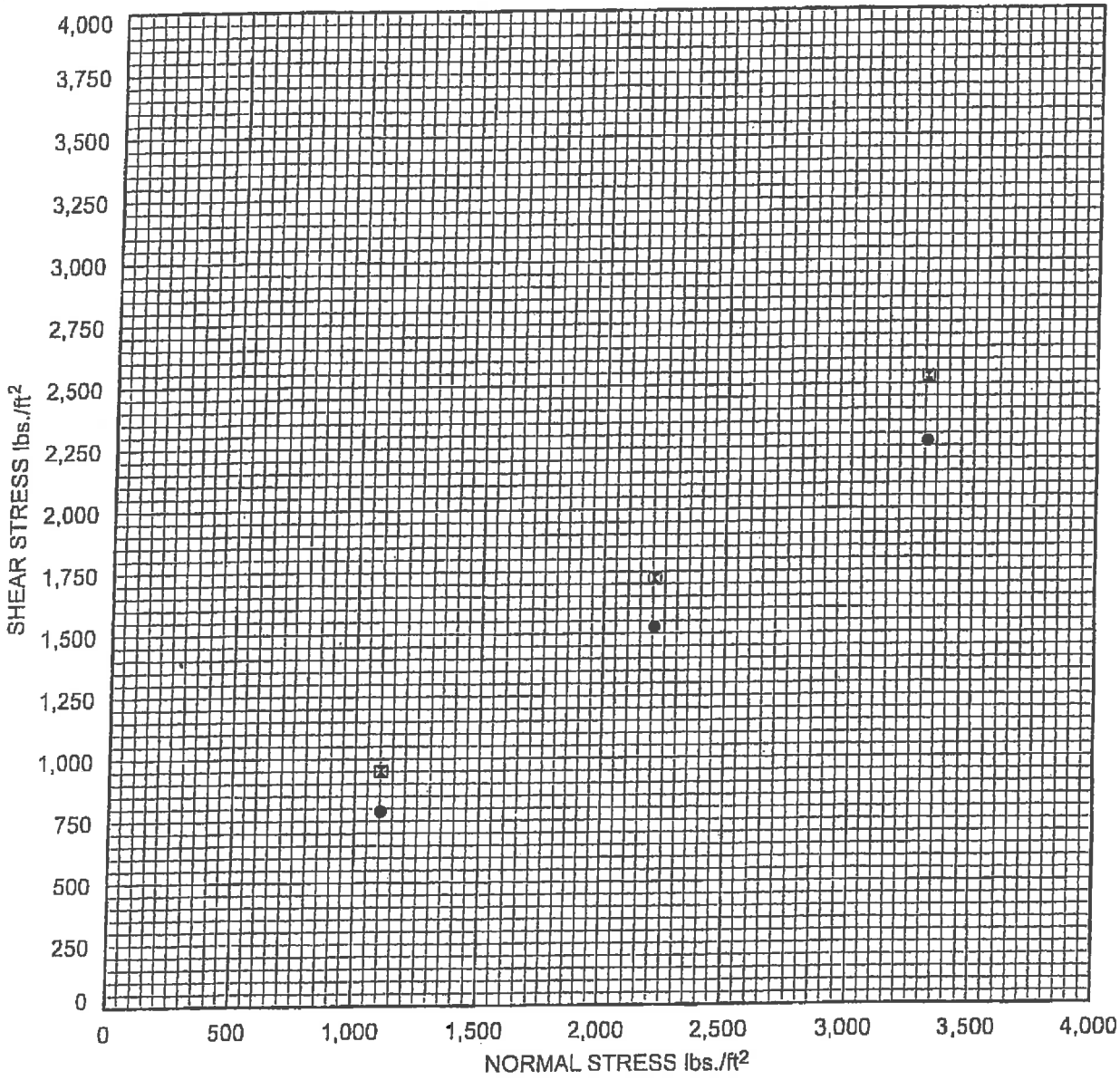
PLATE A-1

TABLE I
SUMMARY OF LABORATORY TEST DATA
W.O. 400956

BORING	DEPTH (FEET)	SOIL DESCRIPTION	GROUP SYMBOL	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)	IN-SITU DRY DENSITY (PCF)	IN-SITU MOISTURE CONTENT (%)	DEGREE OF SATURATION (%)	PLUS NO.4 SIEVE (%)	COARSE SAND (%)	MEDIUM TO FINE SAND (%)	SILT (0.075mm - 0.005mm) (%)	CLAY (minus 0.005mm) (%)	EXPANSION INDEX UBC 18-2	COHESION (PSF)	FRICTION ANGLE (DEGREES)	OTHER TESTS REMARKS
BA-1	10	CLAYEY SANDSTONE (Tsd)				112.0	6.8	36	0	3	67	12	18				
BA-1	15	SANDSTONE (Tsd)				104.7	3.6	16	3	19	67	3	8		50	34	Undisturbed Shear
BA-1	20	SILTY SANDSTONE (Tsd)				98.1	7.5	28	0	0	55	32	13		25	33	Undisturbed Shear
BA-1	30	SANDSTONE (Tsd)				99.6	5.4	25	0	0	83	5	12				

DIRECT SHEAR TEST
UNDISTURBED



SANDSTONE (Tsd)	COHESION	50 psf.
note: cohesion and friction angle derived from residual values	FRICTION ANGLE	34 degrees

symbol	shear value	boring / soil type	depth (ft.)
●	residual	BA-1	15.0
⊠	peak	BA-1	15.0

DIRECT SHEAR TEST

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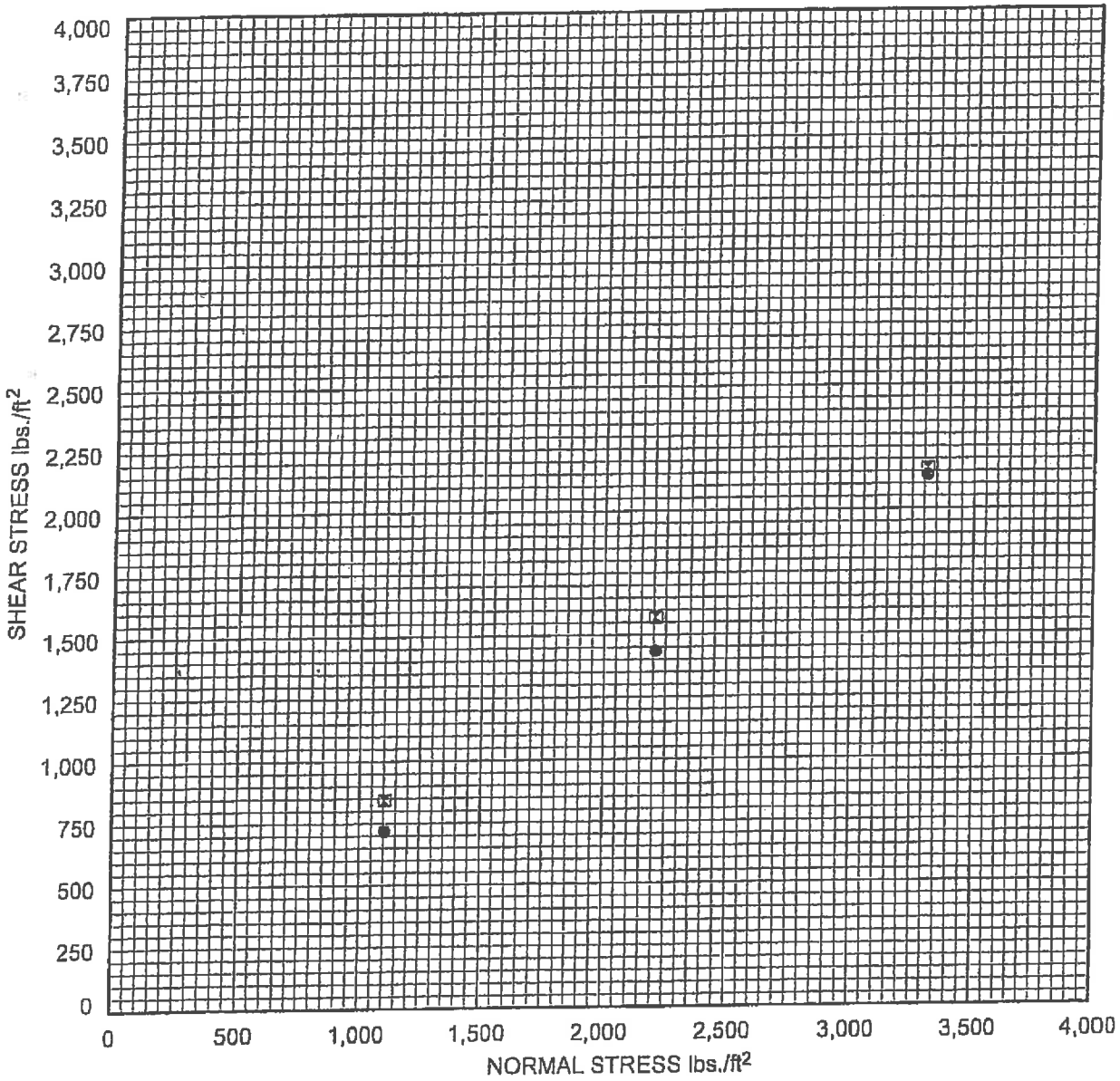
W.O.400956 PLATE B-1

DIRECT SHEAR TEST
UNDISTURBED



SILTY SANDSTONE (Tsd)	COHESION	25 psf.
note: cohesion and friction angle derived from residual values	FRICTION ANGLE	33 degrees

symbol	shear value	boring / soil type	depth (ft.)
●	residual	BA-1	20.0
⊠	peak	BA-1	20.0

DIRECT SHEAR TEST

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W.O.400956 PLATE B-2

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